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WANDOO FACILITY ENVIRONMENT PLAN

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Revision	Date	Originator	Checker	Checker	Approver
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Distribution List

No.	Position	Hard Copy	Electronic Copy
1	VOGA Perth Office Document Control		X
2	Wandoo B Platform		X
3	VOGA Intranet		X
4	Mobile Offshore Drilling Unit	X	X
5	VOGA Managing Director		X
6	VOGA Well Construction Manager		X
7	VOGA HSE Manager		X
8	VOGA Engineering Manager		X
9	Manager Assessment and Compliance NOPSEMA – Perth		X
10	Wandoo Control Room	X	X

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Appendix A VOGA Health, Safety and Environment (HSE) Policy

Appendix B Oil Spil Modelling

Appendix C PFW Dispersion

Appendix D Protected Matters Search Reports

Appendix E Aboriginal Cultural Heritage Inquiry System (ACHIS)

Appendix F Consultation Summary and Report

Appendix G GHG Assessment Technical Note

Abbreviations and Definitions

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
AC	Alternating Current
ACFM	Alternating Current Field Measurement
ACHIS	Aboriginal Cultural Heritage Inquiry System
ACN	Australian Company Number
AEP	The Australian Energy Producers
AFC	Anti-fouling coatings
AFFF	Aqueous film forming foam
AFMA	Australian Fisheries Management Authority
AFZ	Australian Fishing Zone
AHO	Australian Hydrographic office
AHTS	Anchor Handling Transport Supply
AIATSIS	Australian Institute of Aboriginal and Torres Strait Islander Studies
AIIMS	Australasian Inter-Service Incident Management System
AIMS	Australian Institute of Marine Science
AIS	Automatic Identification System
ALARP	As Low As Reasonably Practicable
AMOS	Australian Marine Oil Spill Plan
AMOSC	Australian Marine Oil Spill Centre
AMP	Australian Marine Park
AMS	Australian Marine Services
AMSA	Australian Maritime Safety Authority
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian and New Zealand Guidelines
API	American Petroleum Institute
APPEA	Australian Energy Producers
ARC	AMSA's Response Centre
AS	Australian Standards
ASTM	American Society for Testing and Materials
AUD	Australian Dollar
AUV	Autonomous Underwater Vehicle
bbl	Barrel
BC Act	*Biodiversity Conservation Act 2016* (Western Australia)
BHA	Bottom Hole Assembly

BIA	Biologically Important Area
BKO	Breeding Known to Occur
BLO	Breeding Likely to Occur
BOM	Bureau of Meteorology
BOP	Blow-Out Preventer
BP	British Petroleum
BRS	Bureau of Rural Sciences
BRUVS	Baited Remote Underwater Video Systems
BTAC	Burrup Traditional Aboriginal Corporation
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
BWM	Ballast Water Management
BWMS	Ballast Water Management System
CAES	Compressed-Air Energy System
CALM	*Conservation and Land Management Act 1984* (WA)
CASA	Australian Civil Aviation Safety Authority
CBA	Cost Benefit Analysis
CCR	Central Control Room
CCT	Corporate Command Team
CD	Conservation Dependent
CE	Critically Endangered
CEE	Catastrophic Environmental Event
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CER	Clean Energy Regulator
CFT	Critical Function Test
CGS	Concrete Gravity Structure
CHARM	Chemical Hazard Assessment and Risk Management
CIA	Cumulative Impact Assessment
CKO	Congregation or aggregation known to occur within area
CMS	Competency Management System
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CoP	Cessation of Production
cP	centiPoise
CPF	Central Production Facility
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CT	Coiled tubing
Cth	Commonwealth
DAFF	Department of Agriculture, Fisheries and Forestry
DAWE	Department of Agriculture, Water and the Environment

DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy and the Environment and Water
DEE	Department of the Environment and Energy
DEWHA	Department of Environment, Water, Heritage and the Arts
DGV	Default Guideline Value
DIIS	Department or Industry Innovation and Science now Department of Industry, Science, Energy and Resources (DISER)
DMIRS	The Department of Mines, Industry Regulation and Safety
DMPE	Department of Mines, Petroleum and Exploration
DNA	Deoxyribonucleic Acid
DNP	Director of National Parks
DOT	Department of Transport
DP	Dynamic Positioning
DPAW	Department of Parks and Wildlife
DPIE	Department of Planning and Environment (NSW)
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DRA	Deviation Risk Assessment
DTA	Direct Toxicity Assessment
DTMI	The Department of Transport, Mining and Infrastructure
DWER	Department of Water and Environmental Regulation
DWH	Deepwater Horizon
EAM	Enterprise Asset Management
ECI	Eddy Current Inspection
EEZ	Exclusive Economic Zone
EIA	Environmental Impact assessment
EL	Electric (wire) line
EM Regulations	Emergency Management Regulations 2006
EMBA	Environment that May be Affected
ENVID	Environmental Identification
EP	Environment Plan
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Convention Act 1999*
EPIP Act	*Environment Protection Impact of Proposals Act 1974*
EPO	Environmental Performance Outcomes
EPS	Environmental Performance Standards
ERP	Emergency Response Plan
ESC	Environmental Scientific Coordinator
ESD	Ecologically Sustainable Development

ESP	Electric Submersible Pump
ETL	Export Trunkline
F&G	Fire & Gas
FBL	Fisheries Buffer Line
FEA	Finite Element Analysis
FHA	Floating Hose Assembly
FITs	Formation Integrity Tests
FKO	Foraging Known to Occur
FLIR	Forward looking infra-red
FLO	Foraging Likely to Occur
FMO	Foraging May to Occur
FPSO	Floating Production, Storage and offloading
FPU	Floating Production Unit
FWADC	Fixed-Wing Aerial Dispersant Capability.
FWRAM	Full Waveform Range-dependent Acoustic Model
GDEM	Generalized Digital Environmental Model
GHG	Greenhouse Gases
GLC	Gas Lift Compressor
GLV	Gas lift valve
GOR	Gas Oil Ratio
H2O	Dihydrogen Monoxide
H2S	Hydrogen Sulphide
HAFS	Harmful Anti-fouling Systems
HAZID	Hazard Identification
HF	High Frequency
HFO	Heavy Fuel Oil
HMA	Hazard Management System
HMCS	OSPAR Harmonised Mandatory Control Scheme
HMS	His / Her Majesty's Ship
HQ	Hazard Quotient
HR	Human Resources
HSE	Health, Safety and Environment
HSE MS	Health, Safety and Environment Management System
HSES	Health, Safety, Environment and Security
HTB	High-temperature Blend
HV	High Voltage
HVAC	Heating, Ventilation and Air Conditioning
HWI	Heavy Well Interventions
HWO	Hydraulic workover

IAP	Incident Accident Plan
IAPP	International Air Pollution Prevention
IBC	Intermediate bulk container
IC	Incident Commander
ICC	Incident Control Centre
ICEMR	Industrial Chemicals Environmental Management (Register) Act
ICS	Incident Command System
ICT	Incident Command Team
ID	Inner diameter
IFC	International Finance Corporation
IMCRA	Integrated Marine and Coastal Regionalisation of Australia
IMMR	Inspection, Monitoring, Maintenance and Repair
IMO	International Maritime Organisation
IMR	Inspection maintenance repair
IMS	Invasive Marine Species
IMT	Incident Management Team
IOGP	International Association of Oil and Gas Producers
IPCC	Intergovernmental Panel on Climate Change
IPIECA	International Petroleum Industry Environmental Conservation Association
ISFU	Induced Static Flotation Unit
ISO	International Organisation for Standardisation
ITOPF	International Tanker Owners Pollution Federation
IUCN	International Union Conservation
IWC	International Whaling Commission
JRCC	Joint Rescue Coordination Centre
JSCC	Joint Strategic Coordination Committee
KEF	Key Ecological Feature
KLC	Kimberly Land Council
KO	Species Or Species Habitat Known to Occur Within Area
KPI	Key Performance Indicator
KSAT	Kongsberg Satellite Services
LAT	Lowest Astronomical Tide
LCM	Lost Circulation Materials
LE	Equivalent Sound Level
LF	Low Frequency
LNG	Liquefied Natural Gas
LO	Species Or Species Habitat Likely to Occur Within Area
LOC	Loss of Containment
LOR	Lowest Observable Reading

LOTs	Leak Off Tests
LOWC	Loss of Well Control
LP	Low pressure
LV	Low voltage
LWD	Logging While Drilling
LWI	Light Well Interventions
MAA	Mutual Assistance Agreement
MAC	Murujuga Aboriginal Corporation
MARPOL	International Convention for the Prevention of Pollution from Ships
MARS	Maritime and Aircraft Reporting System
MBES	Multibeam echo sounder
MCS	Master Control Station
MDO	Marine Diesel Oil
MDRT	Measured depth rotary table
MEE	Maritime Environmental Emergencies
MEER	Maritime Environmental Emergency Response
MEPC	Marine Environment Protection Committee
MES	Monitor, evaluation and surveillance
MGO	Marine Gas Oil
MGPS	Marine Growth Prevention Systems
MIC	Microbiologically Influenced Corrosion
MIR	Maintenance, Inspection and Repair
MMA	Marine Management Area
MMO	Marine Management Organisation
MNES	Matters of National Environmental Significance
MO	Marine Order
MoC	Management of Change
MODU	Mobile Offshore Drilling Unit
MOP	Marine Oil Pollution
MOU	Mobile Offshore Unit
MP	Marine Park
MPA	Marine Protected Area
MPI	Magnetic Particle Inspection
MS	Management System
MWD	Measurement While Drilling
N_2	Nitrogen
N_2O	Nitrous Oxide
NATA	National Association of Testing Authorities
NDC	Nationally Determined Contributions

NDRI	National Decommissioning Research Initiative
NE	Northeast
NEBA	Net Environmental Benefit Analysis
NEPA Act	*National Environmental Protection Agency Act 2025*
NEPM	National Environment Protection Measure
NGER Act	*National Greenhouse and Energy Reporting Act 2007*
NGERS	National Greenhouse and Energy Reporting Scheme
NICNAS	National Industrial Chemicals Notification and Assessment Scheme
NMFS	National Marine Fisheries Service
NNTT	National Native Title Tribunal
NO_2	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOPTA	National offshore Petroleum Titles Administrator
NORMS	Naturally Occurring Radioactive Material
NPI	National Pollution Inventory
NSW	New South Wales
NT	Northern Territory
NTRB	Native Title Representative Bodies
NW	North-West
NWMR	North-west Marine Region
NWS	North-west Shelf
NWXA	North West Exercise Area
O&G	Oil and Gas
O^3	Ozone
OCNS	Offshore Chemical Notification Scheme
OCT	On-site Command Team
OD	Outer diameter
ODS	Ozone Depleting Substance
OGP	International Association of Oil and Gas Producers
OHSAS	Occupational Health & Safety Management Systems
OIW	Oil in water
OPEP	Oil Pollution Emergency Plan
OPGGS(E)R	*Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2006*
OPGGSA	*Offshore Petroleum and Greenhouse Gas Storage Act 2006*
OPP	Offshore Project Proposal
OPRC	Oil Pollution Preparedness, Response and Cooperation
OSAT	Oil Science Advisory Team
OSCA	Oil Spill Control Register

OSCP	Oil Spill Contingency Plan
OSM	Operational and Scientific Monitoring
OSMP	Operation and Scientific Monitoring Program
OSPAR Convention	Oslo-Paris Convention 1992
OSR	Oil Spill Response
OSRA	Oil Spill Risk Analysis
OSRL	Oil Spill Response Limited
OSRO	Oil Spill Response Organisation
OSTM	Oil Spill Trajectory Modelling
OSV	Offshore Support Vessel
OWR	Oiled Wildlife Response
P&A	Plug and Abandon
PA	Public Address
PAH	Polycyclic Aromatic Hydrocarbons
PBC	Wandoo B
PBW	Pygmy Blue Whale
PDU	Product Distribution Unit
PEC	Predicted Effect Concentration
PFOA	Perfluoro Octanoic Acid
PFOS	Perfluorooctane Sulfonic Acid
PFW	Produced Formation Water
PHG	Pre-hydrated Gel
PIC	Person in Charge
PLEM	Pipeline end manifold
PLONOR	Pose Little or No Risk to the Environment
PM	Particulate Matter
PMS	Planned Maintenance System
PMST	EPBC Act Protected Matters Search Tool
PNEC	Predicted No Effect Concentration
POB	Persons on Board
POLREP	Marine Pollution Report
POM	Procedures and Operations Manual
POTS Act	*The Protection of the Sea (Prevention of Pollution from Ships) Act 1983*
PPA	Pearl Producers Australia
PSD	Process Shutdown
PSZ	Petroleum Safety Zone
PTS	Permanent Threshold Shift
PW	Produced water
PWTP	Produced Water Treatment Plant

PWTS	Produced Water Treatment System
QHSE	Quality, Health, Safety, Environment and Security
QLD	Queensland
QRA	Quantitative Risk Assessment
RATSIB	Representative Aboriginal/Torres Strait Islander Bodies
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
RKO	Roosting Known to Occur within Area
RLO	Roosting Likely to Occur within Area
RNTBC	Registered Native Title Body Corporate
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
ROV	Remote Observation Vehicle
RR	Residual Risk
RSDV	Riser Shutdown Valves
RWP	Relief Well Plan
SAR	Search and Rescue
SBES	Single beam echo sounders
SBT	Southern Bluefin Tuna
SCERP	Source Control Emergency Response Plan
scf	Stress Concentration Factor
SCRI	Source Control Response Industry
SDS	Safety Data Sheet
SE	South-East
SEEMP	Ship Energy Efficiency Management Plan
SEL	Sound Exposure Levels
SHA	Submarine Hose Assembly
SIMA	Spill Impact and Mitigation Assessment
SIMAP	Spill Impact Mapping Analysis Program
SIMOPS	Simultaneous Operations
SL	Slick line
SLA	Service Level Agreement
SLAR	Side looking airborne radar
SMPEP	Shipboard Marine Pollution Emergency Plan
SO^2	Sulphur Dioxide
SOLAS	International Convention for the Safety of Life at Sea
SOPEP	Shipboard Oil Pollution Emergency Plan
SPE	Society of Petroleum Engineers
SPL	Sound Pressure Level
SPM	Single point mooring
SSSV	Subsurface Safety Valve

SW	Southwest
SWMR	South-West Marine Region
TA	Tuna AustraliA
TD	Total Depth
THC	Total Hydrocarbons
THPO	Tris (Hydroxymethyl) Phosphine Oxide
TIE	Toxicity Identification Evaluation
TMS	Tether Management System
TOC	Total organic concentration
ToFD	Time of Flight Defraction
TPH	Total Petroleum Hydrocarbons
TRFC	Tubing retrievable flow control
TRH	Total recoverable hydrocarbons
TTS	Temporary Threshold Shift
TVD	True vertical depth
TVDRT	True Vertical Depth referenced to Rotary Table
UCH	Underwater Cultural Heritage
UHF	Ultra-High Frequency
UK	United Kingdom
UKOOA	The United Kingdom Offshore Operators Association
UN	United Nations
UNCLOS	United National Convention on the Law of the Sea 1982
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America
USEPA	United States Environmental Protection Agency
UXO	Unexploded Ordnance
VDU	Visual Display Unit
VHF	Very high frequency
VOGA	Vermilion Oil & Gas Australia Pty Ltd
VSP	Vertical Seismic Profiling
WA	Western Australia
WAFIC	Western Australian fishing industry council
WBM	Water Based Mud
WCD	Worst Case Discharge
WCSM	Well Construction Standards Manual
WGS	World Geodetic System
WHP	Wellhead Platform
WNA	Wandoo A

WNB	Wandoo B
WOMP	Well Operations Management Plan
WWII	World War Two
XLQ	PLQ Extension
YMAC	Yamatji Marlpa Aboriginal Corporation

Section 1 Introduction

1.1 Background

Vermilion Oil & Gas Australia Pty Ltd (VOGA) is the licensed permit holder of production licence area WA-14-L, which contains the Wandoo Production Facility (Wandoo Facility). The Permit Area is located within Commonwealth waters in the Carnarvon Basin off the northwest coast of Western Australia (WA), approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island (Figure 1-1).

VOGA has been operating in the Permit Area since 2005. This Environment Plan (EP) applies to production operations and associated support activities conducted at the Wandoo Facility.

The Wandoo facility consists of:

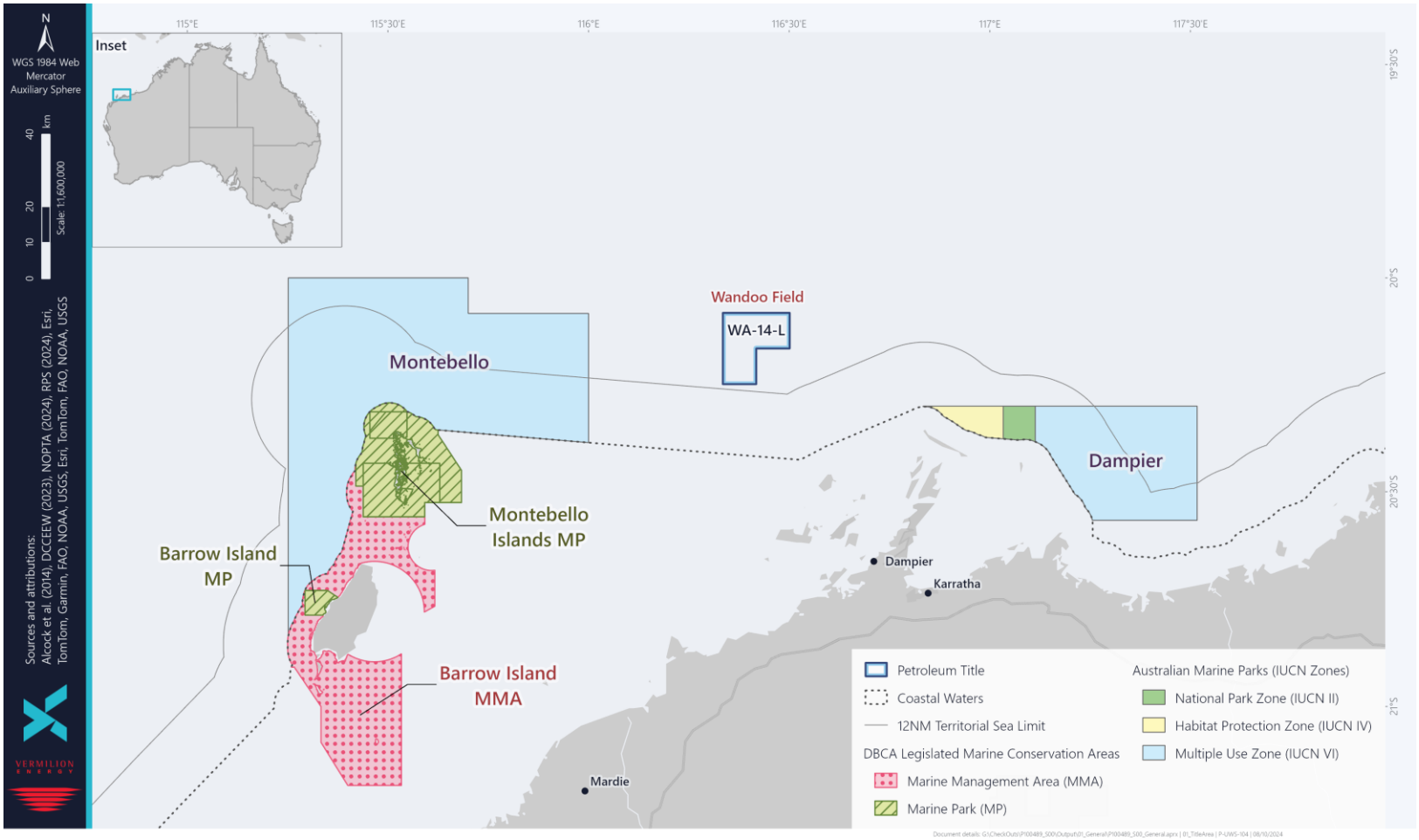
- Wandoo A (WNA), a not normally staffed monopod platform supported by a single column, which has the capacity of a total of five production wells (which have dry trees). The platform has a helicopter landing facility.
- Wandoo B (WNB), the central oil production process and storage platform, is supported on a Concrete Gravity Substructure (CGS). This currently supports 17 production wells with one remaining spare conductor slot and one gas reinjection well, all with dry trees. The Wandoo B topside facilities include processing facilities, oil storage within the CGS, utilities, accommodation and a helipad. The configuration of the CGS provides storage for 66,350 m^3 of processed oil.
- Three infield flow lines including: a production line, a gas lift line, and a test line connecting WNA to WNB.
- The export pipeline system consists of two parallel flexible lines running between WNB and the pipeline-end manifold and the Catenary Anchor Leg Mooring (CALM) Buoy system. A floating hose transfers the oil from the CALM Buoy to export tankers moored to the CALM Buoy.

Support functions include:

- Supply vessel, work vessel and helicopter operations
- Facility logistics
- Maintenance and provisioning within the field.

The activities undertaken at the Wandoo Facility are further discussed in Section 2.

Figure 1-1: WA-14-L location



1.2 Environment Plan Summary

This Wandoo Facility EP summary has been prepared from material provided in this EP. The summary consists of Table 1-1, as required by Regulation 35(7) of the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (OPGGS(E)R).

Table 1-1: Summary of material required for an EP

Material Requirement	Section of EP containing material requirement
The location of the activity	Section 2.2
A description of the receiving environment	Section 3
A description of the activity	Section 2
Details of the environmental impacts and risks	Section 5
The control measures for the activity	Section 7
The arrangements for ongoing monitoring of the titleholder's environmental performance	Section 8.14
Response arrangements in the oil pollution emergency plan	Section 8.10
Consultation already undertaken and plans for ongoing consultation	Section 10
Details of the titleholders nominated liaison person for the activity	Section 1.3

1.3 The Proponent

VOGA is the titleholder of production licence WA-14-L, which contains the Wandoo Production Facilities. VOGA is a wholly owned subsidiary of Vermilion Energy Inc., a Canadian-based oil and gas exploration and production company. VOGA acquired operatorship of the permit at the beginning of 2005 after purchasing the share of the permit from the previous operator, ExxonMobil.

VOGA titleholder details are:

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Managing Director
Vermilion Oil & Gas Australia Pty Ltd
Australian Company Number (ACN): 113 023 591
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Phone: +61 (08) 9215 0300
Fax: +61 (08) 9215 0333
Email: info.australia@vermilionenergy.com

VOGA's nominated liaison person details are:

Namek Jivan
HSE Manager
Vermilion Oil & Gas Australia Pty Ltd
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Perth, Western Australia 6000

Phone: +61 (08) 9215 0300
Fax: +61 (08) 9215 0333
Email: voga.environment@vermilionenergy.com

1.4 Scope and Purpose of the Environment Plan

The purpose of this EP is to document the potential environmental impacts and risks and planned mitigation measures associated with production operations in the Wandoo Field. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Permit Area (WA-14-L).

Activities covered within the scope of this EP include platform-based well activities not utilising a drilling rig (well intervention, de-completion, side-tracking and recompletion).

The Operational Area (also termed the Wandoo Field) for the activities outlined in Section 2 of this EP is defined as the area within the existing Petroleum Safety Zone (PSZ) within the Permit Area of WA-14-L around the Wandoo Facility infrastructure.

Activities excluded from the scope of this EP are:

- Development or exploration drilling activities given they are managed within other EPs [Well Construction EP, Exploration Drilling EP (under assessment by NOPSEMA)]
- Vessel operations within Port Boundaries or State waters given they are managed under the *Shipping and Pilotage Act 1967* (WA) as administered by the relevant Port Authority under the *Port Authorities Act 1999* (WA)
- Vessel operations within Commonwealth waters outside of the Operational Area given they are managed under the *Navigation Act 2012* as administered by the Australian Maritime Safety Authority (AMSA)
- Aviation activities given they are managed under the *Civil Aviation Act 1988* and Civil Aviation Regulation 1998 as administered by the Australian Civil Aviation Safety Authority (CASA).
- Tanker operations when the tanker is not connected to Wandoo infrastructure.

The EP details the arrangements in place for ensuring that the potential environmental impacts and risks associated with relevant activities are reduced to As Low As Reasonably Practicable (ALARP) and are of an acceptable level.

This EP has been prepared in accordance with requirements of the Offshore Petroleum Greenhouse Gas Storage (Environment) Regulations 2023 (OPGGS[E]R).

The implementation strategy contained in this EP will ensure that operations comply with all statutory requirements and the requirements of the VOGA Health, Safety and Environment Management System (HSE MS). The EP has been prepared to address Wandoo operational activities for the next five years from acceptance of this EP by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

VOGA regularly maintain and update the EP as required based on operational needs and activities. All changes that impact the EP will trigger a review to determine if a formal revision is required (as per Section 8.8). Any significant departure from the activity, environment, risks, control measures etc. detailed in the EP, will be identified, and revision and resubmission of the EP will be carried out in accordance with section 38 or 39 of the OPGGS(E)R.

Table 1-1 illustrates how this EP addresses each of the key requirements for the content of an EP ensuring fulfilment of Part 4 of the OPGGS(E)R.

1.4.1 This Revision

This revision of the Wandoo Facility EP constitutes a five-yearly revision and resubmission under section 41 of the OPGGS(E) Regulations 2023.

1.5 Corporate Environmental Performance Philosophy

VOGA is committed to minimising the adverse environmental impacts of its operations and to meeting all regulatory requirements associated with those operations. As stated in the Company Health, Safety and Environment (HSE) Policy, VOGA will:

- Accept responsibility and accountability for providing leadership, visible commitment, direction and resources to meet HSE performance targets
- Maintain a strong HSE management system to identify and manage risks
- Integrate HSE into business objectives
- Make a positive contribution to the protection of the environment in which it operates
- Respond promptly and effectively to emergencies
- Focus on continual improvement in HSE performance
- Communicate openly and fairly on a timely basis with fellow employees and contractors, the public, governments, management and other relevant persons.

A copy of the VOGA HSE Policy is included in Appendix A.

1.6 Applicable Legislation and Codes

This section details the requirements that apply to the activity including relevant legislation, codes, other approvals and conditions. The Commonwealth *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGSA) controls petroleum activities. The OPGGS(E)R stipulates the requirements for EPs to ensure that petroleum activities are carried out in an acceptable manner. NOPSEMA are the designated assessor of petroleum activities under the OPGGSA. VOGA carries out a review of applicable legislation each year.

1.6.1 Commonwealth Requirements

The Operational Area lies within Commonwealth waters. Commonwealth legislation and other requirements relevant to the activity area are described in Table 1-2. Related international conventions are included. Table 1-3 summarises relevant species conservation advices and recovery plans issued by the Department of Climate Change, Energy and the Environment (DCCEEW).

This EP considers the impacts to matters of national environmental significance (MNES) protected under Part 3 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). NOPSEMA are the sole designated assessor of petroleum and greenhouse gas (GHG) activities in Commonwealth waters in accordance with the Minister for the Environment's endorsement of NOPSEMA's environmental authorisation process under Part 10, section 146 of the EPBC Act. The authorisation process includes ensuring activities undertaken in the offshore area are conducted in a manner consistent with the principles of ecologically sustainable development (Section 4.9) and will not result in unacceptable impacts to MNES.

Reforms to the EPBC Act were passed by the Australian Parliament on 28 November 2025. The EPBC Act reforms include 7 Acts:

- *Environment Protection Reform Act 2025* (Reform Act)
- *Environment Information Australia Act 2025* (EIA Act)
- *Environment Protection and Biodiversity Conservation (Restoration Charge Imposition) Act 2025* (Restoration Charge Act)
- *National Environmental Protection Agency Act 2025* (NEPA Act)
- Three separate Acts concerning the imposition of general, customs and excise charges under the EPBC Act.

The EIA Act and NEPA Act will commence on 1 July 2026, together with parts of the Reform Act that relate to the NEPA (DCCEEW, 2025f). The balance of the Reform Act's provisions will commence upon proclamation or within 12 months.

Table 1-2: Relevant Commonwealth legislation and other requirements

Legislation/ Requirement/ Guideline	Scope	Related International conventions	Administering authority
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	The Act enables the Australian Government to protect important Indigenous areas and objects under immediate threat. Areas and objects protected under this Act are included in the National Heritage List and Commonwealth Heritage List. **Application to activity:** Areas or objects protected under this Act may be present within the Project Areas.	-	DCCEEW
Air Navigation Act 1920	This Act is responsible for managing navigation within the avian environment. **Application to activity:** Helicopter and other aircraft activities associated with the facility are required to comply with the requirements of this Act.	-	Department of Infrastructure, Transport, Regional Development and Communications
Assessing and Managing Impacts to Underwater Cultural Heritage in Australian Waters – Guidelines on the application of the *Underwater Cultural Heritage Act 2018* (DCCEEW, 2024a)	Provides guidance on applying the Underwater *Cultural Heritage Act 2018* in relation to assessing impact and mitigation measures of offshore developments. **Application to activity:** The guidelines will inform impact assessment and mitigation strategies required in this EP.	-	DCCEEW

Legislation/ Requirement/ Guideline	Scope	Related International conventions	Administering authority
Australian Maritime Safety Authority Act 1990	This Act facilitates international cooperation and mutual assistance in preparing and responding to a major oil spill incident and encourages countries to develop and maintain an adequate capability to deal with oil pollution emergencies. Requirements are affected through AMSA who administers the National Plan for Maritime Environmental Emergencies (NatPlan). **Application to activity:** AMSA is the designated Control Agency for oil spills from vessels in Commonwealth waters.	International Convention on Oil Pollution Preparedness, Response and Cooperation 1990 Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances 2000 International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties 1969 Articles 198 and 221 of the United Nations Convention on the Law of the Sea 1982	Australian Maritime Safety Authority (AMSA)
Australian Ballast Water Management Requirements (DAWE, 2020)	The Australian Ballast Water Management Requirements set out the obligations on vessel operators with regards to the management of ballast water and ballast tank sediment when operating within Australian seas. **Application to activity:** Provides requirements on how vessel operators should manage ballast water when operating within Australian seas to comply with the *Biosecurity Act 2015.*	International Convention for the Control and Management of Ships' Ballast Water and Sediments (adopted in principle in 2004 and in force on 8 September 2017)	Department of Agriculture, Fisheries and Forestry (DAFF) (formerly DAWE)
Australian Biofouling Management Requirements (DAFF, 2023a)	The Australian biofouling management requirements set out vessel operator obligations for the management of biofouling when operating vessels under biosecurity control within Australian waters. **Application to activity:** Provides requirements on best practice for biofouling management and applies to all operators of vessels subject to biosecurity control.	-	DAFF

Legislation/ Requirement/ Guideline	Scope	Related International conventions	Administering authority
Australian Heritage Council Act 2003	This Act was formed to establish the Australian Heritage Council and associated functions. The act also classifies areas that have heritage value, including those identified on the Commonwealth Heritage List, World Heritage List and National Heritage List. **Application to activity:** The Act applies to any activities that may impact on the heritage values of National or Commonwealth listed properties.	-	DCCEEW
Biosecurity Act 2015 Biosecurity Regulations 2016	This Act is the primary legislation for the management of the risk of diseases and pests that may cause harm to human, animal or plant health, the environment and the economy. The objects of this Act are to: a) manage biosecurity risks; human disease; risks related to ballast water; biosecurity emergencies and human biosecurity emergencies b) give effect to Australia's international rights and obligations, including under the International Health Regulations, the Sanitary and Phytosanitary Agreement and the Biodiversity Convention. **Application to activity:** The Biosecurity Act and regulations apply to 'Australian territory' which is the airspace over and the coastal seas out to 12 nm from the coastline. For the activity the Act regulates vessels entering Australian territory regarding ballast water and hull fouling.	International Convention for the Control and Management of Ships' Ballast Water and Sediments (adopted in principle in 2004 and in force on 8 September 2017)	DAFF

Legislation/ Requirement/ Guideline	Scope	Related International conventions	Administering authority
Climate Change Act 2022	This Act outlines Australia's greenhouse gas emissions reduction targets and codifies Australia's net 2030 and 2050 greenhouse gas (GHG) emissions reductions targets under the Paris Agreement. It also requires the minister to prepare an annual climate change statement and requires the Climate Change Authority to give the minister advice in relation to the annual statement and future emissions reductions targets. **Application to activity:** While industry is not directly subject to these obligations, this Act legislates Australia's emissions net zero targets.	Paris Agreement on Climate Change 2015 (ratified by Australia)	DCCEEW

Legislation/ Requirement/ Guideline	Scope	Related International conventions	Administering authority
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act applies to actions that have, will have or are likely to have a significant impact on matters of national environmental or cultural significance. The Act protects MNES and provides for a Commonwealth environmental assessment and approval process for actions. There are nine MNES: • World Heritage Areas • National Heritage Places • Ramsar wetlands • Listed Threatened species and communities • Listed Migratory species under international agreements • Nuclear actions • Commonwealth marine areas • Great Barrier Reef Marine Park • Water resources for coal seam gas and coal mining developments. **Application to activity:** Petroleum activities are excluded from within the boundaries of a World Heritage Area (Sub regulation 10A(f)). The activity is not within a World Heritage Area. The EP must describe matters protected under Part 3 of the EPBC Act and assess any impacts and risks to these. The EP must assess any actual or potential impacts or risks to MNES from the activity.	1992 Convention on Biological Diversity and 1992 Agenda 21 Convention on International Trade in Endangered Species of Wild Fauna and Flora 1973 Agreement between the Government and Australia and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment 1974 Agreement between the Government and Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and their Environment 1986 Agreement between the Government of Australia and the Government of the Republic of Korea on The Protection of Migratory Birds 2006 Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (Ramsar) International Convention for the Regulation of Whaling 1946 Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979	DCCEEW

Legislation/ Requirement/ Guideline	Scope	Related International conventions	Administering authority
Environment Protection and Biodiversity Conservation Regulations 2000	Part 8 of the regulations provide distances and actions to be taken when interacting with cetaceans. **Application to activity:** The interaction requirements are applicable to the activity in the event a cetacean is sighted.	-	DCCEEW
Environment Protection (Sea Dumping) Act 1981	This Act provides for the protection of the environment by regulating dumping matter into the sea, incineration of waste at sea and placement of artificial reefs. **Application to activity:** May be triggered if equipment remains on the seabed following decommissioning.	-	DCCEEW
Environmental Reform (Consequential Provisions) Act 1999	This Act allowed the transition of legislation from the *Environment Protection Impact of Proposals Act 1974* (EPIP Act) to the EPBC Act. The Environmental Reform (Consequential Provisions) Act clarifies that projects approved under the EPIP Act are exempt from being assessed under the EPBC Act. The Wandoo Full Field Development was approved under the EPIP Act.	-	DCCEEW
Fisheries Management Act 1991	This Act provides for the protection of Australia's offshore commercial fish resources from 3 nm to the extent of the Australian Fishing Zone (200 nm). There are no fisheries within the Operational Area, however, there are several within the Environment that May Be Affected (EMBA). **Application to activity:** Fishermen in Commonwealth-managed fisheries will be informed by VOGA (via AMSA) of program activity as required by legislation.		Australian Fisheries Management Authority (AFMA) DAFF

Legislation/ Requirement/ Guideline	Scope	Related International conventions	Administering authority
Industrial Chemicals (Notification and Assessment) Act 1989	This Act enforces restrictions on using particular chemicals that may have detrimental and harmful effects on health and the environment and creates a national register if chemicals used in the industry. **Application to activity**: Where relevant, chemicals used during operations will be considered under the requirements of this Act prior to use.	-	Department of Health and Aged Care
Industrial Chemicals Environmental Management (Register) Act 2021 (ICEMR Act)	The Act establishes the Industrial Chemicals Environmental Management Standard (IChEMS) to manage environmental risks from industrial chemicals, including the IChEMS Register which lists chemicals and assigns risk management measures. **Application to activity:** Management measures identified under IChEMS may have implications for the import and use of particular chemicals and products for operations (e.g. fire-fighting foams).	-	DCCEEW

Legislation/ Requirement/ Guideline	Scope	Related International conventions	Administering authority
Maritime Legislation Amendment Act 2022	This Act amends the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* (POTS Act) and the *Protection of the Sea (Harmful Anti-fouling Systems) Act 2006* (HAFS Act). The Maritime Legislation Act implements amendments made by the IMO to international conventions that concern pollution from ships and the use of certain anti-fouling systems. The Act contains 4 schedules: • Schedule 1 amends the POTS Act to implement requirements in relation to the discharge of persistent floaters • Schedule 2 amends the POTS Act to implement a prohibition on the use of heavy fuel oil (HFO) in Arctic waters • Schedule 3 amends the HAFS Act to implement a prohibition on the use of cybutryne in anti-fouling systems on ships • Schedule 4 makes minor amendments to the POTS Act and HAFS Act to provide a consistent definition of 'Marine Orders' across relevant legislation.	Various parts of MARPOL Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (also known as the London Protocol) International Convention on the Control of Harmful Anti-fouling Systems on Ships 2001	AMSA
Maritime Legislation Amendment (Prevention of Air Pollution from Ships) Act 2007	This Act implements the requirements of MARPOL 73/78 Annex VI for shipping in Commonwealth waters.	-	AMSA

Legislation/ Requirement/ Guideline	Scope	Related International conventions	Administering authority
Marine Pest Plan 2018–2023: National Strategic Plan for Marine Pest Biosecurity (DAWR, 2018)	Australia's national strategic plan for marine pest biosecurity. It outlines a coordinated approach to building Australia's capabilities to manage the threat of marine pests. It represents agreed priorities and actions of governments, marine industries, and other stakeholders to achieve a common purpose: to manage the risks posed by marine pests and minimise their potential harm to marine industries, communities and the environment. The implementation period for Marine Pest Plan 2018-2023 concluded on 30 June 2023 and a formal review of the document is underway. Until a new document or strategy is published, this document will continue to be consulted. **Application to activity:** Applying the recommendations within this document and implementing effective biofouling controls can reduce the risk of the introduction of Invasive Marine Species (IMS).	-	DAFF
Minamata Convention on Mercury (DCCEEW, 2023c)	Australia ratified the Minamata Convention on 7 December 2021. It is an international treaty that seeks to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds. The Convention includes controls on: • Mercury mining • The manufacture and trade of mercury and products containing mercury • Disposal of mercury waste • Emissions of mercury from industrial facilities. • Countries that have ratified the Convention are bound by international law to put these controls in place. **Application to activity:** Provides requirements for how mercury waste must be treated and disposed.	Minamata Convention on Mercury	DCCEEW

Legislation/ Requirement/ Guideline	Scope	Related International conventions	Administering authority
National Biofouling Management Guidelines for the Petroleum Production and Exploration Industry (MPSC, 2018)	The guidance document provides recommendations for the management of biofouling risks by the petroleum industry. **Application to activity:** Applying the recommendations within this document and implementing effective biofouling controls can reduce the risk of the introduction of IMS.	International Maritime Organisation (IMO) Guidelines for the Control and Management of Ships Biofouling to Minimize the Transfer of Invasive Marine Species (2023)	DAFF
National Environment Protection (National Pollutant Inventory) Measure 1998	The legislative framework underpinning the National Pollutant Inventory (NPI), which tracks pollution across Australia, and ensures that the community has access to information about the emission and transfer of toxic substances which may affect them locally. **Application to activity:** Vermillion Australia is required to report atmospheric pollutants under the NPI.	-	DCCEEW
National Greenhouse and Energy Reporting Act 2007 (NGER Act) National Greenhouse and Energy Reporting Regulations 2008 National Greenhouse and Energy Reporting (Measurement) Determination 2008	This Act introduces a single national reporting framework for the reporting and dissemination of information about the greenhouse gas (GHG) emissions, greenhouse gas projects, and energy use and production of corporations. Under the NGER Act, businesses who are very large emitters of greenhouse gases will be required by law to measure and report their emissions to the government. National Pollutant Inventory reporting is covered by this Act. **Application to activity:** Vermillion Australia is required to report GHG emissions under the NGER Act.	United Nations Framework Convention on Climate Change (UNFCCC) 1992	DCCEEW/Clean Energy Regulator

Legislation/ Requirement/ Guideline	Scope	Related International conventions	Administering authority
Native Title Act 1993 *Native Title Legislation Amendment Act 2021*	The main objects of this Act are: a) to provide for the recognition and protection of native title b) to establish ways in which future dealings affecting native title may proceed and to set standards for those dealings c) to establish a mechanism for determining claims to native title d) to provide for, or permit, the validation of past acts intermediate period acts, invalidated because of the existence of native title. **Application to activity:** Native Title may be present within the EMBA.	-	Attorney-General's Department
Navigation Act 2012	This Act regulates ship-related activities and invokes certain requirements of the International Convention for the Prevention of Pollution from Ships (MARPOL) relating to equipment and construction of ships. Several Marine Orders (MOs) are enacted under this Act relating to offshore petroleum activities, including: • MO 21: Safety of navigation and emergency arrangements • MO 30: Prevention of collisions • MO 31: Vessel surveys and certification. **Application to activity:** The relevant vessels (according to class) will adhere to the relevant MO regarding navigation and preventing collisions in Commonwealth waters.	Certain sections of MARPOL International Convention for the Safety of Life at Sea (SOLAS) 1974 Convention on the International Regulations for Preventing Collisions at Sea 1972 (COLREGs) United Nations Convention on the Law of the Sea 1982 (UNCLOS)	AMSA

Legislation/ Requirement/ Guideline	Scope	Related International conventions	Administering authority
Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGSA) Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (OPGGS(E)R)	The Act addresses all licensing, health, safety, environmental and royalty issues for offshore petroleum exploration and development operations extending beyond the 3 nm limit. Part 4 of the OPGGS(E)R specifies that an EP must be prepared for any petroleum activity and that activities are undertaken in an ecologically sustainable manner and in accordance with an accepted EP. **Application to activity:** The OPGGSA provides the regulatory framework for all offshore petroleum exploration and production activities in Commonwealth waters, to ensure that these activities are carried out: • Consistent with the principles of ecologically sustainable development as set out in section 3A of the EPBC Act • So that environmental impacts and risks of the activity are reduced to ALARP • So that environmental impacts and risks of the activity are of an acceptable level.	-	National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA)
Ozone Protection and Synthetic Greenhouse Gas Management Act 1989	This Act regulates the import, export and manufacture of ozone depleting substances (ODS).	Vienna Convention for the Protection of the Ozone Layer 1985 and the Montreal Protocol on Substances that Deplete the Ozone Layer 1987	DCCEEW

Legislation/ Requirement/ Guideline	Scope	Related International conventions	Administering authority
Ozone Protection and Synthetic Greenhouse Gas Management Reform (closing the hole in the Ozone layer) Act 2022	This act amends the *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989* in relation to the Ozone Protection and Synthetic Greenhouse Gas Program by: • Imposing controls that are currently imposed through licence conditions, such as the ban on import of bulk gas in non-refillable containers • Clarifying licence and exemptions requirements • Increasing the time allowed for submitting reports and payment levies • Adopting the standard provisions of the *Regulatory Powers (Standard Provisions) Act 2014,* including certain minor modifications • Updating the offence and civil penalty provisions • Introducing information gathering powers including the ability to issue a notice to produce; providing the option of licence suspension as an alternative to immediate cancellation of financial penalties • Providing for an internal review mechanism for reviewable decisions • Allowing the use or disclosure of certain information.	-	DCCEEW

Legislation/ Requirement/ Guideline	Scope	Related International conventions	Administering authority
Protection of the Sea (Prevention of Pollution from Ships) Act 1983	This Act regulates Australian regulated vessels with respect to ship-related operational activities and invokes certain requirements of the MARPOL Convention relating to discharge of noxious liquid substances, sewage, garbage, air pollution, etc. **Application to activity:** All ships involved in petroleum activities in Australian waters are required to abide to the requirements under this Act. Several MOs are enacted under this Act relating to offshore petroleum activities, including: • MO 91: Marine Pollution Prevention – Oil • MO 93: Marine Pollution Prevention – Noxious Liquid Substances • MO 94: Marine Pollution Prevention – Packaged Harmful Substances • MO 95: Marine Pollution Prevention – Garbage • MO 96: Marine Pollution Prevention – Sewage • MO 97: Marine Pollution Prevention – Air Pollution.	Various parts of MARPOL Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (also known as the London Protocol)	AMSA
Protection of the Sea (Harmful Antifouling Systems) Act 2006	Under this Act, it is an offence for a person to engage in negligent conduct that results in a harmful anti-fouling compound being applied to or present on a ship. The Act also provides that Australian ships must hold 'anti-fouling certificates', provided they meet certain criteria. **Application to activity:** All ships involved in offshore petroleum activities in Australian waters are required to comply with Act. The MO 98: Marine Pollution Prevention – Anti-fouling Systems is enacted under this Act.	International Convention on the Control of Harmful Anti-fouling Systems on Ships 2001	AMSA

Legislation/ Requirement/ Guideline	Scope	Related International conventions	Administering authority
Underwater Cultural Heritage Act 2018	Protects the heritage values of shipwrecks, sunken aircraft and relics (older than 75 years) in Australian Territorial waters from the low water mark to the outer edge of the continental shelf (excluding the State's internal waterways). The Act allows for protection through the designation of protection zones. Activities/conduct prohibited within each zone will be specified. **Application to activity:** In the event of removal, damage or interference to shipwrecks, sunken aircraft or relics declared to be historic under the legislation, activity is proposed with declared protection zones, or there is the discovery of shipwrecks or relics.	Agreement between the Netherlands and Australia concerning old Dutch Shipwrecks 1972	DCCEEW

Table 1-3: Relevant recovery plans and species conservation advices relevant to the Wandoo Facility Environment Plan

Relevant plan/advice	Applicable threats or management advice	Addressed in EP section
National Light Pollution Guidelines for Wildlife (DCCEEW, 2023d)	The Guidelines outline the process to be followed where there is the potential for artificial lighting to affect wildlife.	Section 6.3 Section 5.14
National Strategy for Reducing Vessel Strike on Cetaceans and other Marine Megafauna (DCCEEW, 2017)	The overarching goal of the strategy is to provide guidance on understanding and reducing the risk of vessel collisions and the impacts they may have on marine megafauna.	Section 5.18
Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Wildlife of Australia's Coasts and Ocean (DEE, 2018)	The objectives of the plan include seeking to understand the scale of marine plastic and microplastic impact on key species, ecological communities and locations.	Section 5.10
Birds		
National Recovery Plan for albatrosses and petrels (2022) (DCCEEW, 2022a)	The recovery plan is a co-ordinated conservation strategy for albatrosses and petrels. Threats: • Marine pollution • Marine debris • Marine infrastructure interactions (including lighting).	Section 5.3 Section 5.4 Section 5.10 Section 5.14
National Recovery Plan for the Australian Fairy Tern (*Sternula nereis nereis*)	The recovery plan is a co-ordinated conservation strategy for the Australian Fairy Tern. Threats: • Disturbance • Invasive species • Climate variability and change • Native wildlife • Habitat degradation and loss of breeding habitat • Water management and increased salinity.	Section 5.1 Section 5.3 Section 5.4 Section 5.5 Section 5.6 Section 5.7

Relevant plan/advice	Applicable threats or management advice	Addressed in EP section
Approved Conservation Advice for *Sternula nereis nereis* (Fairy Tern) (TSSC, 2011)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the fairy tern. Threats: • Marine pollution: evaluate risk of oil spill impact to nest locations and, if required, appropriate mitigation measures are implemented.	Section 5.1 Section 5.3 Section 5.4 Section 5.5 Section 5.6 Section 5.7
Approved Conservation Advice for *Calidris canutus* (Red Knot) (DCCEEW, 2024k)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the red knot. Threats: • Marine pollution: evaluate risk of oil spill impact to nest locations and, if required, appropriate mitigation measures are implemented.	Section 5.1 Section 5.3 Section 5.4 Section 5.5 Section 5.6 Section 5.7
Approved Conservation Advice for *Calidris tenuirostris* (Great knot) (DCCEEW, 2024g)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the great knot. Threats: • Habitat loss and degradation: prevent destruction of key breeding and migratory staging sites. • Marine pollution: evaluate risk of oil spill impact to nest locations and, if required, appropriate mitigation measures are implemented.	Section 5.1 Section 5.3 Section 5.4 Section 5.5 Section 5.6 Section 5.7
Approved Conservation Advice for *Calidris frruginea* (Curlew sandpiper) (DCCEEW, 2023e)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the curlew sandpiper. Threats: • Habitat loss and degradation: maintain undisturbed feeding and roosting habitat at sites on the northwest coast used during migration for the species.	Section 5.1 Section 5.3 Section 5.4 Section 5.5 Section 5.6 Section 5.7
Approved Conservation Advice for *Charadrius mongolus*	Conservation advice provides management actions that can be undertaken to ensure the conservation of the lesser sand plover.	Section 5.1

Relevant plan/advice	Applicable threats or management advice	Addressed in EP section
(Lesser sand plover) (TSSC, 2016)	Threats: • Habitat loss and degradation from pollution, changes to water regimes and invasive plants.	
Approved Conservation Advice for *Papasula abbotti* (Abbott's booby) (TSSC, 2020)	Conservation advice provides management actions that can be undertaken to ensure the conservation of Abbott's booby. Threats: • Loss of breeding habitat on Christmas Island.	Section 5.1 Section 5.3 Section 5.4 Section 5.5 Section 5.6 Section 5.7
Approved Conservation Advice for *Anous tenuirostris melanops* (Australian lesser noddy) (TSSC, 2015)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the Australian lesser noddy. Threats: • Marine pollution: evaluate risk of oil spill impact to nest locations and, if required, appropriate mitigation measures are implemented.	Section 5.1
Wildlife Conservation Plan for Migratory Shorebirds – 2015 (DoE, 2015b)	Threats: • None identified.	Section 5.1 Section 5.3 Section 5.4 Section 5.5 Section 5.6 Section 5.7 Section 5.14 Section 5.18
Wildlife Conservation Plan for Seabirds (CoA, 2022)	Conservation advice provides management actions that can be undertaken to ensure the conservation of seabirds. Threats: • Light pollution.	Section 6.3 Section 5.14

Relevant plan/advice	Applicable threats or management advice	Addressed in EP section
National recovery plan for the red goshawk *Erythrotriorchis radiatus* (DCCEEW, 2012)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the red goshawk. Threats: • Habitat loss. • Fragmentation • Threats to nest sites, prey base and prey availability.	Section 5.1 Section 5.3 Section 5.4 Section 5.5 Section 5.6 Section 5.7
Conservation Advice for *Charadrius leschenaultii* (greater sand plover) (DCCEEW, 2023e)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the greater sand plover. Threats: • Habitat loss • Sea level rise, and climate change in breeding areas • Chronic and acute pollution.	Section 5.1 Section 5.3 Section 5.4 Section 5.5 Section 5.6 Section 5.7
Conservation Advice for *Limnodromus semipalmatus* (Asian dowitcher) (DCCEEW, 2024m)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the Asian dowitcher. Threats: • No major threats in Australia.	Section 5.1 Section 5.3 Section 5.4 Section 5.5 Section 5.6 Section 5.7
Conservation Advice for *Numenius madagascariensis* (far eastern curlew) (DCCEEW, 2023g)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the far eastern curlew. Threats: • Human disturbance • Habitat loss and degradation from pollution • Changes to water regime and invasive plants.	Section 5.1 Section 5.3 Section 5.4 Section 5.5 Section 5.6 Section 5.7
Conservation Advice *Phaethon lepturus fulvus* white-tailed	Conservation advice provides management actions that can be undertaken to ensure the conservation of the white-tailed tropicbird.	Section 5.1 Section 5.3

Relevant plan/advice	Applicable threats or management advice	Addressed in EP section
tropicbird (Christmas Island) (DoE, 2014)	Threats: • Introduced predators on Christmas Island.	Section 5.4 Section 5.5 Section 5.6 Section 5.7
Conservation Advice for *Tringa nebularia* (common greenshank) (DCCEEW, 2024p)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the common greenshank. Threats: • No widespread threats in Australia.	Section 5.1 Section 5.3 Section 5.4 Section 5.5 Section 5.6 Section 5.7
Fish, sharks and rays		
Approved Conservation Advice for *Rhincodon typus* (whale shark) (TSSC, 2015b)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the whale shark. Threats: • Habitat loss and degradation from pollution, changes to water regimes and invasive plants. • Boat strike from large vessels and habitat disruption from mineral exploration, production and transportation. • Marine debris.	Section 5.10 Section 5.18
Recovery Plan for the White Shark (*Carcharodon carcharias*) (DSEWPC, 2013	The overarching objective of this recovery plan is to assist the recovery of the white shark in the wild throughout its range in Australian waters. Threats: • None identified.	Section 5.14
Recovery Plan for the Grey Nurse Shark (*Carcharias Taurus*) west coast population (DoE, 2014)	The recovery plan considers the conservation requirements of the grey nurse shark across its range and identifies the actions to be taken to ensure the species long-term viability.	Section 5.14

Relevant plan/advice	Applicable threats or management advice	Addressed in EP section
Approved Conservation Advice for *Pristis zijsron* (green sawfish) (DEWHA, 2008b) Sawfish and River Sharks Multispecies Recovery Plan: (*Pristis pristis, Pristis zijsron, Pristis clavata, Glyphis glyphis* and *Glyphis garricki*) (DoE, 2015c)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the green sawfish. Threats: • Habitat loss and degradation.	Section 5.1 Section 5.3 Section 5.4 Section 5.5 Section 5.6 Section 5.7 Section 5.9 Section 5.10
Approved Conservation Advice for *Pristis clavata* (dwarf sawfish) (DEWHA, 2009) Sawfish and River Sharks Multispecies Recovery Plan: (*Pristis pristis, Pristis zijsron, Pristis clavata, Glyphis glyphis* and *Glyphis garricki*) (DoE, 2015c)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the dwarf sawfish. Threats: • Habitat loss and degradation.	Section 5.1 Section 5.3 Section 5.4 Section 5.5 Section 5.6 Section 5.7 Section 5.9
Marine Reptiles		
Approved Conservation Advice for short-nosed sea snake (*Aipysurus apraefrontalis*) (DSEWPC, 2011)	The long-term recovery objective for marine turtles is to minimise anthropogenic threats to allow for the conservation status of marine turtles to improve so that they can be removed from the EPBC Act Threatened species list. Threats: • Chemical and terrestrial discharge/marine debris • Light pollution • Habitat modification • Vessel strike/disturbance • Noise interference.	Section 5.3 Section 5.4 Section 5.5

Relevant plan/advice	Applicable threats or management advice	Addressed in EP section
Recovery Plan for Marine Turtles in Australia, 2017-2027 (Commonwealth of Australia, 2017)	See above for Recovery Plan for Marine Turtles in Australia, 2017-2027.	Section 5.3 Section 5.4 Section 5.5 Section 5.8 Section 5.10 Section 5.12 Section 5.14 Section 5.18 Section 6.3
Approved Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle) (DEWHA, 2008c)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the short-nosed sea snake. Threats: • Degradation of reef habitat: no anthropogenic disturbance in areas where the short-nosed sea snake occurs.	Section 5.10 Section 5.12 Section 5.18 Section 5.14
Marine Mammals		
Conservation Management Plan for the Blue Whale, 2015-2025 (DoE, 2015)	The long-term recovery objective for blue whales is to minimise anthropogenic threats to allow for their conservation status to improve so that they can be removed from the EPBC Act threatened species list. Threats: • Noise interference: evaluate risk of noise impacts and, if required, appropriate mitigation measures are implemented. • Vessel disturbance: evaluate risk of vessel strikes and, if required, appropriate mitigation measures are implemented.	Section 5.11 Section 5.12 Section 5.15 Section 5.16 Section 5.17 Section 5.18
Approved Conservation Advice for *Balaenoptera borealis* (Sei Whale) (TSSC, 2015c)	Conservation advice provides threat abatement activities that can be undertaken to ensure the conservation of the sei whale. Threats:	Section 5.11 Section 5.12 Section 5.15 Section 5.16

Relevant plan/advice	Applicable threats or management advice	Addressed in EP section
	• Noise interference: evaluate risk of noise impacts to cetaceans and, if required, appropriate mitigation measures are implemented. • Vessel disturbance: evaluate risk of vessel strikes and, if required, appropriate mitigation measures are implemented. • Habitat degradation • Pollution • Vessel strike.	Section 5.17 Section 5.18
Approved Conservation Advice for *Megaptera novaeangliae* (Humpback Whale) (TSSC, 2015)	Conservation advice provides threat abatement activities that can be undertaken to ensure the conservation of the humpback whale. Threats: • Noise interference: evaluate risk of noise impacts to cetaceans and, if required, appropriate mitigation measures are implemented. • Vessel disturbance: evaluate risk of vessel strikes and, if required, appropriate mitigation measures are implemented.	Section 5.12 Section 5.18
National Recovery Plan for the Southern Right Whale (*Eubalaena australis*) (DCCEEW, 2024)	The recovery plan provides threat abatement activities that can be undertaken to ensure the conservation of the southern right whale. Threats: • Habitat degradation: including offshore development. • Anthropogenic underwater noise: including vessel noise. • Collision: including vessel strikes.	Section 5.11 Section 5.12 Section 5.15 Section 5.16 Section 5.17 Section 5.18
Approved Conservation Advice for *Balaenoptera physalus* (Fin Whale) (TSSC, 2015d)	Conservation advice provides threat abatement activities that can be undertaken to ensure the conservation of the fin whale. Threats: • Noise interference: evaluate risk of noise impacts to cetaceans and, if required, appropriate mitigation measures are implemented. • Vessel disturbance: evaluate risk of vessel strikes and, if required, appropriate mitigation measures are implemented.	Section 5.11 Section 5.12 Section 5.15 Section 5.16 Section 5.17 Section 5.18

Relevant plan/advice	Applicable threats or management advice	Addressed in EP section
Conservation Advice for *Orcaella heinsohni* (Australian snubfin dolphin) (DCCEEW, 2025d)	The recovery plan provides threat abatement activities that can be undertaken to ensure the conservation of the Australian Snubfin Dolphin. Threats: • Habitat loss and degradation as a result of climate change, marine pollution, vessel interaction and coastal developments.	Section 5.10 Section 5.11 Section 5.12 Section 5.15 Section 5.16 Section 5.17 Section 5.18
Conservation Advice for *Sousa sahulensis* (Australian humpback dolphin) (DCCEEW, 2025h)	Conservation advice provides management actions that can be undertaken to ensure the conservation of the Australian humpback dolphin. Threats: • Habitat loss and degradation as a result of climate change, marine pollution, vessel interaction and coastal developments. • Anthropogenic underwater noise as a result of industrial and vessel noise.	Section 5.10 Section 5.11 Section 5.12 Section 5.15 Section 5.16 Section 5.17 Section 5.18

1.6.2 Western Australian Legislation

While the scope of this activity is limited to the Operational Areas within Australian Commonwealth waters, there are a number of State legislative requirements relevant to the potential impact of an oil spill in State jurisdiction. Table 1-4 summarises the principal, relevant WA legislative requirements.

Table 1-4: Relevant Western Australian legislation

Legislation	Scope	Application to the Activity	Administering authority
Aboriginal Heritage Act 1972	Protects and manages Aboriginal heritage by requiring approval for activities that may impact or cause harm.	Sites and objects protected under the Act may be present in the EMBA.	Department of Planning, Lands and Heritage (DPLH)
Biodiversity Conservation Act 2016	Provides for the conservation and protection of biodiversity and biodiversity components and the ecologically sustainable use of biodiversity components in Western Australia.	Biodiversity Conservation Regulations 2018 sets out separation distances for whale sharks and other marine fauna.	Department of Biodiversity, Conservation and Attractions (DBCA)
Environmental Protection Act 1986	Provides for the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment.	This Act regulates wastes discharged into the environment.	Department of Water and Environmental Regulation (DWER)
Conservation and Land Management Act 1984	This Act provides for the use, protection and management of public lands, including parks and forests. It includes water, flora and fauna on these lands.	The Act may be triggered in the event of a spill that impacts upon a public conservation reserve.	DBCA
Fish Resources Management Act 1996	Regulates the management of and utilisation and conservation of fish and their habitat.	Liaison with commercial fishermen. Requires management of IMS risks.	Department of Primary Industries and Regional Development (DPIRD)
Local Government Act 1985	This Act is concerned with the administration of municipalities. It vests local authorities with responsibility for handling domestic and trade wastes, sewage disposal and protection of water sources (channels, pools, dams, etc.) from pollution.	Waste will be disposed of at an onshore facility.	Local Government Authority
Marine and Harbours Act 1981	Provides for the advancement of efficient and safe shipping and effective boating and port administration.	This Act contains regulations to control the refuelling of ships and boats; administered by the Department of Fisheries.	Department of Fisheries (DoF)

Legislation	Scope	Application to the Activity	Administering authority
Maritime Archaeology Act 1973	Provides for the preservation of the remains of ships lost before 1900.	May be triggered in the event of impacts to a known or previously un-located shipwreck.	WA Museum
Pollution of Waters by Oil and Noxious Substances Act 1987	Provides for the protection of the sea from pollution by oil and other noxious substances. Gives effect to MARPOL in state waters.	Triggered in the event of vessels operating in state waters.	Department of Transport (DoT) Relevant Port Authority
Western Australian Marine Act 1982	Regulates navigation and shipping.	Triggered in the event of vessels operating in state waters.	DoT

1.6.3 Codes of Practice

The Australian Energy Producers (AEP) Code of Environmental Practice (APPEA, 2008) is the most relevant Code of Practice for offshore petroleum activities. Specific requirements of the AEP Code of Environmental Practice include:

- Compliance with applicable laws, regulations, standards and guidelines and, in their absence, adopting the most practical means to prevent or minimise adverse environmental impacts
- Ensuring that waste management practices minimise the potential impact on the environment. Practices are based on the prevention, minimisation, recycling, treatment and safe disposal of wastes
- Providing adequate training to enable employees and contractors to adopt environmentally responsible work practices
- Developing emergency plans and procedures so that incidents can be responded to in a timely and effective manner
- Developing and maintaining management systems to identify, control and monitor risks.

VOGA is an AEP member and, when undertaking its projects and activities, adheres to the provisions of its Code of Environmental Practice (APPEA, 2008).

Additionally, the International Finance Corporation (IFC) Environmental, Health, and Safety Guidelines for Offshore Oil and Gas Development (IFC, 2015) are technical reference documents with general and industry-specific examples of Good International Industry Practice.

Both the AEP Code of Environmental Practice and the IFC Environmental, Health, and Safety Guidelines were key references in preparing for the environmental risk assessment process associated with this EP and in the development of the Environmental Performance Outcomes (EPOs) contained within it.

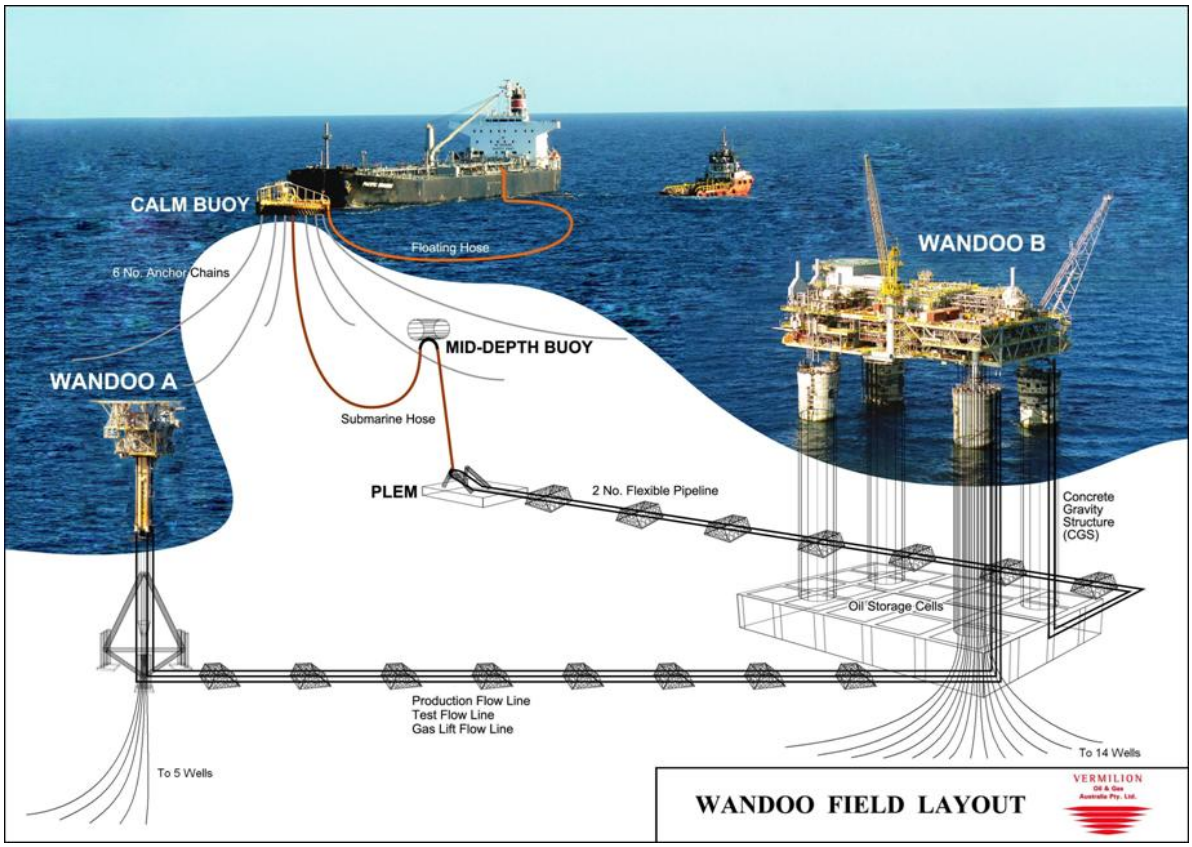
Section 2 Description of the Petroleum Activity

2.1 Background and Scope

The Wandoo Field was discovered in 1991. Extraction of crude oil commenced in 1993 from a single not normally staffed monopod wellhead platform (Wandoo A) supporting a helideck and five production wells. The Wandoo B production platform and a Concrete Gravity Structure (CGS) with associated processing facilities, were installed in 1997 and connected to Wandoo A (WNA) by a subsea flowline.

The oil produced from WNA is piped to the Wandoo B (WNB) platform. After treatment, the oil is stored in the CGS and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the WNB platform (Figure 2-1). A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil. Oil production from the WNB production platform commenced in March 1997 with the end of field life currently forecast to be approximately 2035-2038.

Figure 2-1: The Wandoo Production Facilities



2.2 Location

The Wandoo Facilities are located in production licence area WA-14-L, approximately 80 km northwest of Dampier and in water depths of 54 m. Geographical coordinates of the various facilities at Wandoo are given in Table 2-1. The location of the Wandoo Field is shown in Figure 2-1.

Table 2-1: Coordinates of Wandoo facilities

Facility	Latitude	Longitude
Wandoo A	20º 08’ 14.61” South/4396833.8 mE (GDA2020/MGA2020)	116º 25’ 22.43” East/7773210.2 mN (GDA2020/MGA2020)
Wandoo B	20° 07’ 37.12” South/441009.3 mE (GDA2020/MGA2020)	116° 26’ 08.23” East/7774367.1 mN (GDA2020/MGA2020)
CALM Buoy	20° 06’ 57.43” South/440955.4 mE (GDA2020/MGA2020)	116° 26’ 06.51” East/7775587.3 mN (GDA2020/MGA2020)

2.3 Reservoir Properties

2.3.1 Hydrocarbon Composition

Wandoo crude is a medium (19.4° API) Group IV persistent oil that has undergone extensive microbial biodegradation within the reservoir (Table 2-2), resulting in the loss of most lighter fractions. The crude has a low pour point, negligible paraffin wax content and low asphaltene levels, and is broadly comparable to other medium crudes produced on the North West Shelf.

The oil comprises approximately 1.7% volatile, 10.2% semi-volatile, and 33.1% low-volatile hydrocarbons (Table 2-3). The volatile and semi-volatile fractions evaporate readily from the sea surface following release. The remaining 55% of the hydrocarbon mixture is classified as persistent; these compounds are not expected to evaporate but will degrade over time through bio– and photo–degradation.

Weathering behaviour under representative seasonal conditions was confirmed through laboratory trials undertaken by ChemCentre (2015). Under both summer and winter conditions, approximately 20% of the oil mass is lost within the first 24 hours (Table 2-4). After 10 days, cumulative losses increase to around 50% in summer and 30% in winter, reflecting higher evaporation and weathering rates under warmer conditions. After 21 days, residual oil fractions of 45% (summer) and 62% (winter) remain.

Seasonal climate parameters used to characterise weathering behaviour (sea temperature, air temperature, wind speed and salinity) are summarised in Table 2-5 and reflect typical conditions for the North West Shelf.

Table 2-2: Physical properties for Wandoo Crude

Properties	Wandoo Crude
Density (kg/m^3)	934.8 (at 15°C)
API	19.8
Dynamic viscosity [centipoise (cP)]	168 (at 20°C)
Pour point (°C)	-27
Hydrocarbon property category	Group IV
Hydrocarbon property classification	Persistent

Table 2-3: Boiling point ranges for Wandoo Crude

Characteristic oil type	Volatiles (%)	Semi-volatiles (%)	Low volatiles (%)	Residual (%)
Boiling point (°C)	< 180	180-265	265-380	> 380
	Non persistent			Persistent
Wandoo Crude	1.7	10.2	33.1	55

Table 2-4: Results from weathering trials of Wandoo crude (ChemCentre, 2015)

Time	Summer conditions loss (w/w%)	Winter conditions loss (w/w%)
1 day	19%	20%
2 days	29%	23%
3 days	36%	23%
4 days	43%	28%
5 days	48%	29%
10 days	53%	34%
21 days	55%	38%

Table 2-5: Seasonal climate parameters used to characterise weathering behaviour

Parameter	Summer	Winter
Sea temperature	26°C	26°C
Air temperature	28°C	22°C
Wind speed	15 knots	10 knots
Sea salinity	36‰	36‰

2.3.2 Geology and Reservoir Characteristics

The seabed at Wandoo is approximately 54 m below mean sea level. The lithological sequence of interest in the Wandoo Field:

Sea floor to 300 m Total Vertical Depth Rotary Table (TVDRT) – Tertiary age: The upper 300 m is highly uncompacted calcareous mudstone. No hydrocarbon indications have been seen on any wells drilled in the Field. No evidence of porosity in samples or logs.

- 300 to 480 m TVDRT – Cretaceous age “Santonian” (Withnell Formation): Claystone and calcareous claystone. These rocks are non-porous and form the main sealing formation in the

area. Traces of siderite and sandstone occur in a few wells in the Field. No hydrocarbon indications have been seen on any wells drilled in the Field. No porosity or hydrocarbon shows observed.

- 480 to 540 m TVDRT – Cretaceous age "Cenomanian" (Lower Gearle Formation, upper): Claystone with minor silty claystone interbeds. No hydrocarbon indications have been seen on any wells drilled in the Field. No porosity or hydrocarbon shows observed.
- 540 to 580 m TVDRT – Cretaceous age "Albian" (Lower Gearle Formation, lower): Claystone with minor silty claystone interbeds. No hydrocarbon indications have been seen on any wells drilled in the Field. No porosity or hydrocarbon shows observed.
- 580 to 750 m TVDRT - Cretaceous age "Barremian" (Muderong Shale Formation): 100% glauconitic claystone. It has calcareous cement with abundant interspersed fine peletal glauconite. No porosity with minor patchy oil stains on cuttings is observed. This unit is the regional top seal for most hydrocarbon accumulations in the Carnarvon Basin, including the Wandoo Field.
- 620 to 690 m TVDRT – Cretaceous age "*M. australis* Sandstone": Comprised of an upper and lower unit, Unit A and Unit B, respectively. Unit A is a fine to medium-grained glauconitic sandstone (greensand), whilst Unit B is a fine to medium-grained massive sandstone. Together, Units A and B are the main producing formations of the Wandoo Field. The "*M. australis* Sandstone" is wholly contained within the Muderong Shale Formation, which creates both an upper and lower seal.

Currently, the only producing reservoir in the Operational Area is the *M. australis* Sandstone. The *M. australis* Sandstone is subdivided into an upper unit (the A sand) and lower unit (the B sand). The A sand is a fine-grained highly glauconitic sandstone (greensand) with an average porosity of 35% and permeability ranging from 50 to 3,000 millidarcy (mD) with reservoir characteristics that improve markedly with depth. The A sand is subdivided into three units, the uppermost being the A1 and the lowermost the A3. The low permeabilities measured in the A1 and A2 subdivisions of the A sand result in those intervals being considered non-reservoir in terms of recovering Wandoo oil (they may be productive for gas). As a result, the upper portion of the A3 unit (A3U) is considered to be the shallowest unit in which Wandoo oil can be recovered. The B sand is a relatively clean, fine to medium-grained, quartzose sandstone of exceptional reservoir characteristics with an average porosity of 36% and permeability ranging from 5 to 15 darcy (D). The B sand is also subdivided into several units based on reservoir quality (B1, B2, etc.).

Both the A and B sands are effectively unconsolidated. An important feature of the A sand is the presence of laterally discontinuous and correlatable siderite beds. These siderite beds are primarily concentrated in the A2 unit, with lesser occurrences in the A1 and A3L units. The A3U subdivision is devoid of siderite and is generally the main target interval for recent infill wells. Due to the unconsolidated nature of the sand and its high glauconite content, drill cuttings from the reservoir do not consist of rock chips and fragments that would otherwise be expected if a harder substrate or more consolidated substrata was drilled. Consequently, cuttings from this reservoir consist essentially of loose grains of sand and dispersed clays rather than rock fragments.

Prior to the start of production, the Field had a 22.1 m oil column overlain by an 18 m gas column at the crest of the Field. The oil is heavily biodegraded and viscous (19.4 API gravity, 14.5 centiPoise (cP) viscosity, -24°C pour point) and has a low Gas Oil Ratio (GOR) (99 standard cubic feet per barrel (scf/bbl)). The sulphur and wax contents are also low.

Since production began in the mid-1990s, the reservoir has depleted to a flowing pressure of ~5,100 kPa (0.89SG). Recent evaluation of shut-in pressure with all wells shut in for a period of 2 weeks indicated a reservoir pressure of ~5,475 kPa (0.95 SG). Due to the water drive mechanism that charges the Wandoo reservoir, it is generally understood that over time, the reservoir will recharge to virgin pressure. However, whilst operations are ongoing, the reservoir will continue to exhibit a sub-hydrostatic pressure regime requiring a very high level of under-balance to achieve flow to surface. The reservoir pressure was hydrostatic prior to the commencement of production at Wandoo. Over the 18 years of production, the pressure has now declined to some 75% of its original state (from 6,900 kPa to 5,100 kPa).

2.4 Field Infrastructure

2.4.1 Wandoo A Platform

The WNA platform is a 'normally unattended' wellhead platform that consists of a fixed structure without processing equipment. The substructure is a monopod structure piled to the seabed and the topsides consists of two deck levels. Lower Deck (Wellhead Deck) consists of:

- Five production wellheads and wellhead choke valves
- Flowline risers and riser shutdown valves
- Wellhead and Tubing Retrievable Surface Controlled Subsurface Safety Valve (TRSCSSV) control panel, with telemetry system linking back to WNB Central Control Room
- A carrier caisson that contains four risers:
  - 323.9 mm outer diameter (OD) Production riser
  - 219.1 mm OD Test riser
  - 114.3 mm OD Gas Lift riser
  - 323.9 mm OD Spare Production riser
- Production header and pig launcher
- Gas lift header and pig receiver
- Wellhead control panel
- Instrument gas system with nitrogen backup (nitrogen stored on Main Deck)
- Life raft and controlled descent devices
- Safety equipment.

Note that the test riser and flowline system is currently isolated, and no longer used for hydrocarbon service. It is positively isolated from the process at WNA and WNB.

Upper (Main) Deck consists of:

- Platform crane with remote power unit
- Equipment/personnel shelter
- Helideck

- Monitoring and control system, including data link to WNB telemetry
- Potable water tank
- Laydown area, chemical storage area and nitrogen bulk storage
- Chemical injection system
- Radio telemetry system, and navigation aids
- Power distribution system, including solar panels and batteries
- Life raft and controlled descent devices
- Removable hatches for well entry access.

A crane is provided to transfer equipment or supplies from a supply boat and support well intervention operations. The crane is rated for an off-the-boat lift of 7 t at 7 m radius.

The primary access to the platform is by helicopter.

The platform is accessible by a cantilever jack-up rig (as described in the Well Construction EP), referred to as a mobile offshore drilling unit (MODU). Depending on the well being worked on, the positioning tolerance for the rig might be as small as ±1 m.

Domestic discharges (i.e., sewage and greywater) will not occur from WNA (other than a handbasin, which discharges directly to sea). Drainage from deck areas released to the marine environment consist of wash-down water, rainwater, sea spray and may contain small amounts oil, grease and detergent.

2.4.2 Wandoo B Platform

The WNB platform is comprised of a single integrated three-level deck (Main, Mezzanine and Cellar) of rectangular plan, supported at four corners by the CGS shafts. The CGS and the topside facilities are described in the following sections.

2.4.2.1 WNB CGS Storage System and Shafts

Storage System

The WNB topside facility is supported on four concrete shafts that integrate into a concrete base (the CGS) that is comprised of ballast, product storage and water cells. The CGS sits on the seabed.

- Shaft 1 is located at the northeast corner of the facility and provides a conduit for the original 12 well conductors. Risers and conductors are also installed on the outside of the shaft
- Shaft 2 is located on the southeast corner of the platform and forms the main fuel storage with a capacity of up 2,200 m^3 of diesel
- Shaft 3 is located on the southwest corner and is flooded for ballast with the seawater inlet locked closed
- Shaft 4 is located at the northwest corner and contains several internal caissons for oil product storage, ballast water inlet, ballast water pumps, export pumps and interface layer treatment pumps. It is also used for Ballast Water storage.

The CGS has several functional requirements, the most important being to:

- Support the weight and structural design loads of the topside and transfer it to the seabed
- Provide stabilised crude oil import, storage and export facilities
- Provide fuel storage facilities
- Support flowline risers and well conductors.

The CGS is made of reinforced and post-tensioned concrete. It consists of a rectangular base caisson sitting directly on the seabed with four vertical shafts projecting from the base to support the topsides above sea level. The structural integrity of the CGS is managed under the Wandoo Facility Integrity Management System.

Shafts

The four hollow shafts are 11 m in outside diameter and stand 52 m clear of the top of the base caisson roof, and 15 m above LAT (Lowest Astronomical Tide). There are concrete slabs covering the top of each shaft. The shaft walls are thickened locally at the top to accommodate the steel deck connection on each shaft.

Each of the vertical shafts has the same internal diameter of 10.2 m with a wall thickness tapering from 575 mm to 400 mm. Each shaft is locally thickened to 3,500 mm at the top to accommodate the deck connections.

Shaft 1

Shaft 1 is located at the northeast corner of the facility and provides conduit for the original 12 well conductors which provide the production to the process. In 2008 three conductors were installed on the north face of Shaft 1 with guidance provided by a purpose-built integrated conductor guide and protection frame. In 2022, a new external free-standing conductor was installed. Two risers are located externally to the west face of the shaft for crude oil export, incoming production and test risers from WNA and a gas lift riser supplying WNA.

Shaft 1 is the drill shaft internally containing:

- 11 production wells
- One gas reinjection well.

The steel conductors enclosing the well casings and tubing run vertically in Shaft 1, entering through the base caisson floor slab and exiting through the shaft capping slab so they are effectively isolated from the shaft. The conductors are laterally supported in the shaft at regular intervals by steel guide frames attached to the shaft walls. Shaft 1 is flooded up to mean sea level with an air space between the water level and the shaft capping slab. There are no equipment, lights or sensors within Shaft 1. No provision for human entry is provided for.

On the outside of Shaft 1 are:

- Two oil export risers
- A gas lift riser and test riser inside a single caisson
- A production riser

- Four free standing production well conductors.

Note that the test riser and flowline system is currently isolated and preserved and no longer used for hydrocarbon service.

Shaft 2

Shaft 2 is used for diesel storage, with the concrete shaft walls and the base caisson top slab forming the containment of the tank.

Diesel is supplied from a bunkering vessel and pumped via a rundown caisson into Shaft 2.

Electrical submerged duty and standby pumps are provided, plus a sump pump, and are contained within Shaft 2. All pumps and instrumentation can be withdrawn through the Shaft 2 roof capping slab. No personnel entry is provided.

The outside of Shaft 2 provides support for a firewater pump caisson and a sewage caisson.

Shaft 3

Shaft 3 is located on the southwest corner and is flooded for ballast with the seawater inlet locked closed. There are no equipment, lights, sensors etc. in Shaft 3. There is no provision for personnel entry into Shaft 3.

The outside of Shaft 3 provides support for another firewater pump caisson, seawater service pump caissons, and a seawater service outfall.

Shaft 4

Shaft 4 is located at the northwest corner and contains several internal caissons for oil product storage, ballast water inlet, ballast water pumps, export pumps and interface layer treatment pumps. Shaft 4 is the utility shaft. It contains the equipment and pipework to import and export crude oil to and from the storage compartments. This crude oil import/export system is outlined in the Process Description (Section 2.5.8.9). Numerous caissons and pipes are supported on a central steel tower within the shaft.

Shaft 4 is filled with ballast water and maintained to a level approximately 15 m below sea level to maintain the negative hydrostatic pressure in the oil storage compartments. This level is maintained by the ballast water system which is also described in the Process Description (Section 2.5.8.7).

The outside of Shaft 4 supports a produced formation water (PFW) outfall line.

There are 13 caissons that penetrate the Shaft 4 capping slab. All caissons and pipes in which fluids flow are made from glass reinforced epoxy and are supported on a steel tower structure running the full height of the shaft. The electric motors for the shaft driven oil export pumps are located on the Cellar Deck. All other pumps are electrical submerged pumps.

Other penetrations through the slab include equipment hatches, personnel access hatches and the exhaust and supply ducts for the shaft ventilation system.

To minimise the possibility of methane and hydrogen sulphide build up in Shaft 4 vapour space, a forced ventilation system is installed to provide approximately four air changes per hour. Ducted fresh air is supplied and removed from a high elevation near the capping slab and a low elevation above the ballast water level. Hydrogen sulphide, methane and smoke detectors monitor the extracted air.

2.4.2.2 Base Caisson

The base caisson is 115 m long, 70 m wide and 17 m high and has a maximum capacity of 430,000 bbls (US).

The rectangular caisson base is subdivided by internal walls into 60 cells each measuring 11.25 m by 11.25 m in plan. There are 16 perimeter cells that are open, having no top slab and are filled with rock ballast. A further four cells are filled with water ballast.

There are two large oil storage compartments in the base caisson:

- The smaller compartment consists of 16 interconnected cells.
- The larger compartment is made from one main group of 16 cells and two smaller groups of four cells each.

The internal walls are 350 mm thick and have penetrations to allow the cells groups to interconnect while forming two independent compartments. The perimeter walls of the two compartments resist hydrostatic forces and are nominally 875 mm thick but are thickened to 1425 mm at the cross-wall locations.

The depth of the base caisson floor slab varies between 720 mm and 845 mm, and the top slab has a constant thickness of 776 mm. A series of base drain strips are cast onto the bottom of the floor slab to permit the dissipation of any excess pore water pressures in the soil. All the base caisson walls are post-tensioned. The roof slab is post-tensioned in the shorter direction only and the shafts are post-tensioned vertically. The base slab is not post-tensioned.

All four sides of the CGS have scour protection with graded iron ore used both for ballasting of the CGS and for scour protection. The scour protection is 10 m wide by 1.5 m deep.

2.4.2.3 WNB Topsides

The principal features of the WNB platform are shown below in Table 2-6.

Table 2-6: Platform principal features

Features	Nominal specifications
Slots	18 slots for production wells and one slot for gas reinjection.
Plans	Dimensions of approx. 87 m x 51 m, including all wellbay extensions. Maximum height (flare tip) 67.5 m above LAT.
Deck area	Total deck area to support process and utility equipment of approx. 7,637 m^2, including the wellbay extension.
Trusses	Two 10 m deep trusses (TA and TB) spanning approx. 51 m in the N-S direction. Seven 10 m deep trusses (T1 to T7) spanning approx. 25 m in the E-W direction.

Features	Nominal specifications
Passive fire protection	Passive fire protection to the main truss steelwork, north of the firewall.
Dry and operating weights	Dry and operating weights of 6,103 t and approx. 9,150 t respectively including all wellbay deck extensions.
Deck height	Height between each deck level of 5.0 m.
Accommodation	WNB living quarters comprise a total of 59 POB.

The underside of Cellar Deck primary steel is set at an elevation of +21.0 m to provide an air gap to the crest of the 100-year return period for extreme weather cyclonic waves.

Primary access to the platform is by helicopter. The helideck is located on top of the accommodation module.

One pedestal crane is provided for top deck materials handling and transfer of equipment and supplies from a support vessel, and for other platform activities (e.g. to support construction activities on the platform). This crane also enables some work basket activities to be conducted over the side. The equipment and facilities provided on each of the three WNB decks are listed in Table 2-7 to Table 2-10.

The Main Deck has been designed to take impact loads from a defined object weight and drop height. All the main process equipment has been located away from the main lifting zones. The subsea flow lines and risers are also located away from the main lifting zones.

There is swinging load protection in the form of crash barriers around the south and west faces of the Main Deck laydown area, and around the north, south and west faces of the other Main Deck laydown area. No protections were required on the Cellar Deck laydown area where diesel filters are located.

Table 2-7: Equipment and facilities on the WNB Main Deck

WNB Main Deck	
North End	Flare boom (northwest side)
	Space above the CGS Shaft 1 and Mezzanine Deck wellhead area for well intervention operations (northeast side)
	Laydown area including extended deck for existing wellbay extension and planned extension
	Gas lift compression and treatment
	Recovered gas compression
	Fuel gas treatment
	Fuel gas filters
	Chemical injection and storage
Central Area	Production separators (two)

WNB Main Deck	
	Hydrocyclones (two)
	Second stage and test separators
	Chemical injection and storage facilities
	Platform crane (east side)
	Nitrogen generator package
South End	Cooling and heating medium equipment and tanks
	Electro-chlorination unit
	Air compressor packages
	Platform power generation units gas turbines
	Accommodation
	Food storage freezer and PLQ Extension Heating, Ventilation and Air Conditioning (HVAC)
	Helideck above accommodation module (southwest corner)

Table 2-8: Equipment and facilities on the WNB Mezzanine Deck

WNB Mezzanine Deck	
North End	Wellheads, Xmas trees, Wellhead Control Panel and wellbay extensions
	Production, test and gas lift manifolds
	Pig launchers and receivers and process heat exchanges
	Rundown metering
South End (south of the blast wall)	Platform HVAC plant
	High voltage switch gear room
	Platform workshops, storage and laboratory
	Temporary refuge area comprising of: • Muster area • Control room and telecommunications room • Instrument equipment room low voltage (LV) switch gear.
	Instrument equipment room
	Uninterruptible power supply systems
	LV switchgear room

Table 2-9: Equipment and facilities on the WNB Cellar Deck

WNB Cellar Deck	
North End	Oil export facilities

WNB Cellar Deck	
	Production rundown headers
	Ballast water facilities
	Interface layer facilities
	Flare knock out drum
	Metering skid
	Infield risers with associated emergency shutdown valves
Central Area	Production Separator 3 with 2 hydrocyclones
	Produced Water Treatment System (PWTS) including Degasser, Recovered Oil Tank, Recovered Oil Vessel, Induced Static Flotation Unit 1 (ISFU) and ISFU2
	Platform diesel storage in crane pedestal (east side)
South End (south of the blast wall)	Seawater lift pumps and filters
	Reverse osmosis (desalination) unit
	Diesel fuel treatment package
	Firewater pumps
	Firewater deluge manifold and firewater ring main
	Aqueous film forming foam package
	Emergency generator package
	2 x Temporary Safety Craft and 1 x Wandoo Response Craft (extreme south end)
	Cooling medium exchangers

Table 2-10: Equipment and facilities below the WNB Cellar Deck

WNB Below Cellar Deck
Infield and export flowline risers
Platform hazardous open drains tank
Platform closed drain vessel
Platform non-hazardous open drains tank
Fresh air inlets and combustion air inlets for: • HVAC systems for the Temporary Refuge, High Voltage switch room, workshops and laboratory • Firewater pumps • Emergency generator.

WNB Accommodation Modules

The permanent accommodation module is located on the Main Deck in the southwest corner, and has lower, intermediate and upper levels.

WNB Helideck

The helideck is located directly on top of the accommodation module. Access to the helideck is via two stairways. The helideck includes bunding and an overboard drain pipe.

2.4.3 Bird Deterrents

The Wandoo Facility has a number of existing and proposed deterrents that will be utilised in different periods to effectively deter birds and prevent habituation. These are identified in the Bird Management Plan for Wandoo Offshore Facilities [VOG-1100-YH-0013], and include:

- Passive systems: bird spikes, wire, prey decoys, optical gel
- Active systems: noise/vibration emitting devices, visual lasers.

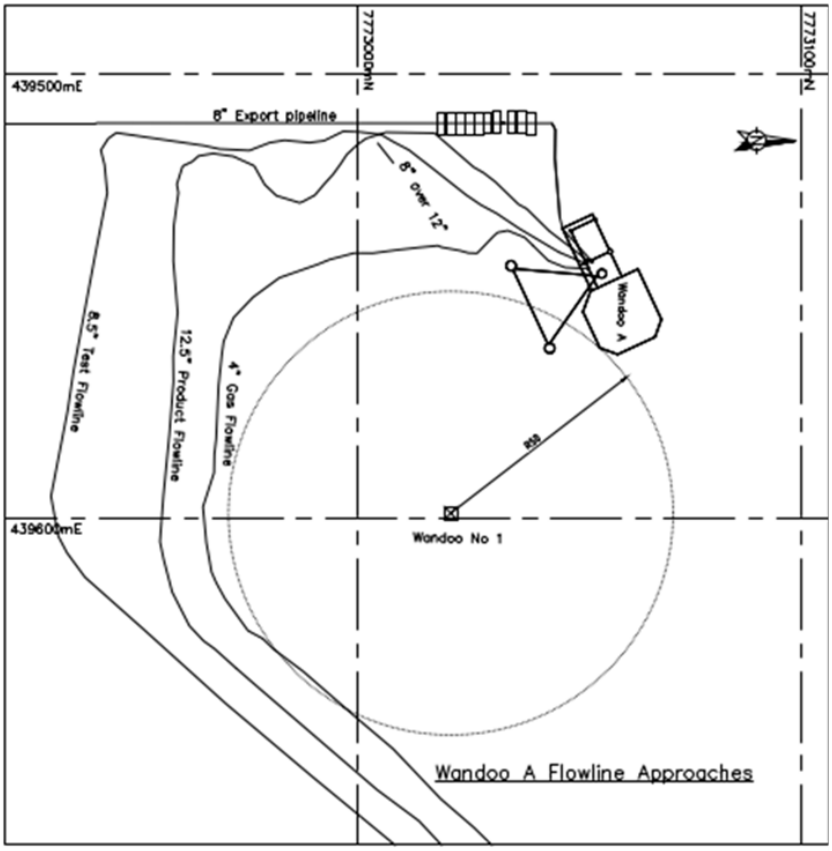
2.4.4 Unutilised Assets

2.4.4.1 Wandoo-1 Well

The Wandoo-1 subsea well is located within Permit Area WA-14-L. The Wandoo-1 subsea exploration well is located within 50 m of WNA structure and the WNB–WNA gaslift line (Figure 2-2). It was drilled in May 1991 to a total depth of 1,570 m MDRT. Two hydrocarbon bearing zones were discovered, the *M. australis* oil bearing sandstone reservoir and a deeper second non-developed gas source located within the Aalenian sediments. Both formations were isolated by cement, with the Aelenian isolated with openhole cement plugs and the *M. australis* isolated within and behind the 9-5/8" casing string. Both formations have been plugged with permanent abandonment barriers compliant with abandonment requirements when drilled and would be compliant with current (modern) abandonment standards.

Wandoo-1 was suspended in June 1991 at reservoir level with permanent abandonment barriers (cement plugs) compliant with abandonment requirements when drilled and would be compliant with current (modern) abandonment standards. Components of the well above the abandonment barriers (cement plugs number 5 and number 6) are not exposed to hydrocarbon formations and do not form part of the barrier envelope, as outlined in the VOGA Wandoo-1 Well Operations Management Plan [VOG-1000-YG-007]. The Wandoo-1 well has no surface equipment installed to conduct integrity tests of the shallow and/or surface suspension or the casing. Hence the only well integrity activity available is visual inspection of the wellhead condition at seabed. As the casing strings above the top abandonment barrier (cement plug number 6) are not part of the well barrier envelope, any casing corrosion that results in communication between the casing strings will not impact the Wandoo-1 subsea well integrity. Figure 2-3 is a well barrier schematic for Wandoo-1 showing locations of the cement plugs.

Figure 2-2: Wandoo-1 location

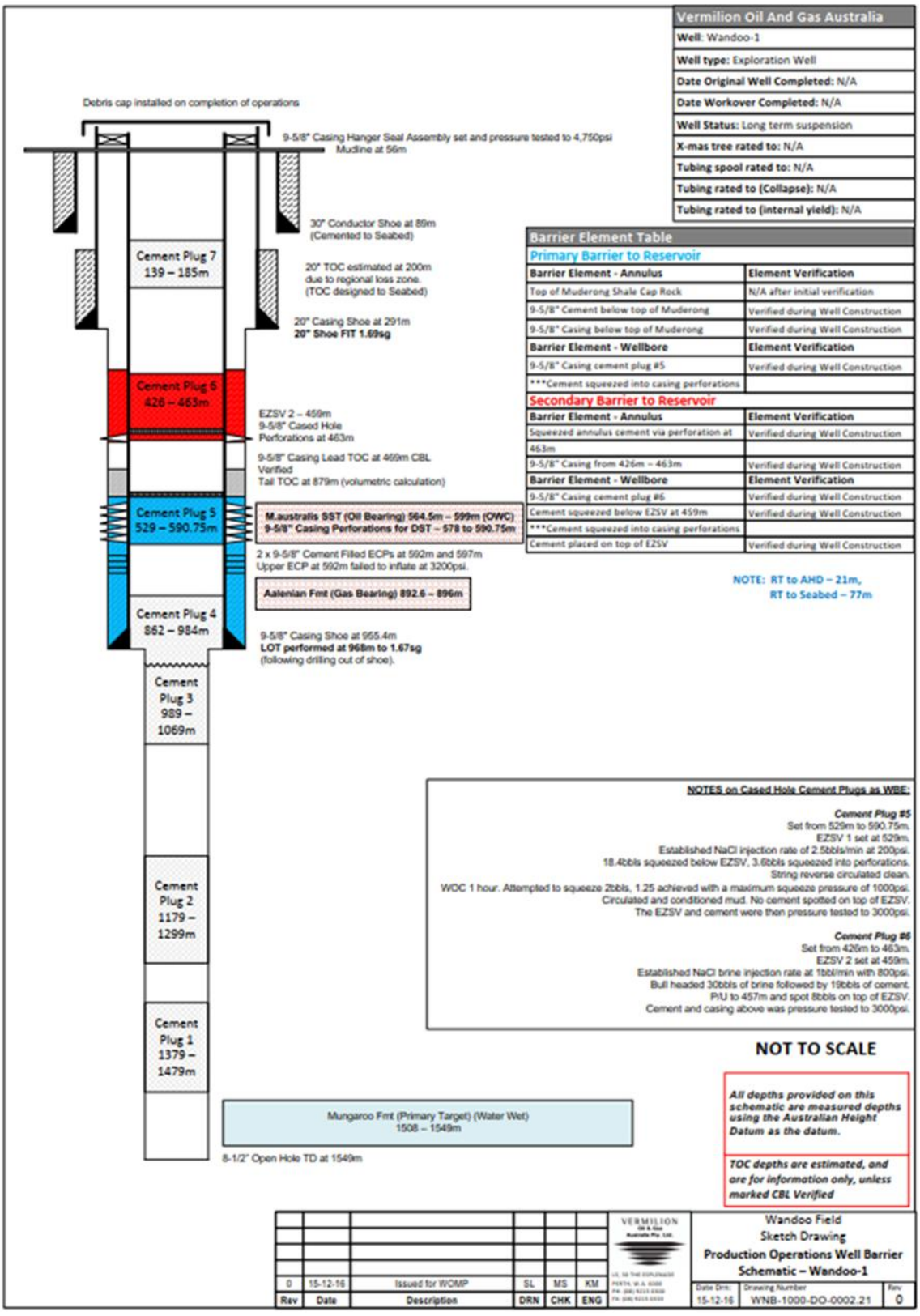


It should be noted that:

- Wandoo-1 is unlikely to create additional impact to the environment or stakeholder activities than currently considered for WNA and WNB infrastructure. It has a relatively small footprint and is located within the petroleum safety zone.
- Wandoo-1 was suspended at reservoir level and the well infrastructure ends at the seabed. As the well retains a subsea wellhead at the mudline, it is not considered as abandoned and is being managed as a long-term plugged and suspended well.
- Due to the current state of Wandoo-1, and the sub-hydrostatic pressure within the Wandoo reservoir, the inherent hydrostatic of the sea water column and column of fluids within the well ensure that a permanent overbalance is in place at reservoir level at all times. As such, any loss of control event will unlikely result in a release from the reservoir.

VOGA plan to continue to manage the well under VOGA Wandoo-1 Well Operations Management Plan [VOG-1000-YG-007], including periodic integrity monitoring undertaken as part of this EP, until such a time that it is deemed feasible (from cost and technical risk perspective) to complete abandonment of the well and remove wellhead from seafloor. VOGA anticipate the Wandoo-1 final abandonment to be carried out when the WNA wells are permanently abandoned, following Cessation of Production from the Wandoo Field as per the Wandoo Production Facility Decommissioning Strategy [AUFZ23002-VOG-1000-RH-0014]. Refer to Section 2.9 for additional information on VOGA's decommissioning strategy.

Figure 2-3: Wandoo-1 well barrier schematic



2.5 Hydrocarbon Production

2.5.1 Reservoir Fluids

2.5.1.1 General

Table 2-11 provides the reservoir properties.

Table 2-11: Reservoir properties

Reservoir	
Depth	563 m – 650 m below Mean Sea Level (MSL)
Current Reservoir Pressure (at 600 m MSL at 1 Jan 2026)	~5,100 kPa (0.89SG) (740 psi)
End of field life pressure (at 600 m MSL)	4,702 kPa (682 psi)
Temperature (at 600 m True Vertical Depth [TVD] Subsea)	50°C

2.5.1.2 Crude Oil and Gas Composition

Table 2-12 shows the composition of the reservoir fluids.

Table 2-12: Composition of reservoir fluids

Component	Mol %	Weight %
Hydrogen Sulphide	0.00	0.00
Carbon Dioxide	0.24	0.04
Nitrogen	0.06	0.01
Methane	21.46	1.43
Ethane	0.01	0.00
Propane	0.00	0.00
Iso-Butane	0.00	0.00
N-Butane	0.00	0.00
Iso-Pentane	0.00	0.00
N-Pentane	0.00	0.00
Hexanes	0.00	0.00
Heptanes Plus	78.23	98.52
Total	100.00	100.00

2.5.2 Facility Production Rates

Table 2-13 shows the Wandoo Facility's design production rates.

Table 2-13: Nominal design rates

Fluid	Nominal design rate
Gas	1,200,000 Sm^3/day
Oil	6,359 m^3/day
PWTS	36,000 m^3/day

2.5.2.1 Production Well Profile

Wells are drilled from either WNA or WNB platforms and are completed horizontally through the reservoir, with the horizontal section extending 500 m to 5,000 m.

The temperatures at Xmas tree during normal operation are:

- Minimum: 40°C
- Maximum: 51°C.

The solution gas-oil ratio is 17.6 Sm^3/m^3 oil (99 scf/bbl oil).

2.5.3 Wandoo Well Types

The Wandoo reservoir pressure is sub-hydrostatic which means it does not flow out of the reservoir naturally. Artificial lift is required to produce wells in the Wandoo Field. Artificial lift is currently provided by either using gas lift with excess gas injected into the reservoir through WNB-10 source/injection well, or Electric Submersible Pump (ESP). In general, wells in the Wandoo Field produce liquids which are approximately 95-99% water and 1-5% oil. Wells in the Wandoo Field will only produce 100% oil immediately following a drilling campaign. Over a period of between 1 to 9 months following a drilling campaign the percentage of oil within the well fluids will reduce to the range of ~1-10%.

Consequently, Wandoo wells broadly fall into the following categories:

Gas injection well: Currently WNB-10 well is used as a gas source well and to inject excess produced gas into the reservoir gas cap. WNB-10 well can flow naturally to surface. B10 is used as the worst-case production well release event (Section 5.14.1).

Wells that cannot sustain flow to surface: Most wells at the Wandoo facilities fall into this category. These wells do not contain sufficient free gas to sustain flow to surface for a reasonable duration. When the application of artificial lift stops, either when gaslift gas into the well downhole via the gas lift mandrel stops or the ESP is stopped, (as would be the case in response to a loss of well integrity, or uncontrolled hydrocarbon release) the wells will not flow. In fact, due to the sub-hydrostatic nature of the reservoir the most likely scenario would be an influx of reservoir fluid into the wellbore where the established fluid column within the well would be balanced with the reservoir pressure with no hydrocarbon released to the environment.

2.5.4 Flow Lines and Riser Systems (Platform and Subsea)

Three subsea flexible flow lines connect WNA and WNB (Figure 2-4).

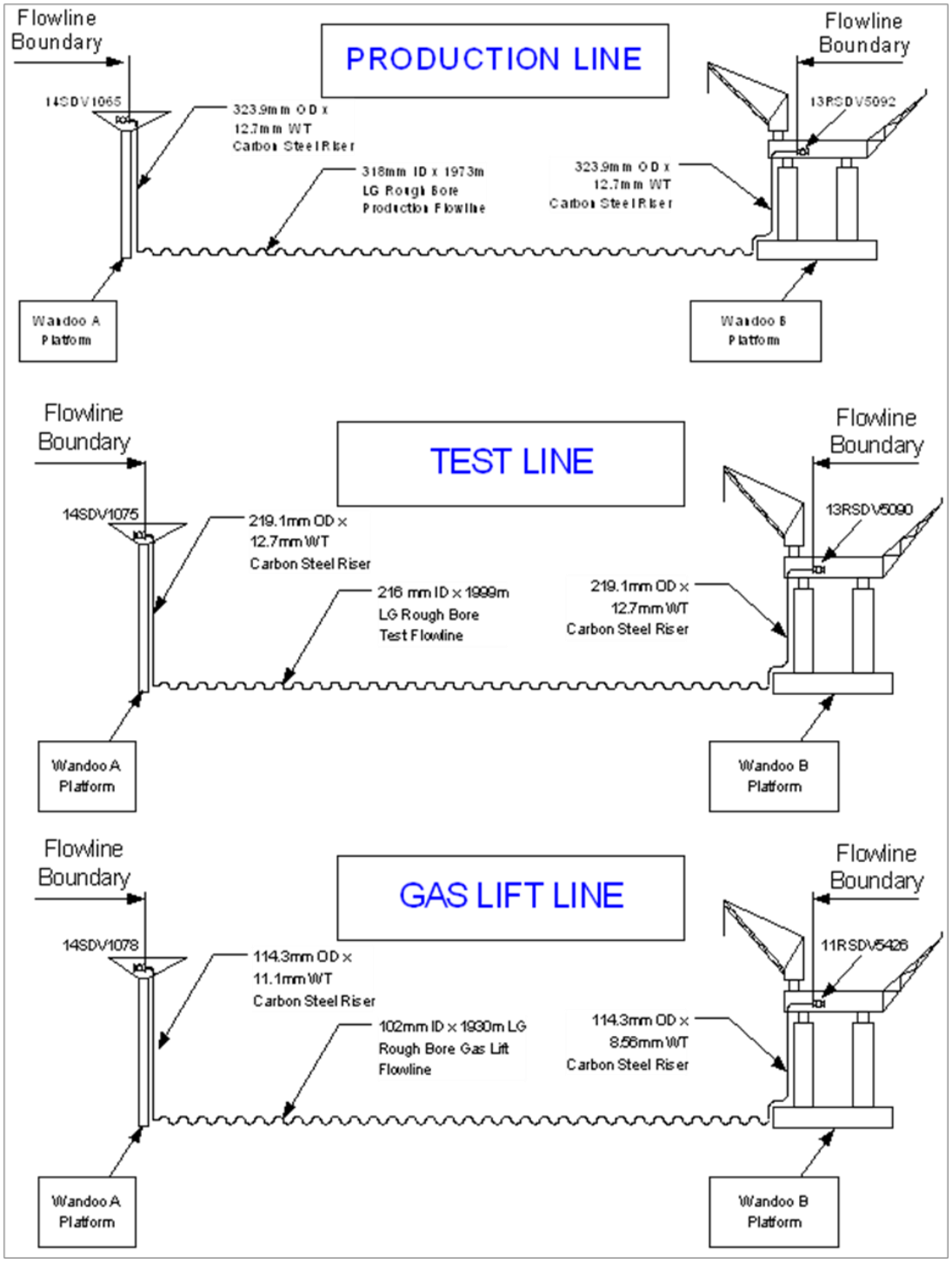
- WNA – WNB Production Flow Line
- WNA-WNB Test Line
- WNB – WNA Gas Lift Flow Line.

Each flow line is connected to an existing carbon steel riser on WNA, and a carbon steel riser on WNB. There are Riser Shutdown Valves (RSDV) on both WNA and WNB for each flow line. Table 2-14 shows the properties of the various flow lines.

Table 2-14: Flow line pressure, temperature, flow rates and components

Flow line	Operating pressure (kPag)	Operating temp (°C)	Flow rates	Components
WNA – WNB Production Flow Line	1,100 – 1,700	25 – 45	Less than 200 m^3/d oil, 3000-4000 m^3/d produced formation water, less than 100,000 sm^3/d formation gas plus 250,000 sm^3/d gaslift gas	Corrosion inhibited produced well fluids & lift gas
WNA-WNB Test Line	Not used for hydrocarbon service	N/A	N/A	N/A
WNB – WNA Gas Lift Flow Line	5,800 – 6,900	40	250,000 Sm^3/day	Methane (>95%), N_2, CO_2, H_2O

Figure 2-4: Production, test and gas lift lines



2.5.5 Wells and Subsurface Systems (Wellheads and Xmas Trees)

2.5.5.1 Wellheads

Wandoo A

The WNA wells (Figure 2-5) are conventional fixed platform producers completed with API rated wellheads and Xmas trees, tied into a common production manifold and configured with standard tubing, casing and control line arrangements consistent with the Wandoo field design. The wells use conventional spooled wellheads, with A6H1/H3 installed through the central column and the remaining wells through external conductors.

The wells have been constructed with:

- A conductor casing string set approximately 25 m below the mud-line and cemented to seabed.
- A 13-3/8" buttress thread carbon steel surface casing set at approximately 300 m TVD AHD with an inclination of approximately 10° to 30°. The expected top of cement is at the base of the regional loss zone at approximately 200 m TVD AHD. The formation at shoe depth has a leak-off strength of approximately 1.62 sg, although shoe tests are typically limited to 1.5 sg. Note: The WNA Platform well design incorporated external casing packer set near the conductor shoe that enabled cement to be brought to near seal level to provide greater conductor stiffness, as these conductors are fully exposed to metocean conditions.
- A 9-5/8" premium gas tight thread carbon steel production casing set at 90° inside the M. australis Formation. The cementations were designed to place the top of cement above the surface casing shoe depth. The fracture gradient at the base Muderong and for the *M. australis* is equal to or greater than 1.60 sg.
- A 5-1/2" premium gas tight thread 13 Cr steel tubing is used for the completion.

Wandoo B

The WNB wells (Figure 2-6 and Figure 2-7) are conventional fixed platform producers completed with API rated wellheads and Xmas trees, tied into a common production manifold and configured with standard tubing, casing and control line arrangements consistent with the Wandoo field design. The wells use conventional spooled wellheads, with WNB 1-12 located within Shaft 1 and WNB 13-18 located in external conductors.

The wells have been constructed with:

- A conductor casing string set approximately 25 m below the mud-line and cemented to seabed.
- A 13-3/8" buttress thread carbon steel surface casing set at approximately 300 m TVD AHD with an inclination of approximately 10° to 30°. The expected top of cement is at the base of the regional loss zone at approximately 200 m TVD AHD. The formation at shoe depth has a leak-off strength of approximately 1.62 sg, although shoe tests are typically limited to 1.5 sg.
- A 9-5/8" premium gas tight thread carbon steel production casing set at 90° inside the *M. australis* Formation. The cementations were designed to place the top of cement above the

surface casing shoe depth. The fracture gradient at the base Muderong and for the *M. australis* is equal to or greater than 1.60 sg.

- The gas lift wells located within Shaft 1 utilise a 5-1/2" premium gas tight thread 13 Cr steel tubing for the completion.
- The gas lift well located in external conductors utilise a 7" premium gas tight thread 13 Cr steel tubing for the completion.
- The ESP wells utilise a 7" x 7-5/8" premium gas tight thread 13 Cr steel tubing for the completion, with the ESP hung off on 4-1/2" 13 Cr steel tubing inside the 7" x 7-5/8" tubing.

2.5.5.2 Xmas Trees

Wandoo A

A 3000 psi single block tree has been installed on each wellhead. The tree body has manual lower master, gas master and manual swab valves. The pneumatic actuator for the upper master valve is tied into the platform Emergency Shutdown control system. A manually operated 5-1/8" production wing valve is flanged to one side while a 2-1/16" manual kill wing valve is bolted on the opposite side.

All tree and wellhead connections are API flanged.

Wandoo B

The Xmas trees on WNB 1, 2, 3, 4ST1, 6, 7, 8ST1, 9ST1, and 10 are single block 3,000 psi rated and have a manual lower master valve, a wireline cutting actuated upper master valve, a manual swab valve, an actuated production wing valve and a manual kill wing valve. The pneumatic actuators are tied into the platform shutdown logic sequence.

The WNB 13H and 14H Xmas trees are also single block, but are rated to 5,000 psi and fitted with hydraulic actuated master and flow wing valves.

The WNB 5 ST1, 11ST1, 12 ST2/12 ST3, B15ST1 and B16ST2 utilise a tubing spool with a side through bore. A horizontal block tree comprising a manual 5-1/8" 3,000 psi gate valve, an actuated 5-1/8" 3,000 psi gate valve and a manual 2-1/16" 5,000 psi gate valve is flanged to the tubing spool side outlet.

All tree connections are API flanged.

Figure 2-5: Typical WNA well

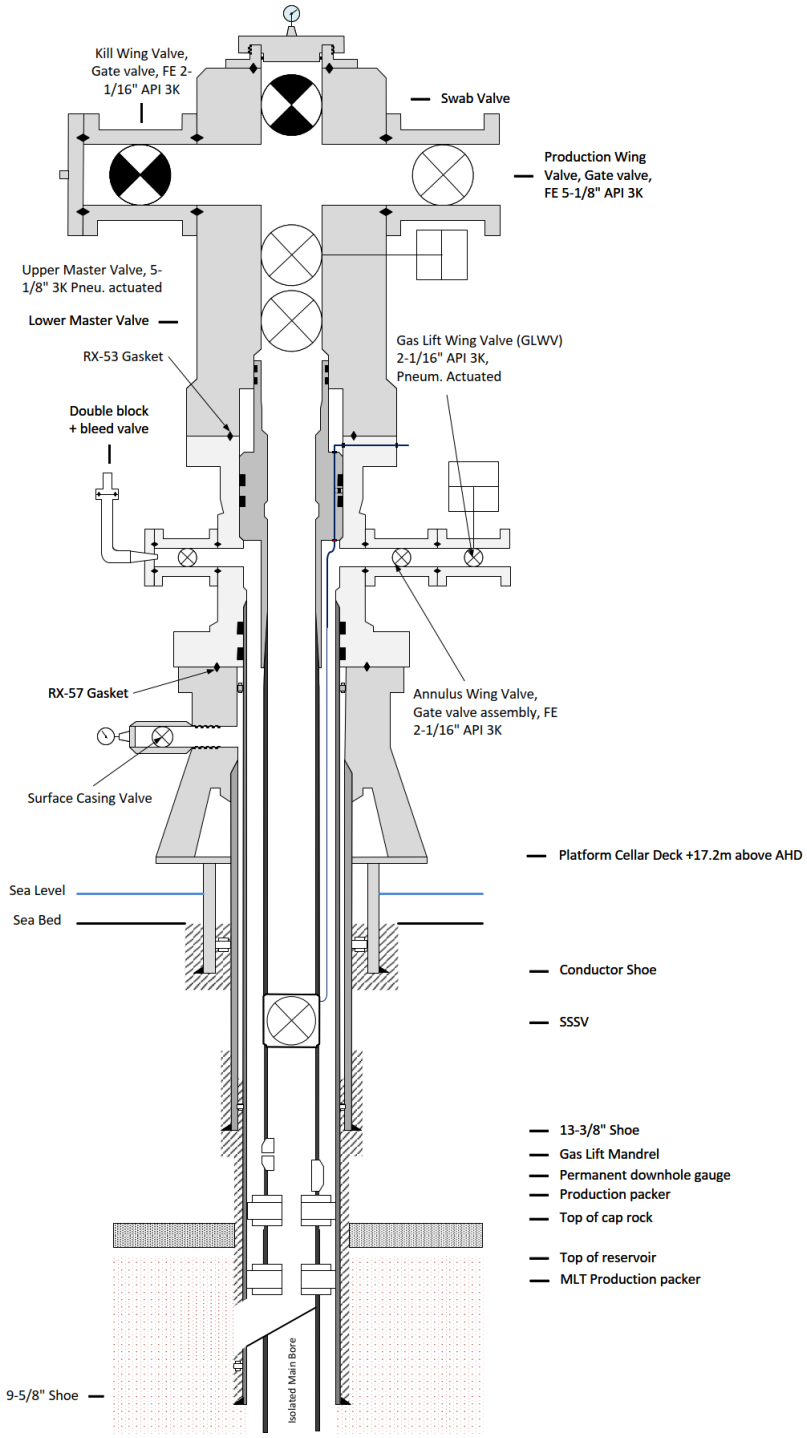


Figure 2-6: Typical WNB gas lift well

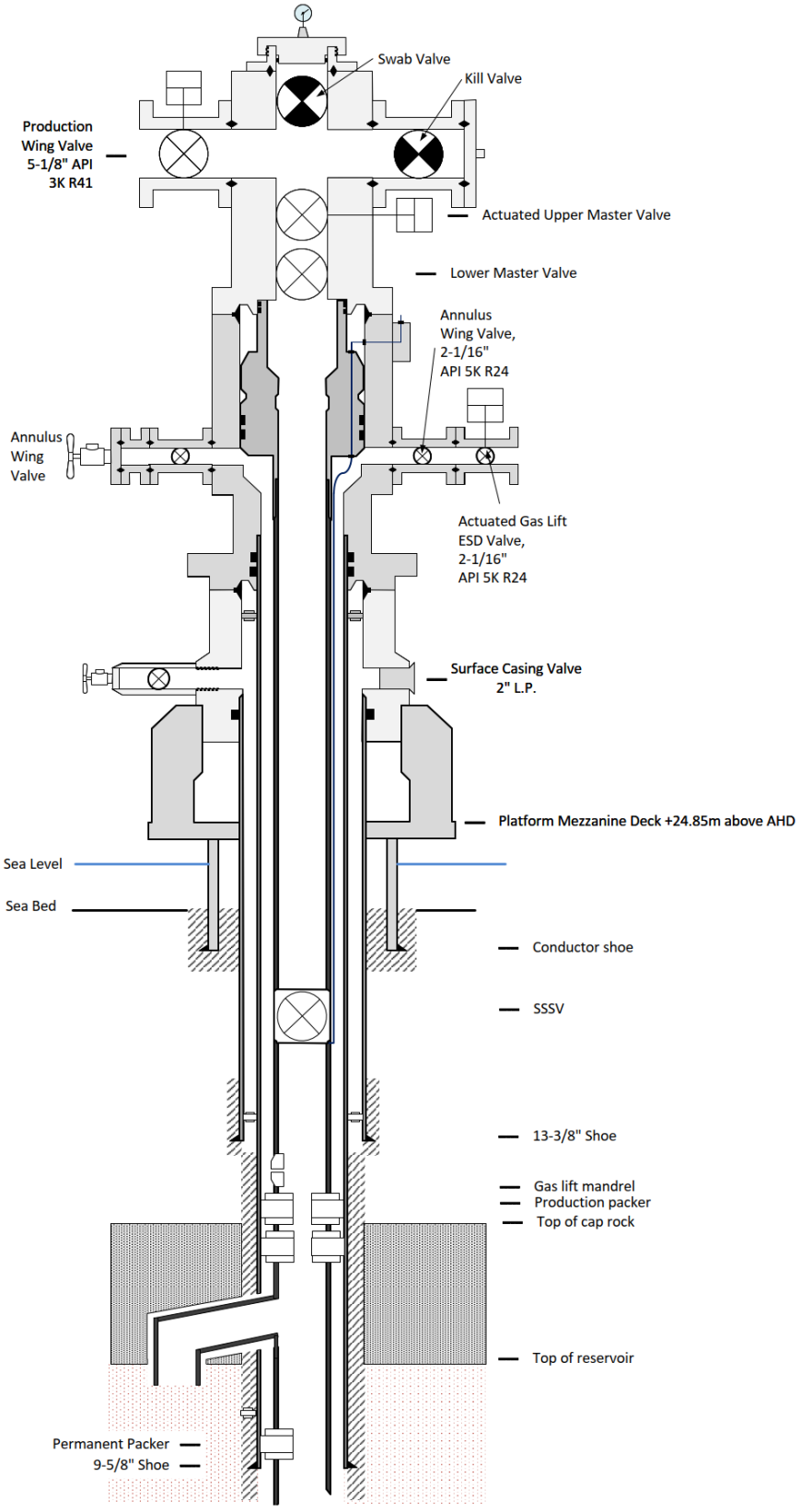
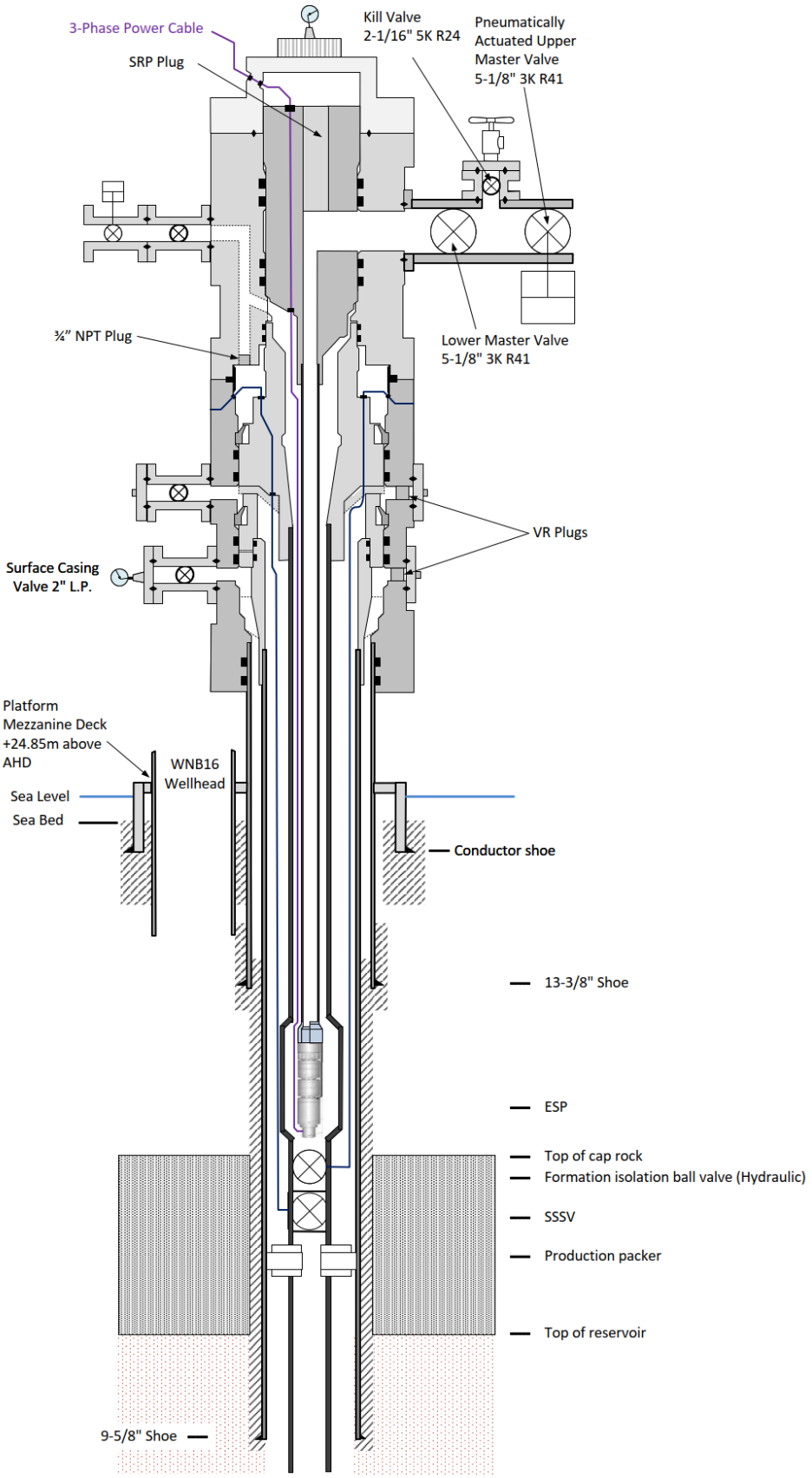


Figure 2-7: Typical WNB ESP well



2.5.6 Wells and Subsea Systems (Down-hole Equipment)

All wells have 5-1/2" or 7", 13 Cr L80, premium connection tubing installed. Sand production into the wellbore is mitigated by down-hole sand control across the production intervals in the form of prepacked or premium wire wrapped screens.

The primary safety device in each well preventing the uncontrolled flow of well fluids, should an event occur that precludes the use of surface safety systems, is an SSSV. The SSSV has metal-to-metal seals. It is a 'fail-safe closed' valve, with the valve being normally held open by surface applied hydraulic pressure via a 1/4" control line. The SSSV is generally set at approximately 110 m Measured Depth Subsea (water depth is 54 m Indian Spring Low Water), while B5/ST1, B11ST1, and B12 ST2/B12 ST3, B15ST1, and B16ST2 have their SSSVs set at around 290 m, 500 m and 450 m, 690 m and 670 m Measured Depth Subsea respectively.

Each well has a production packer installed at approximately 550 m TVDRT. This packer, in conjunction with a tubing seal assembly, provides the main annulus/reservoir isolation.

The completion design allows the setting of wireline plugs in nipples or blank tubing for isolation, temporary gauge installation, etc.

Each producer (except for B11/ST1, B12ST2/ST3, B15ST1 and B16ST2 which are lifted via an ESP) has one side pocket mandrel fitted for gas lift (B12ST2/ST3, B15ST1 and B16ST2 do not have a gas lift mandrel). Lift gas is injected down the tubing by 9-5/8" casing annulus and through gas lift valve (GLV) set in the side pocket mandrel into the tubing to lift production fluids from the well. The GLV is a 'fail-safe closed' orifice valve which is held open by the gas lift pressure and closed automatically when gas lift pressure is removed.

B11ST1, and B12 ST2/B12 ST3, B15ST1 and B16ST2 are lifted via an ESP. The ESP is deployed on 4-1/2" tubing string inside a 7" x 7-5/8" x 5-1/2" completion with the ESP sitting either inside the 7-5/8" section or the 7" section.

The TRFCs installed on wells A6H1/H3, and B8/ST1 are down-hole hydraulic sliding sleeves that are installed below the production packer in each of the wells to control flow from the main and lateral production intervals. The TRFC does not have a safety function and is not part of any Emergency Shutdown or safety function loops.

2.5.7 Wandoo A Process Description

2.5.7.1 Overview

WNA is operated remotely from WNB. Reservoir fluids are produced through five gas lifted wells (WNA 3, 5 ST1, 6H1/H3, 8ST1 and 9). There are no processing facilities on WNA, and all well production fluids are sent to WNB platform via the production flowline. A second flow line is used to supply lift gas from WNB to WNA.

Each well flow line is equipped with a low pressure (LP) pilot on the segment of the flow line upstream of the remotely operated choke, an electrical resistance probe, temperature and pressure measuring devices.

The lift gas is imported from WNB via a lift gas line. The lift gas is not dried at WNB therefore condensation will occur in the subsea flow line. Condensed liquid in the lift gas flow line is removed and the liquid is returned to WNB with the production fluids.

No instrument air is available on WNA; therefore, lift gas is regulated to 700 kPa and used as instrument gas. Instrument gas passes through the Instrument Gas Scrubber (14-V-100) before it is distributed to the various users. Instrument gas exhausts from the users is manifolded to the monopod vent for safe disposal.

Refer to Figure 2-11 for the process flow diagram of the Wandoo facilities.

2.5.7.2 Wandoo A Isolatable Hydrocarbon Inventories

The isolatable hydrocarbon inventories on WNA are summarised in Table 2-15, based on the design process conditions. Actual inventories at typical operating conditions will in most cases be less.

Table 2-15: Isolatable hydrocarbon inventories

Inventory	Pressure (Bara)	Temperature (°C)	Total vapour (m^3)	Total liquid (kg)
1 - Production Flow Lines	12.0	12.0	50	1.0
2 - Production Header	12.0	12.0	50	2.2
3 - Gas Lift System	61	61	21	2.7
4 - Production Flowline	10.9	10.9	36	177.2
5 - Test Flowline	10.9	10.9	36	81
6 - Gas Lift Flowline	69.4	69.4	40	22.6

Note that the test riser and flowline systems are currently isolated and preserved and no longer used for hydrocarbon service.

2.5.7.3 Wandoo A Gas Lift System

Gas imported from WNB via a DN100 subsea flow line is used for gas lift of the production wells. A riser shutdown valve (activated by LP pilot or by any surface shutdown) isolates WNA topside from the gas lift import flow line. A gas lift receiver (14-R-100) facilitates pigging of the DN100 gas lift flow line from WNB. Liquid condensing in the lift gas flow line system is separated in the WNA Gas Lift Knockout Drum (14-V-101). Liquid from the knockout drum is routed to the production header. The separated gas goes to the DN100 manifold from which it is distributed to provide gas lift to five producing wells and supply to the instrument gas system. Each gas lift line is equipped with shutdown valve, flow meter and flow controller, LP pilot and gas lift Emergency Shutdown Valve mounted on the wellhead annulus wing valve.

2.5.7.4 Instrument Gas

An instrument gas system (with bottled nitrogen back up) replaces a typical instrument air system due to the lack of compressed air source on WNA. The instrument gas passes through Instrument Gas Scrubber (14-V-100) for liquid removal before reaching the distribution header. No liquid

separation is expected during normal operation. High liquid level switches provide alarms at WNB for abnormal operation resulting in liquid build-up. In the event of pressure control valve (14-PCV-1061) failure, high pressure in the scrubber 14-V-100 is detected by 14-PSH-1210 causing closure of scrubber inlet shutdown valve 14-SDV-1131. The platform will continue to operate on nitrogen backup gas until the problem is resolved or bottled nitrogen is depleted giving time for operators to transfer to WNA solve the problem or to shutdown WNA in a controlled manner.

2.5.8 Wandoo B Process Description

2.5.8.1 Overview

WNB platform provides facilities for processing, storage and export of Wandoo crude. It has 18 (17 used) production well slots and one gas injection well. Future drilling will likely utilise the remaining unused slot.

Using gas lift or ESPs for artificial lift, crude oil is produced from each well via individual wellheads, through the well headers and horizontal choke valves to Production (three of) and Test manifolds. There the produced fluids combine with the production fluids from WNA.

The crude processing facility consists of primary oil/water/gas separation followed by heating and then secondary three-phase separation and solids removal. Wells which produce high volumes of solids can be directed to a dedicated primary oil/water/gas separator, that includes an online solids removal system, before being sent to the secondary three-phase separator. The crude is stabilised and stored in the CGS structure. Crude is pumped from storage via a metering package, subsea flowlines and a CALM Buoy to a tanker during export operations.

Separated gas from the primary and secondary separation is compressed to provide lift gas for the WNA and WNB wells, and fuel gas to the WNB gas lift compressor and main power generators. Produced gas in excess of requirements is reinjected for both environmental and fuel conservation management strategies into the reservoir via the gas injection well provided for this purpose.

Refer to Figure 2-11 for a process flow diagram of the Wandoo facilities.

2.5.8.2 Process Inventories

Process Conditions

Wandoo well fluids comprise a high-water-cut mixture of crude oil and produced formation water (typically 95–99% water cut), together with associated methane gas. Once brought to surface, the main topsides inventory of these fluids is contained within the Test Separator, the three Production Separators, and the Second Stage Separator, along with the lift-gas and recovered-gas compressor packages and the fuel-gas treatment system. Stabilised crude is transferred to and stored within the CGS storage compartments.

Table 2-16 shows the process conditions of various vessels.

Table 2-16: Vessel pressure, temperature and flowrate

Vessel	Liquid Flowrate (m^3/day)	Pressure (kPag)		Temperature (°C)		Max slug size (m^3)
		Design	Operating	Design	Operating	
Test separator	2,385	1,100	750	80	49	3.2
Production separator (2)	19,080	1,250	700	60	40–50	16.0
Production separator No 3	14,340	1,050	700	120	40–50	16.0
Second stage separator	19,078	650	400	120	60	N/A

Chemical storage and injection facilities are provided on WNA and WNB and are operated and stored from bunded areas. Highly flammable chemicals are avoided if practical alternatives exist.

WNB Isolatable Hydrocarbon Inventories

The isolatable hydrocarbon inventories on WNB are summarised based on the design process conditions (Table 2-17). Actual inventories at typical operating conditions will typically be less.

Table 2-17: Isolatable hydrocarbon inventories

Inventory	Pressure (Bara)	Temp (°C)	Total vapour (m^3)	Total liquid (kg)
1 (Production flowlines, manifolds and headers)	8	40	7.5	2,300
2 (Test separator)	7	40	31.0	1,213
3 (Production separator x 2)	7	40	86.4	1,485
4 (Production Separator No.3)	7	40	53.22	1,400
5 (Second stage separator)	5.6	85	105.2	73,320
6 (Crude heat exchangers)	5.6	70	1.6	1,316
7 (Gas compression header)	8.9	39	3.1	0
8 (Gas compressor)	22.7	40	10.9	0
9 (Gas lift manifold)	70.1	40	0.4	0
10 (Fuel gas scrubber)	18.8	5	3.4	0
11 (Fuel gas header)	4.4	25	14.6	0
12 (Recovered gas)	6.8	40	2.7	0
13 (Oil metering)	15.8	40	0	2,632

2.5.8.3 Separation and Conditioning

Two production separators (PS1 & PS2), operating in parallel provide free water ‘knockout’ and gas separation. A third production separator (PS3) includes online solids removal. The crude

emulsion carryover from the production separators is heated in plate heat exchangers before being routed to the Second Stage Separator for further separation of crude, water and gas.

The crude from the Second Stage Separator is cooled in plate heat exchangers prior to being routed to one of the storage compartments located in the CGS.

Two pumps, one dedicated to each storage compartment, operate in parallel to provide oil export flow. The pumped oil is metered on topsides and exported via subsea flowlines to an export tanker at the CALM Buoy.

A common three-phase test separator is provided for WNB well testing. The test separator is sized for 15,000 bpd liquids, the nominal design well flow rate. Downstream of the test metering equipment, the crude stream is fed to the Second Stage Separator and the water stream to the Production Separator 3. Gas from the test separator is routed to the gas lift compressor.

Low-pressure gas from the Second Stage Separator is compressed in the Recovered Gas Compressor then re-routed to the Lift Gas Compressor suction. The recovery of low-pressure gas minimises the flaring of hydrocarbon gas from the facility. The facility can be operated without the recovered gas compressor, however flaring is increased.

Second Stage Separator Bypass

During periods where the Second Stage Separator is required to be isolated for maintenance, production from the ESP wells can be bypassed around the Second Stage Separator and directed to storage after the first stage separation. Under this arrangement all gas lifted wells will be shut down and isolated along with the gas lift compressor. The process involves:

- Operation of the 1st Stage Separators, PS1, PS2, and PS3 to provide the same functionality and instrument protection as the Second Stage Separator process conditions and PS3 will be shutdown.
- All WNA and WNB gas lifted wells are shut down and isolated along with the gas lift compressor.
- WNB process is operated as follows:
  - Crude oil stabilisation will occur in the PS1/2/3 separators prior to transfer to the rundown coolers. This process condition is similar to the existing 2SS operating condition.
  - Associated gas will be directed to the LP flare system and/ or the pilot/purge gas system. A flowrate of approximately 8,000 Sm^3/d will be produced and suitable for flare header purging/pilot system.
  - Separated produced water will be treated via the hydrocyclones and the ISFUs. The combined Hydrocyclone and ISFU PW treatment train will treat the Overboard PW to well within the threshold limits (Table 5-57).
  - The produced oil from the separators will be combined with the stabilised Closed Drains fluids and the Recovered oil from the hydrocyclones/ISFU's and then routed via the Oil Rundown Coolers to the CGS storage cells.
  - PS1, PS2 and PS3 vessels have the same instrumented protection/shutdown functionality as the 2SS. These systems are fully integrated to ensure protection of the CGS and to meet the PFW OIW overboard limits.

Although there is a minor increase in CO_2 emissions as a result of flaring the associated gas (approximately 13 t/d) there will be an overall net reduction in GHG emissions because the GLC is not in operation and burning any fuel during the shutdown saving approximately 90 t/d.

2.5.8.4 Solids Removal

The Wandoo reservoir is unconsolidated sandstone that is prone, if not controlled, to excessive production of sand, where the sand comes to the surface with the reservoir fluids. The quantity of sand produced at Wandoo has historically been minimised by the installation of down-hole sand control across the production intervals in the form of prepacked or premium wire wrapped screens. However, 3 wells currently produce more solids than the other wells (B12ST2/ST3, B13H and B14H) and will be treated via the solids removal system.

Solids removal is achieved with the use of Solids Recovery Cyclone manifolds, installed in the base of the PS3 and Second Stage Separator. Motive fluid in the form of produced water is used to fluidize the solids, for removal from the vessel. The motive fluid is sourced from the outlet of the Induced Static Flotation Unit No. 2 (ISFU2) recirculation pumps. The solids are directed to a solids removal system and solids bins to collect and store the slurry before disposal onshore. Oil and liquids from the slurry is decanted out from the solids bins and returned to the process.

2.5.8.5 Gas Lift

The lift gas compressor is a two-stage centrifugal compressor. Each stage has independent surge control. An overall compressor recycle line and control valve is installed. The valve position is set depending on compressor control and throughput requirements.

Lift gas flow to each well is measured and flow controlled. Surplus gas is routed to the gas injection well for injection back into the reservoir.

2.5.8.6 PFW Treatment

Wells in the Wandoo Field produce reservoir fluids that are predominantly water. The produced fluids are brought to the surface and routed through the produced water treatment system (PWTS) (Figure 2-11). The PWTS is designed to separate the incoming reservoir fluids into oil, solids and water, and to further “polish” the produced water stream so that it meets the required quality specifications for discharge overboard.

The PWTS uses hydrocyclones to separate oil in water (OIW) from the water produced from PS1, PS2 and PS3: two hydrocyclones at production separator water outlets for PS1 and PS2, and two hydrocyclones on the cellar deck for PS3 (Section 2.5.8.3). The water from the hydrocyclones is routed to ISFU1 or ISFU2 prior to discharge overboard (Figure 2-11). The combined hydrocyclone and ISFU PWTS treats PFW discharges to meet threshold limits (Table 5-57).

Recovered oil from the hydrocyclones is fed to the recovered oil tank or the recovered oil vessel and then pumped onto the Second Stage Separator for further separation of crude, water and gas. The PFW produced from the Second Stage Separator is treated in ISFU1 or ISFU2 to further reduce OIWs prior to PFW discharge. PFW discharge is monitored for OIW content and only PFW within OIW specification is discharged overboard (Section 2.5.8.8).

Each ISFU has a maximum work capacity of 18,000 m^3/day, therefore the PWTS is designed to process a maximum of 36,000 m^3/day (Table 2-13). The PFW is combined with ballast water (Section 2.5.8.8) discharged 8 m below the water surface at a temperature of ~51°C at the PFW outfall line located outside of Shaft 4 (Section 2.4.2.1).

In 2017/2018 the PWTS was updated to the system as described above, from the use of one ISFU to the use of two floatation units i.e. ISFU1 and ISFU2. ISFU2 was commissioning in Q1 2018. The PWTS update increased the total fluid production rates, at reduced OIWs. The PWTS update included an upgrade of the recovered oil system to route separated oil back to the second stage separator and upgrades of the OIW monitoring system.

Production chemicals are injected at various stages in the process for following purposes:

- Prevention of marine growth and scale formation within utility pipework
- Management of internal corrosion of pipework
- Optimising process separation of oil and water.

The following chemicals are added into the PFW streams (target chemical concentrations given in Table 5-60):

- Corrosion inhibitor
- Water clarifier
- Oxygen scavenger
- Scale inhibitor
- Reverse demulsifier
- Forward demulsifier.

Biocide is also added in batches as part of flow line and riser pigging operations with details outlined in Section 2.7.3.

2.5.8.7 Ballast Water Storage and Treatment

Sea Water is used to ballast the Wandoo Facility during hydrocarbon export. As oil is exported, ballast water flows into Shaft 4 and into the compartments via the buffer cell to replace the exported oil. Ballast water discharge is generally equal to daily oil production and is typically managed between 700–1,500 m^3/day.

Ballast water from the Wandoo Facility may contain some oily water from the interface zone in the CGS. Due to decline in production rate over time, the residence time of ballast water in the CGS has increased, allowing for sufficient oil-water separation within the CGS without the requirement for further processing. Typical OIW concentrations of ballast water is a low <3 mg/L due to the long residence time and dilution in the tanks and buffer cell, and the deep suction location of the ballast water pumps.

Ballast water is pumped via one of two ballast water pumps in a duty/standby arrangement. The electric submersible pumps are located in caissons within Shaft 4.

Water level in Shaft 4 is controlled via the ballast water pump flowrate by an automated level control valve. This maintains the drawdown level to an elevation of approximately 15 m below sea level. The water is discharged to sea via the ballast water OIW analyser on the topsides then discharged overboard with the PFW discharge. Ballast water is monitored for OIW content and only water within specification is discharged overboard (Section 2.5.8.8).

Ballast water oil interface system includes a temporary skimmer pump that can be used in Shaft 4 when necessary to remove any possible oil carryover floating on the ballast water surface. Ballast water can also be treated through the ISFU if necessary.

Sodium hypochlorite is injected into the Wandoo Facility seawater service system intakes.

2.5.8.8 OIW PFW and Ballast Water Monitoring and Management

PFW and ballast water is combined and discharged 8 m below the water surface at a temperature of ~51°C at the PFW outfall line located outside of Shaft 4 (Section 2.4.2.1). OIW limits for PFW and ballast water as detailed in Section 5.8 are continuously monitored and managed as described below.

The management of OIW for PFW and Ballast water discharges relies primarily on continuous monitoring using inline OIW analysers, which provide real-time measurements of PFW and ballast water to the WNB control room (Figure 2-9). Readings are recorded in the Monitoring and Control System (MCS), allowing trending and performance review. Twice-daily manual laboratory samples are used to verify analyser accuracy, supported by scheduled cleaning of the instruments to maintain reliable operation. The MCS calculates instantaneous, 20-minute and rolling 24-hour average OIW values which are displayed and trended to support PWTS operation. Alarm thresholds are programmed in accordance with acceptable and unacceptable daily OIW limits for the applicable flow regime, enabling early detection of excursions so that operators can intervene and keep overboard discharge within specification. For further details on the Produced Water Adaptive Management Strategy refer to Section 8.12.

For PFW, short-duration OIW excursions are tracked through an internal “Flag” system, allowing operators to record potential causes and identify trends. Persistent high OIW values trigger response actions under the Measurement and Reporting procedure [WNB-012-502] noting that limited storage capacity in Shaft 4 may require production curtailment or shutdown to prevent exceedance of daily unacceptable limits. Deviations between inline analyser results, onsite manual laboratory testing and monthly NATA laboratory TRH analyses are managed through the Adaptive Management Plan [WNB-7000-RP-0010], including additional sampling, recalibration and investigation where required. Historic comparisons indicate that offshore OIW measurements are typically conservative, and ongoing correlation with NATA results ensures confidence in the accuracy of monitoring and early identification of any instrument issues.

For ballast water, if monitoring indicates elevated OIW concentrations (i.e. results approaching 30 ppm), the ballast water is redirected through the PWTS for additional treatment and dilution before being discharged overboard together with PFW.

The historical average volume of PFW and ballast waste discharged per day and the OIW concentration is outlined in Table 2-18 and Figure 2-8.

Table 2-18: Annual average PFW and ballast water OIW concentrations and flow rates

Year	Ballast Water Flow Rate	PFW Flow Rate	Ballast Water OIW	PFW OIW
	m^3/day	m^3/day	mg/L	mg/L
2007	1,193	17,100	9.8	22.0
2008	1,076	22,386	16.4	21.4
2009	1,241	23,320	8.0	15.6
2010	1,169	21,513	2.0	13.2
2011	1,298	23,165	2.3	11.0
2012	1,011	21,532	1.8	12.4
2013	1,030	21,550	1.9	11.3
2014	1,044	21,022	3.1	14.7
2015	1,026	22,355	4.3	13.6
2016	1,037	21,941	2.2	11.7
2017	957	22,612	2.5	13.8
2018	764	24,101	2.0	8.0
2019	970	24,729	1.0	8.3
2020	760	27,238	1.1	8.9
2021	657	27,242	1.6	8.4
2022	760	27,379	1.3	5.3
2023	852	5,071	1.8	5.6
2024	1,431	17,695	2.6	6.2
2025	1,044	27,664	1.3	7.5

Figure 2-8: Annual average PFW and ballast water OIW concentrations and flow rates

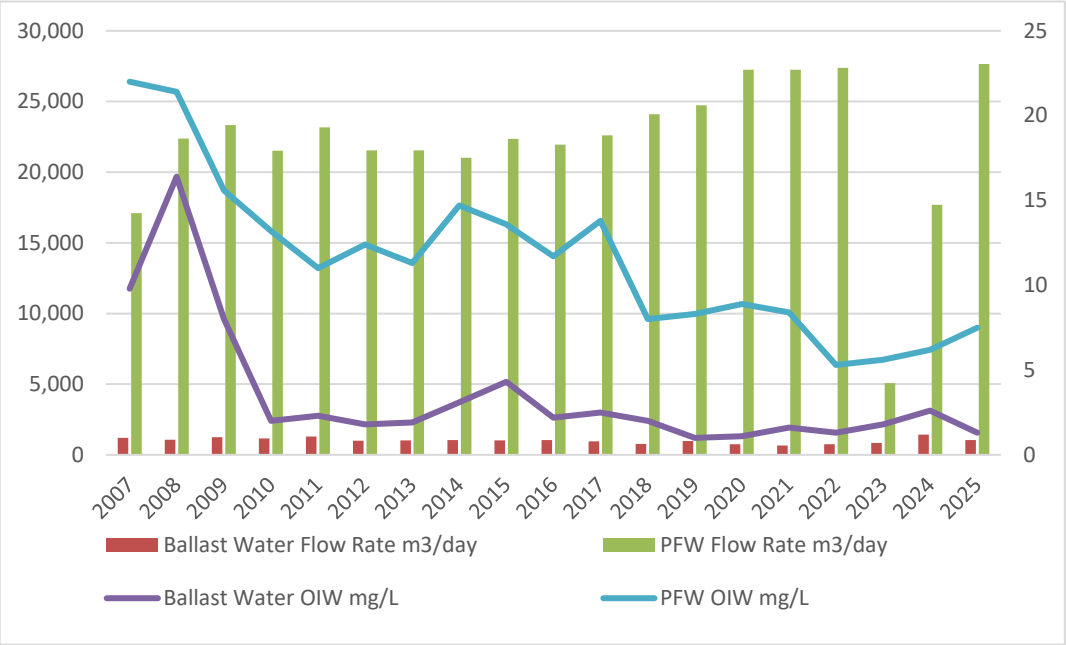
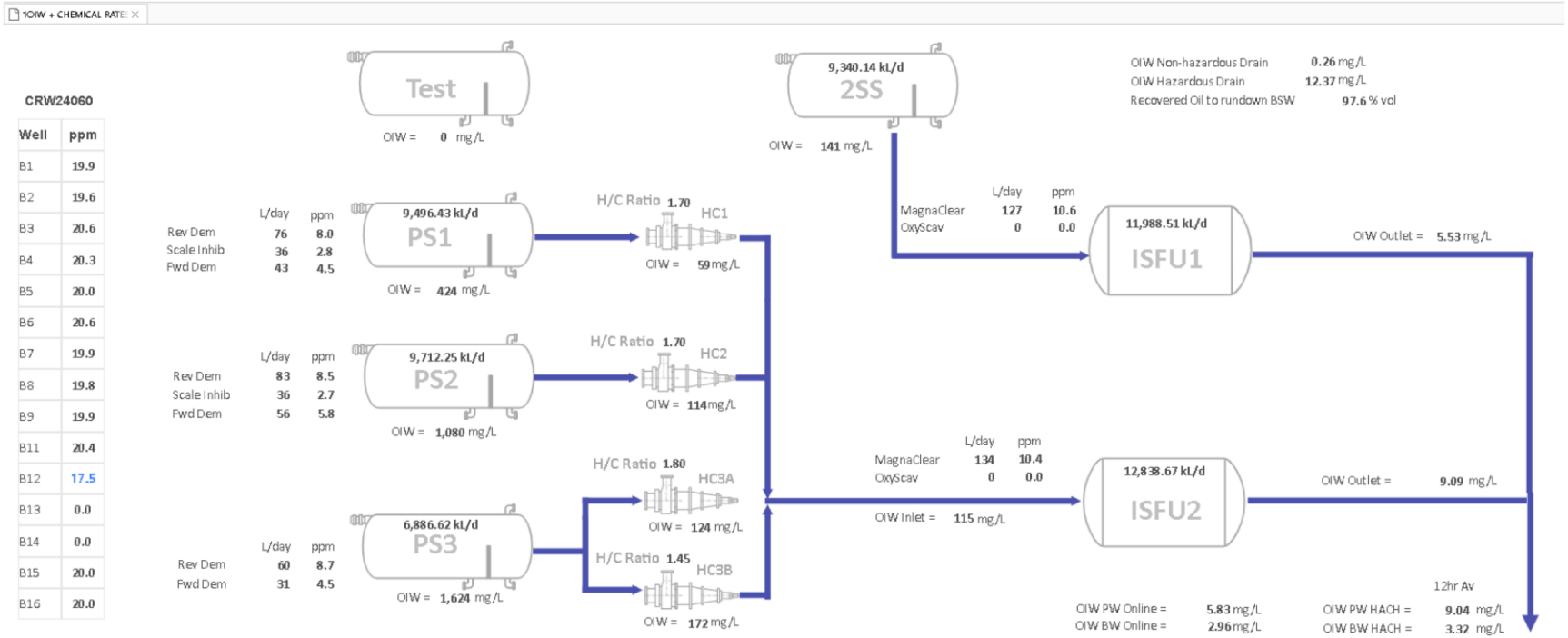


Figure 2-9: Dashboard of OIW tracking

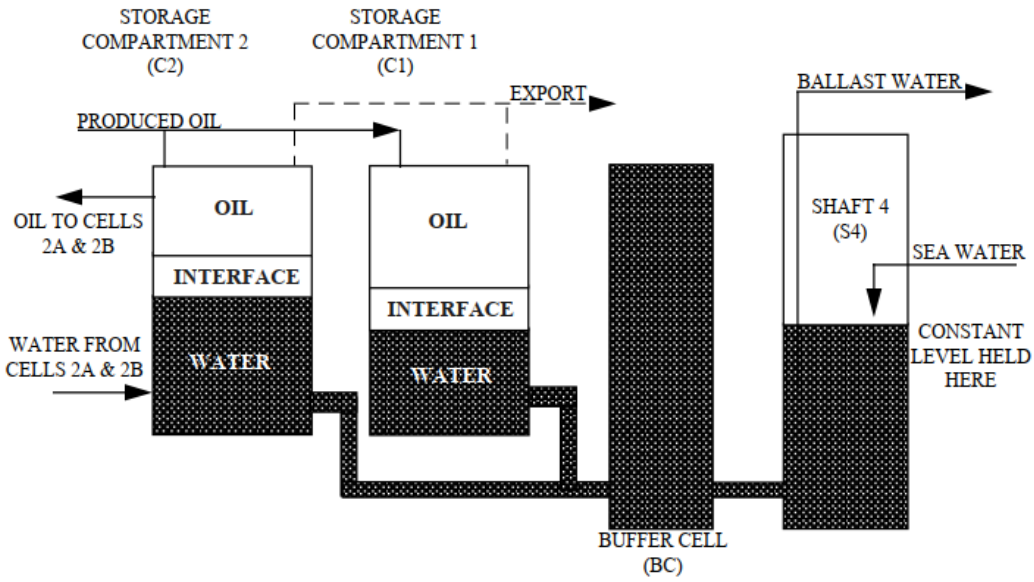


2.5.8.9 Oil Storage System

The two oil storage compartments in the CGS base are filled with oil floating on top of seawater (ballast water) and maintained at a drawdown pressure by keeping the water level in Shaft 4 at about 15 m below sea level (Figure 2-10).

Stabilised and degassed, Crude at atmospheric pressure and ~40°C flows into the 'rundown' caissons and into the storage compartments or cells displacing its own volume of ballast water. The top interconnections between the cell groups of each of the larger storage compartments allow oil to flow between them and maintain a uniform level. The displaced ballast water flows into the buffer cell and then into Shaft 4. To ensure that the ballast water outflow equals the crude production, the ballast pump discharge flow is adjusted to maintain the Shaft 4 water level set point. The ballast water is discharged to sea via the ballast water OIW analyser on the topsides.

Figure 2-10: Oil storage system



Chemical treatment (biocide) of oil storage compartments may be infrequently required to minimise microbial growth and is typically done during exports via biocide treated water added to the buffer cell.

When export of the oil is required, the oil is exported to the tanker moored at the remote CALM Buoy. Normal practice is to export from both compartments simultaneously along with concurrent oil production. One oil export pump is provided for each storage compartment. The pump impellers are vertical type shaft driven and are located in glass reinforced epoxy caissons and are top driven by electric motors situated on the Cellar Deck. The pump can be withdrawn for maintenance when necessary.

2.5.8.10 Oil Interface System

The Interface Layer system is designed to remove any oil/water emulsion that may form at the interface in the oil storage compartments. The inlet suction is situated below the level of oil export suction inlet in the storage compartments. The interface pump is run during export and the system detects the change in density of the interface before it rises to the oil export pump inlet level. This ensures the export crude does not include any free water.

Each main oil storage cell compartment has its own interface pump. The buffer cell also has an interface pump to recover any oil that may be carried over should the main storage cells be accidentally overfilled. Fluid recovered by the interface system is diverted back to the oil storage compartments.

2.5.8.11 Cooling Water

Seawater is primarily used for processing and utilities cooling at WNB but also provides firewater ring main pressurisation and is a feed source for the potable water maker and the hypochlorite generator. Approximately 1,000 m^3 seawater is pumped into the Wandoo Facility per hour. Seawater is lifted from the sea by one or two of three seawater lift pumps. More seawater is required for cooling in summer than winter due to the increase in ambient seawater temperature.

To prevent marine growth in the seawater system, seawater is treated by continuous dosing of hypochlorite at 1-2 mg/L which is consumed by organic material prior to discharge.

The heated seawater is discharged directly overboard to the ocean after usage. Seawater discharged to the ocean (at surface) from the cooling system is elevated in temperature by 2-3°C. The maximum discharge rate is 1,000 m^3/hr.

Freshwater generated by the on-board reverse osmosis plant (Section 2.6.1.5) is also used to top up the closed loop facility cooling medium system which provides process and machinery cooling. The cooling water contains a corrosion inhibitor at a dosage rate of around 0-5% of total cooling system volume, which equates to approximately 20 L per year.

2.5.8.12 Chemical Storage and Injection Facilities

Chemical storage and injection facilities are provided on WNA and WNB. A bunded area is provided for containment of spilt chemicals. Highly flammable chemicals are avoided by suitable selection.

Table 2-19 lists the hazardous substances that may be stored on either the WNA or WNB facilities. Procedures specified in the applicable SDS are followed whenever handling these products.

The SDS are managed in the ChemAlert Database (HSE MS Element 11 – Information Management Documentation and Records). Both offshore and onshore personnel can consult the database.

A JSA is conducted for any work that involves the handling of hazardous substances and their relevant SDS are to be viewed by and accessible to the Work Permit Holder. This is emphasised in the Work Management Manual.

Table 2-19: Hazardous substances

Substance	Maximum inventory	Comments
Corrosion inhibitor	40,000 L	Stored in day tank and IBC containers within a dedicated bund.
Scale inhibitor	10,000 L	Stored in IBC containers within a dedicated bund.
Biocides	2,000 L	
Forward demulsifier	6,000 L	
Reverse demulsifier	20,000 L	
Water clarifier	20,000 L	
Sulphamic acid	2 x 25 kg	Kept in powder form and stored in 25 kg plastic bags within a steel container. Only small stocks are maintained offshore and powder is stored at a safe distance from the other chemicals.
Diesel fuel oil	2,260 m^3	Stored in Shaft 2 (maximum storage 2,200 kl) and the crane pedestal (maximum storage 60 kl).
Gas lift corrosion inhibitor	2,000 L	Stored in IBC containers within a dedicated bund.
Freshwater corrosion inhibitor	800 L	Stored in 200 L barrels.
Oxygen scavenger	4,000 L	Stored in IBCs within a dedicated bund.
Pentane	60 L	Stored in a hazardous chemical storage locker located in the laboratory on WNB. For use in the laboratory.
Anti-foulant	2,000 L	Stored in IBC container within a dedicated bund.
Xylene	25 L	Stored in a hazardous chemical storage locker located in the laboratory on WNB. For use in the laboratory.
Acetone	25 L	
Methanol	5 L	Stored in a hazardous chemical storage locker located in the laboratory on WNB.
Trimethyl Butyl Ether	5 L	

2.5.9 Flaring, Blowdown and Process Venting

2.5.9.1 Flare and Blowdown

Production gas is separated from the well stream by the production separators. Production gas is divided into fuel gas, lift gas and reinjected gas via gas compression. Fuel gas or diesel can used to power the generators and compressor. The excess amount of the remaining gas is reinjected. If the compressors are unable to cope with large volumes of gas coming into the separators the excess gas will be diverted to flare to maintain pressure control. Flaring is only used for separator pressure control and safety reasons and is a key component of the Emergency Shutdown and blowdown systems. Emergency Shutdown and blowdown flaring depressures the facility to half operating pressure within 15 minutes.

The flare system consists of:

- Pressure control valves on each major process vessel or system
- Relief devices at source

- Relief headers routed to the inlet of the flare knockout drum. The knockout drum is sized for knocking out liquids above 300 microns size during gas blowdown
- Flare outlet pipe, supported on a flare boom from the knockout drum to the flare tip
- Flare tip with flare ignition pilots.

The flare knockout drum is sized to remove significant liquid droplets from the gas stream at maximum throughput.

Pressure relief devices and blowdown valves protecting equipment and piping systems are routed to the flare system. Maintenance venting of pressurised hydrocarbon systems and pressure control of the separators are also routed to the flare system.

The automatic blowdown of the process pressure vessels and lines is initiated by fire or confirmed gas detection on the platform. The blowdown system is sized to depressurise the process vessels quickly and safely as per performance standard requirements.

The relief and blowdown discharge is routed via header lines to the Flare Knockout Vessel, sized to remove entrained liquid from the gas. The separated gas is routed to the flare tip via flare header. The separated liquids are returned to process via the closed drains system.

The blowdown system is tested as per performance standard requirements.

The flare system is designed to handle the maximum throughput from the blowdown systems. The flare system is rated for 60,000 Sm^3/hr. The blowdown rate is calculated as 27,000 Sm^3/hr. Flare volumes or rates are monitored, and the platform aims to minimise flaring as far as possible. Generally, the WNB flare is low enough that it is only visible at night. There is monitoring and detection of both pilot burners' functionality including an alarm if the pilot goes out.

The gas is primarily comprised of methane (CH_4) and inert nitrogen gas (N_2) used to purge and sweep some of the hydrocarbon containing equipment. The primary by-products produced from flaring are carbon dioxide (CO_2), carbon particles, and water. Trace amounts of hydrocarbons, carbon monoxide (CO), oxides of nitrogen (NOx) and oxides of sulphide (SOx) are also present. Fuel gas that is combusted in the turbines produces similar by-products.

2.5.9.2 Process Vents

Smaller volumes of other gases are vented from some of the oil rundown caissons, the produced water treatment system, diesel storage tanks, and from the electro-chlorinator which emits low levels of hydrogen gas (H_2). The rate of venting is based on the daily process throughput.

Cold venting from the flare is rare and generally avoided. Cold venting from flare should only occur if the flare pilots are malfunctioning and are not lit.

Nitrogen is used as a blanket inert gas within the WNB process low pressure vents and flare. This sweeps the headers and prevents high concentrations of methane (CH_4) from building up within the pipework.

Small quantities of methane are also released from WNA via pneumatic chemical pumps and instrument gas system vents.

These gases contribute to the atmospheric emissions associated with the activity and are reported as part of the NGERs reporting requirements.

2.5.10 Process Control Features

2.5.10.1 Production

Production flow from each WNB well can be adjusted using the manual choke valves, but in practice it is controlled primarily by the gas lift flow rate or ESP speed. The gas lift rate to each well is measured and is controlled by a flow control valve. ESP speeds are governed using a Variable Speed Drive. The optimum production rate required for each well is normally set following well testing.

To ensure that the ballast water outflow equals the crude production, the ballast pump discharge flow is adjusted to maintain the Shaft 4 water level set point. Selection of well routing from WNA and WNB wells for the test separator and either of the three production separators is achieved by manually operated header valves.

2.5.10.2 Level Control

The WNB separator level control systems provide the ability to operate the separator interface level by either direct level control from the displacer instrument in the separator to the stream outlet valve, or by imposed cascade control where the outlet valve operates on a flow control set point cascaded from the level indication from the displacer measurement in the separator. This provides a secondary control method for the interface level, which can be difficult to measure in heavy oil separation at lower temperatures and provides a damping of liquid outflow during slug flow to the separators.

2.5.10.3 Well Fluid Heating

Process flow from First Stage to Second Stage Separation is heated by flowing through a crude heat exchanger to improve oil/water separation in the Second Stage Separator.

2.5.10.4 Crude Pumps and Metering

During oil export start-up, the pumps are started on re-circulation control prior to the metering system ‘ramp-up’ sequence of controlling the export throughput. Pump minimum flow is maintained by monitoring the metered flow rate and the recirculation flow rate to control the bypass rate.

2.5.10.5 Safety Control Systems for use During Emergencies

2.5.10.6 General

The following systems are provided for control during emergencies.

- Fire and Gas (F&G) detection system
- Process Shutdown (PSD)/Emergency Shutdown system
- Matrix panel
- Emergency Shutdown -0 Relay panel

- Monitoring and Control System (MCS).

2.5.10.7 Wandoo A Systems

Fusible Plug/Emergency Shutdown Panel IP101

The Emergency Shutdown panel IP101 includes:

- Subsurface and surface shutdown of WNA wells
- The provision of a surface output from the panel to trip, instrument gas scrubber shutdown valve – gas lift flow line manifold valves and gas lift knockout drum shutdown valve
- Repeat pressure switches to monitor the gas lift flow line pressure pilots
- All local manual override/trip hand switches on IP101 have one common override/test/run pressure switch at the remote telemetry unit
- Remote reset/start-up override header.

Subsurface control panel IP-102 provides subsurface shutdowns and interface for workover control.

Valve Shutdown Panel IP103

The valve shutdown panel IP103 includes:

- The production flow line shutdown logic allows the shutdown of valve 14-SDV-1065 to be activated from WNB or locally on surface shutdown
- The test flow line shutdown logic allows valve 14-SDV-1075 to be shut down from WNB
- Gas lift isolation valve 14-SDV-1078 can be reset from WNB or locally.

Note that the test riser, header and flow line systems are currently isolated and preserved and no longer used for hydrocarbon service. It is used for round trip flushing of the production riser and flowline system.

Interface Control Panel IP104

The interface control panel contains the following:

- A gas reset header/manifold with electrical solenoid and quick release valve to allow start up override operation from WNB
- Solenoids for individual well surface shutdown initiated from WNB
- Repeat switches 14-PSL-0100 to 0500 for monitoring upper master valve open/closed status
- Manual override/test/run hand switches for the gas lift wing and manifold shutdown valves
- Gas lift manifold pressure pilot and repeat switch
- Instrument gas scrubber high-pressure pilot and repeat pressure switch to monitor the pilot status
- Repeat pressure switch to monitor the gas scrubber high level alarm.

Simultaneous Operations (SIMOPS) with MODU

During well construction or well intervention operations, an Emergency Shutdown-1 (subsurface shutdown) electrical link is installed on the MODU or workover unit, with shutdown buttons places in the Doghouse, Radio Room, or work basket. The Emergency Shutdown loop is linked up to the Emergency Shutdown panel IP101. Prior to commencement of the well construction or intervention operation, the Emergency Shutdown loop is function tested to ensure that the correct signal is being sent and received.

2.5.10.8 Wandoo B Systems

Fire and Gas Detection Systems

The F&G detection system initiates all Emergency Shutdown executive actions including Emergency Shutdown-0 (e.g. control system and battery isolations), Emergency Shutdown-1, Emergency Shutdown-2, platform alarms, firewater and appropriate fire suppressant systems. The fire protection systems on WNB include:

- Water deluge to process areas
- CO_2 suppressant systems to turbine and emergency generator enclosures
- Foam (Aqualoy) systems to fire pump enclosures and galley range hood, water sprinkler system to accommodation internal rooms.

It also sends a signal to the PSD/Emergency Shutdown system to initiate other Emergency Shutdown levels. The hardware consists of a dedicated 'Triconex' programmable logic controller connected to the 'Honeywell' MCS. All F&G status and alarm conditions are displayed on the control room console Visual Display Unit (VDU) graphics. Operator actions acknowledge (e.g. alarm logic reset, fire zone lockouts, setting maintenance overrides) are initiated from the graphic displays or keyboard action.

The 'Triconex' systems have triplicate internal architectures and the MCS interface hardware is duplicated to increase the availability and safety of the systems. Power to the 'Triconex' systems is supplied from two independent 24V DC battery-backed power supplies.

Process and Emergency Shutdown System

The PSD/Emergency Shutdown system initiates all Emergency Shutdown 1, 2, 3 and unit shutdown actions. The hardware consists of a dedicated 'Triconex' programmable logic controller connected to the MCS for display of all shutdown alarms on the VDU graphics and facilities for operator actions (e.g. unit shutdown resets, setting maintenance overrides).

Matrix Panel

The process matrix panel consists of switches, pushbuttons and indicators and is wired directly to the PSD/Emergency Shutdown system. The F&G matrix panel is wired directly to the F&G system to provide direct operator execution of emergency outputs and actions.

Emergency Shutdown-0 – Relay Panel

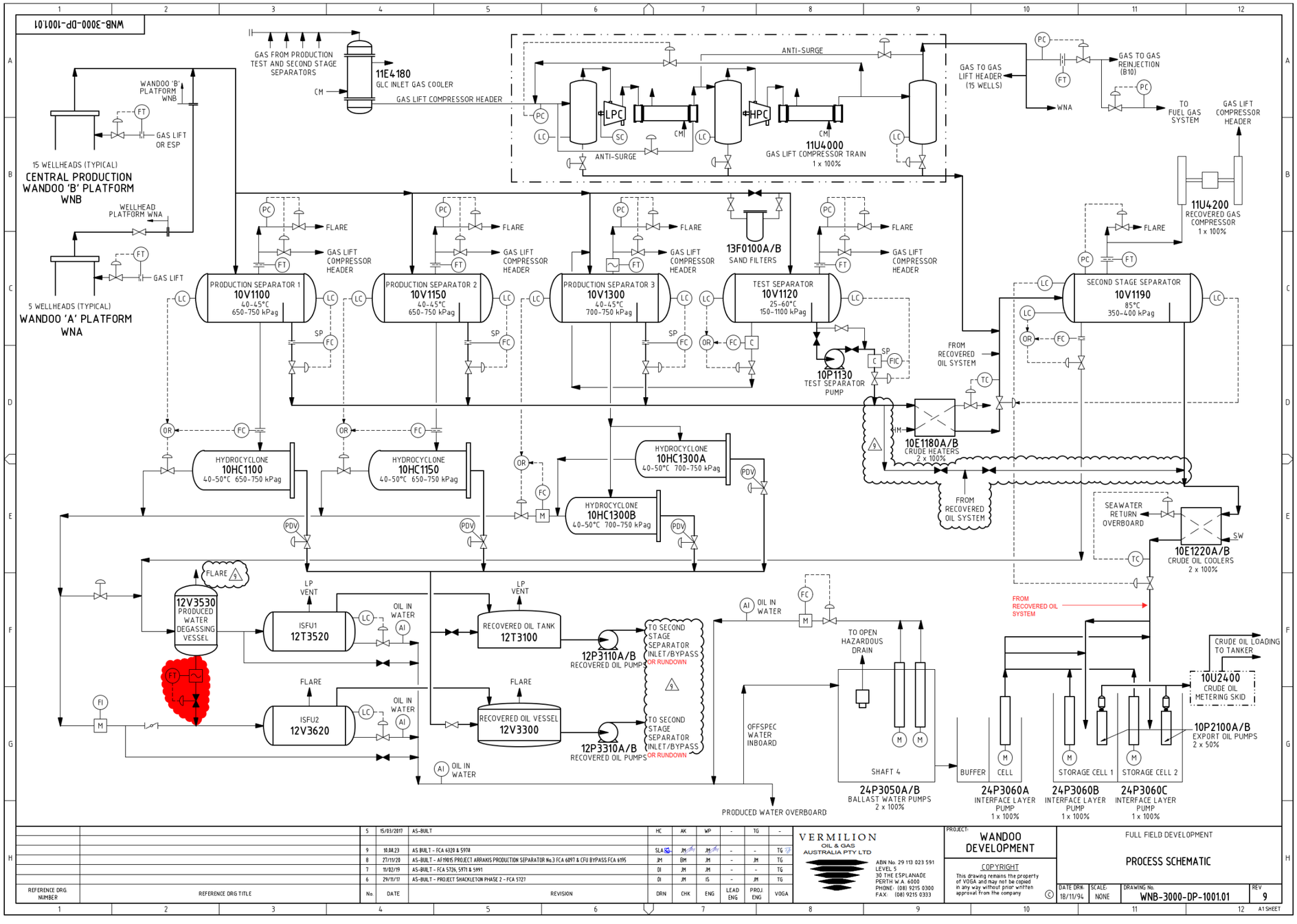
The Emergency Shutdown-0 relay panel is an independent hardwired system designed to initiate Emergency Shutdown-0 executive actions in the event of a total failure of the F&G system. Without the F&G system, the safety of the platform cannot be monitored, necessitating a total shutdown of the facilities. Initiation of Emergency Shutdown-0 is from pushbuttons in the control room and at the lifeboat stations; and is initiated automatically when all three F&G processors fail or if gas is detected within the Temporary Refuge (TR) area.

Monitoring and Control System

The MCS is in the Central Control Room (CCR) within the TR and performs all monitoring and control functions on WNB and provides operations and monitoring interfaces to the F&G, PSD/ Emergency Shutdown and WNA systems. The MCS consists of Honeywell Experion hardware that has a duplicated architecture to increase system availability. The control room console contains five VDU-based four operator stations and multiple displays and three printers that are used for reporting, indication and alarming of the MCS, PSD/Emergency Shutdown, F&G and WNA systems. All displays and operator functions are accessible from operator stations.

Monitoring is also possible remotely through Honeywell Experion station and LAN connection. The Experion provides easier Honeywell maintenance and engineering upgrades to be completed on the monitoring system and is an additional screen which displays critical alarms. Excessive number of alarms can be silenced during an emergency to give the operators a better focus on the key control actions.

Figure 2-11: Process flow diagram of Wandoo facilities



2.5.11 Export of Hydrocarbons

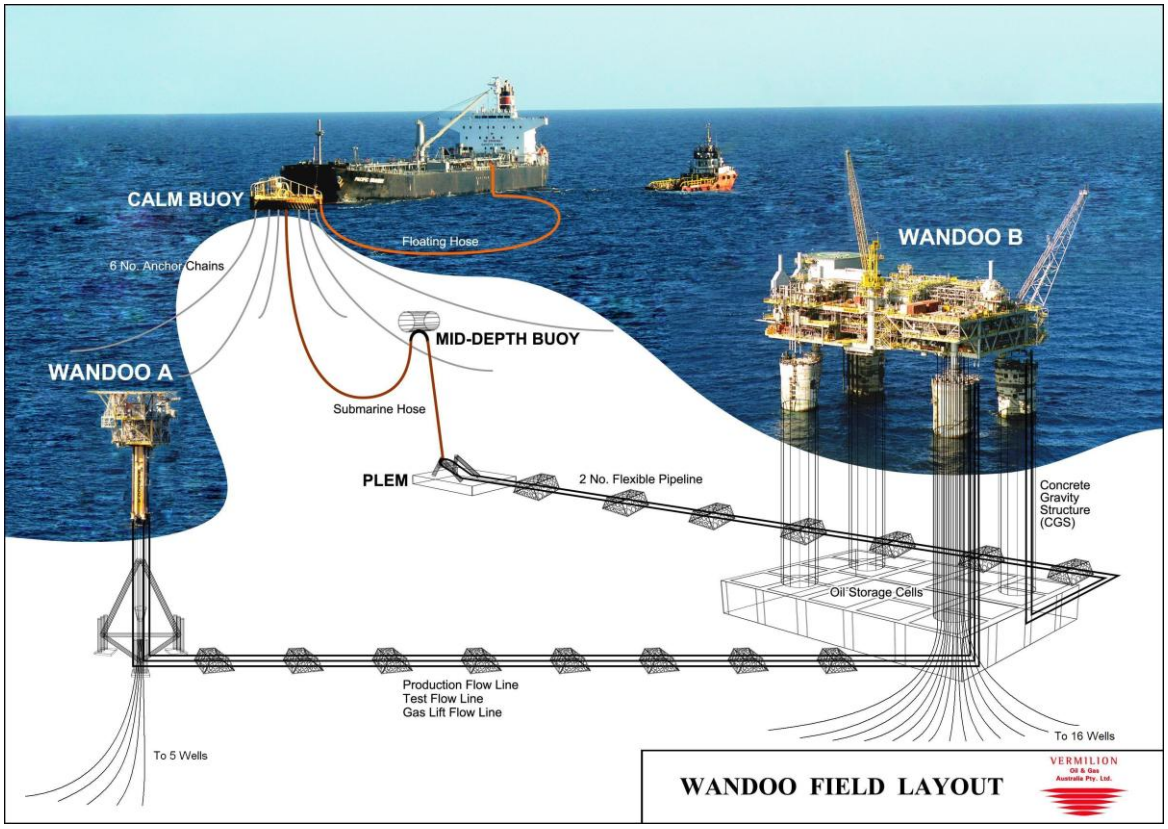
2.5.11.1 Export System Flow Lines

The export lines inventory is stabilised crude oil of the required specification. Table 2-20 shows the properties of the export system. A schematic of the export system is shown in Figure 2-12.

Table 2-20: Export system line pressure, temperature, flow rates and components

Flow line	Size	Operating pressure (kPag)		Design temp. (°C)	Flow rates (bpd)
		Design	Operating		
Export Flowline	2 of 14" NB	2700	1320	60	150,000 -300,00
PLEM	14" OD (manifold and piping)	1960	-	21 to 40	150,000 -300,00
Submarine Hose Assembly (SHA)	10 X 16" NB	-	1900	-20 to +82	150,000 -300,00
Floating Hose Assembly (FHA)	1 x 12/16" NB	-	1900	-20 to +85	150,000 -300,000

Figure 2-12: Schematic of the Wandoo B export system



2.5.11.2 CALM Buoy System

The tanker anchoring zone is located five nautical miles from the Wandoo facilities. The Wandoo Mooring Master boards the tanker two nautical miles out from the terminal. A series of safety checks are then undertaken before piloting and berthing the tanker onto the CALM Buoy that is located 1.2 km north of the WNB platform. A 3 knot speed limit applies within the 500 m restricted zone. The CALM Buoy is 15 m in diameter and 8 m deep and comprises a central chamber surrounded by six watertight compartments. Two of these compartments are filled with polyurethane foam to ensure positive buoyancy should accidental flooding occur.

The buoy is anchored to the seabed by six anchor lines.

The central chamber contains the product pipework that connects the under-buoy hose to the Product Distribution Unit (PDU). The PDU comprises a fixed inner section and an outer section that is free to rotate with a rotating arm assembly and permits the tanker to weather vane about the buoy whilst continuously loading crude oil.

The rotating arm assembly comprises a pipe arm, mooring arm and balance arm. The pipe arm carries the crude flow to the floating hose. The mooring arm provides an attachment point for the mooring hawser. The balance arm is oriented to counterbalance the weight of the mooring arm and pipe arm, thus balances the mooring loads and allowing the arms to rotate.

Pre-start and routine checks are performed on the tanker during offloading in accordance with requirements of the SPM Marine Facilities Procedures (WPA-7000-YV-0002). Whilst the third party vetting agency checks the tanker for class and compliance with terminal requirements, the mooring master signs off on the tanker prior to allowing it to proceed to berth at the CALM Buoy. The tankers remain on site for up to 72 hours.

2.5.11.3 Offtake Operation

Overview

Oil is offloaded from the WNB CGS through twin 348 mm 1.2 km long flexible flowlines to a CALM Buoy via a Pipelines End Manifold (PLEM) and submarine hose system.

The oil export pumps draw the oil from the storage compartments of the CGS through the oil export product storage facility lines in Shaft 4. The oil then passes through the metering skid located at the north end of the Cellar Deck and Shutdown Valves (SDVs). The oil then travels down twin 355.6 mm OD carbon steel risers located on the external west face of Shaft 1 to a twin 1.2 km flexible flowline system from WNB to a CALM Buoy via a PLEM and submarine hose system.

The system comprises the following:

- WNB topside export piping from each storage cell with an individual export pump, metering run and Emergency Shutdown Valve installed on the Cellar Deck. The systems are flanged to a tie-in to the platform export risers.
- A flowline riser (356 mm OD) installed externally down the west face of Shaft 1 of the CGS, crossing to the south of Shaft 4 to the western edge of the platform substructure to terminate approximately 1 m above the scour protection, 20 m from the northwest corner of the substructure.

- Two 348 mm ID approximately 1,250 m long smooth bore flexible flowlines running due north from the platform. Flowlines are flanged to the riser and to the PLEM. Subsea flowlines are subject to regular subsea inspection where the support of the flowline on the seabed is inspected for scouring or change.

A gravity based subsea PLEM structure contains the 356 mm OD manifold pipework. Flow is commingled via equal diameter barred 'Tee" and is configured to allow for future 'round up' pigging of the subsea lines. The pipework contains a single diver operated, in-line ball valve downstream of the manifold. Pipework terminates in a single 400 mm NB ANSI class 300 bolted flange.

Tanker Movements

Tanker movements occur approximately every 2 to 8 weeks, depending on production rates and market requirements. Offtakes occur 6-10 times per year. Duration of export activity is typically up to 54 hours depending on the export cargo size and transfer rate. During export operations, a suitable Offtake Support Vessel provides a stern static tow of the Tanker whilst moored to the CALM Buoy.

Export tankers are only within the scope of this EP when connected to the Wandoo Facility.

The most frequently used tanker type is the Aframax, details are outlined in Table 2-21.

Table 2-21: Tanker details

Name	Length (m)	Cargo tank capacity (m^3)
Aframax	~250	~125,000

2.6 Support Activities for Operations

Includes all supporting activities required to meet the primary activities of processing, storage and export of hydrocarbons from the Wandoo Facility.

2.6.1 Platform Support Operations

2.6.1.1 Crane Operations

Platform cranes transfer materials to and from the supply boats and any materials on the WNA and WNB platforms. Table 2-22 shows crane types and locations on the Wandoo platforms.

The cranes on WNA and WNB are powered by diesel engines.

Table 2-22: Crane types and locations on Wandoo platforms

Platform	Model	S/N	Boom length	Winch capacities				Engine
				Main hoist		Fly hoist		
				Low	High	Low	High	
WNA	60 RL	824	12	7	N/A	N/A	N/A	Isuzu 6BD1
WNB	ML 6400	26651	39.6	25	10	N/A	N/A	GM8V-92TA

2.6.1.2 Waste Management

The VOGA Waste Management Procedure specifies that all wastes, apart from approved discharges are stored in suitable containers on the platform and returned to shore for disposal.

The waste streams covered by this procedure fall into three main categories:

- Recyclable (non-hazardous)
- General (non-hazardous)
- Hazardous.

The procedure provides detailed information and guidance to ensure that waste is correctly identified, classified, labelled, stored, transported, treated, and disposed of in accordance with regulatory and VOGA requirements.

Sewage, greywater, putrescible waste and cooling water are discharged from WNB.

2.6.1.3 Power Generation and Compression

The Wandoo Facility main Alternating Current (AC) power is provided by two Gas/Diesel Turbine Driven Generator Sets (located on the Main Deck), and one Diesel Driven Emergency/Standby Generator set located on the Cellar Deck. The two Turbine Driven Generator Sets have the capability of running on a diesel or natural gas fuel supply.

The Turbine Driven Generator Sets are the normal source of AC power for the Wandoo Facility. The two Turbine Driven Generator Sets and the Standby/Emergency Generator Set have the capability of parallel operation. The requirement for initiation of parallel operation is dependent on Wandoo Facility load demand and to suit operational procedures, such as carrying out routine maintenance/load checks on the Standby/Emergency Generator.

The AC power for the Wandoo Facility is generated at 6,600 V AC and distributed at 415 V, three-phase, four wire facilitating provision of neutral earth resistor for current limiting of neutral to earth fault via two 6,600/415 V step down transformers. Each of these transformers can provide the total power requirements for the Wandoo Facility LV loads. In normal operating conditions, both transformers are operative and share the AC electrical load of the Wandoo Facility.

The voltage levels utilised on the Wandoo Facility are listed in Table 2-23.

Table 2-23: Voltage levels at the Wandoo Facility

Equipment	Voltage levels
Main Turbine Driven Generators	6,600V AC, 3P (three-phase), 50Hz, four wire, 4MW
Emergency Diesel Generator	415V, 3P, 50Hz, four wire, 240V AC, two wire
High Voltage (HV) Motors	600V AC, Note: that all electric motors on the facility are started direct online except for the four down-well ESPs.
LV Motors	415V AC, 3P, 50Hz (the fractionally rated motors, are 240V AC)

Equipment	Voltage levels
Lighting	240V AC, 50Hz
Switchgear Controls	24V DC
Motor Controls, start/stop/local/ remote	24V DC
Fire and Gas, Master Control Panel	24V DC and 240V AC, 50Hz
Navigational Aids	12V DC nominal with 14V DC feed and 240V AC
Emergency Lighting	240V AC, each of the emergency fluorescent light fittings is provided with an integral battery pack
Link Radio/Public Address (PA) System	-48V DC
Ultra-High Frequency (UHF)/Very High Frequency (VHF) Radio	+12V DC and 240V AC 50Hz
Entertainment/Data Systems	240V AC 50Hz

2.6.1.4 Laboratory

A laboratory is located on the south end of the Mezzanine Deck on WNB and is used to analyse routine process samples.

Laboratory wastes are generated during testing well stream, ballast water and PFW characteristics. The wastes comprise n-pentane, acetone, hydrochloric acid and the detergent "Quantum Clean". Oil soluble chemicals are disposed to the CGS oil storage.

All hazardous waste generated in the laboratory are disposed of in accordance with the Waste Management Procedure.

Laboratory sinks and drains are connected to the open drains tank for separation and recovery.

2.6.1.5 Potable Water Production

The desalination plant on WNB produces approximately 60 m^3 of potable water per day.

The volume of reject water produced is dependent on the amount of potable water required on the platform but is estimated to be approximately 500 m^3 per day. The salinity of the discharged reject water is slightly higher than seawater and contains small quantities of scale inhibitor. The reject water is discharged directly overboard.

2.6.1.6 HVAC and Refrigeration Systems

The ventilation, pressurisation and air conditioning systems on the WNB platform are divided into discrete areas according to the specific requirements of the area.

The separate areas with dedicated Air Handling Units (AHUs) are as follows:

- HV & LV Switch Rooms, Battery Rooms, Temporary Refuge (Muster Area, Equipment Room, Control Room and Communications Room)

- Mech Workshop, InElec Workshop, Store Room and Laboratory
- PLQ Lower Level
- PLQ Intermediate Level
- PLQ Upper Level
- PLQ Extension (XLQ)
- The Shaft 4 air space is force ventilated with fresh air via fans and ducting but does not contain any heating or refrigeration equipment.

Chilled water to first five AHUs above is supplied from the original central chiller package located on the south west corner of the Mezzanine level. There are two sea water cooled chiller units and operating in a duty/standby configuration.

Chilled Water to the XLQ AHU is supplied from the XLQ chiller package located on the south centre of the Main Deck. There are two air cooled chiller units operating in a duty/standby configuration.

Additional Heat Pump type refrigeration units are installed for:

- 2 x Galley Cool Rooms located on the Main Deck south at the PLQ Lower level for food storage
- External Freezer Room on Main Deck south for food storage
- HV Switch Room booster coolers on Mezz Deck south east. 3 x units were added to manage increased the thermal loads from ESP Variable Speed Drives installed in the HV Switchroom
- Crain operators cabin air conditioning.

The HVAC dampers are fitted where required for fire & gas isolations and are tested as per Critical Function Test (CFT) requirements.

Maintenance and servicing of HVAC and refrigeration systems is generally performed by a specialist third-party service provider.

2.6.1.7 Fuel Bunkering

Bunkering of diesel is undertaken in accordance with the procedure outlined in the Platform Operations Manual. Diesel required for fuelling the Wandoo Facility is transferred from a bunkering vessel via a flexible hose to the WNB platform. The hose connects to receiving manifold on the WNB topsides which provides course filtering before directing flow to Shaft 2 inlet standpipe. Shaft 2 has a maximum storage volume of 2,200 m^3. Fuel preservative or equivalent (aquatic biocide) is added to ensure fuel is suitable for long-term storage. This will remain in the fuel and is not discharged. On completion of the fuel transfer from the bunkering vessels, the contents of the hose are drained back to the vessel tanks(s). An end cap is fitted to the flexible hose before it is recovered from the vessel deck and stored on the facility hose saddles.

The frequency of bunkering depends on the storage capacity of the bunkering vessel used and its availability. The largest bunkering vessel that is used has eleven tanks with a total storage capacity of 450 m^3. Bunkering takes place as required depending on operational needs. The average supply vessel has a storage capacity of 200 m^3.

2.6.2 Marine Vessel Operations

Support vessels are normally contracted to support the Wandoo Facility operations and are considered in scope when they are within the Operational Area. They provide the following services:

- Supply materials and services and bulk and liquid waste removal
- Diesel fuel bunkering to WNB or MODU
- Offtake operations
- Vessel based marine mooring facilities maintenance or replacement
- Diving operations for inspection, maintenance, repair or replacement of subsea infrastructure
- Surveys including remotely-operated vehicle (ROV), side scan sonar, sub-bottom profiling
- Towage of new infrastructure into the field and old infrastructure out of the field
- Personnel accommodation
- Emergency response, including standby and rescue and on-site oil spill response.

Examples of typical support vessels used for these activities is provided in Table 2-24.

Table 2-24: Example support vessel details

Activity	Vessel name or analogue	Gross Tonnage
Production support, diesel bunkering and ROV	Bhagwan Athos Mermaid Guardian	2,237 499
Air diving	Bhagwan Dryden	1,475
Dive support/construction vessel (saturation diving, hyperbaric rescue vessel)	Sapura Constructor Southern Star Skandi Singapore	8,337 10,097 7,386
Crew transfer vessel	Sea Stryder/Stenella/Loligo	32
Tug	Athos Offshore Supplier	2,237 468
Accommodation vessel	Jack-up – Keppel FELS KFELS MOD V Super B Class or Friede & Goldman JU3000N designs or similar	5,000 to 12,000

It is estimated that infield vessel movements at the Wandoo Facility are in the order of one per week for approximately one day. The maximum POB for an accommodation vessel is 120. The maximum POB for all other support vessels is 52.

Saturation diving vessels are only as required for specific activities but generally are a one in five-year event. Most of these vessels are based in Dampier. A Hyperbaric Rescue Vessel may be required to support diving activities, but would not be located in the Operational Area unless required. If a Hyperbaric Reception Facility is required, it will be located in Dampier.

During some project activities (e.g. infrastructure replacement) the volume of vessels will increase to up to 4 vessels per day over up to 7 weeks. The most vessels that will be in the Operational Area concurrently is 4, potentially consisting of 2 tow tugs, a crew transfer vessel and a diving support vessel. There would only be 4 vessels in the Operational Area for short periods of time, not for the duration of a project.

Some projects may require the use of an accommodation vessel. The longest duration for an accommodation vessel in the Operational Area could be up 7 weeks and it would be moored and may be connected to a facility via a gangway.

Aspects associated with standard vessel operations include:

- Navigational lighting
- Atmospheric emissions
- Operational discharges:
  - Sewage, greywater and food waste
  - Cooling water and reverse osmosis brine
  - Deck drainage.

All vessels are required under contract to comply with all State and Commonwealth legislation for the control of all sources of pollution and of discharges at sea, Marine Orders (enact MARPOL) and quarantine requirements. In addition, all vessels are required to have a Shipboard Oil Pollution Emergency Plan (SOPEP).

2.6.3 Helicopter Operations

Primary personnel access to the WNA and WNB platforms is by helicopter. Normal transport of materials is by supply vessel. Helicopter transport is used on occasion for small items requiring urgent delivery.

On average there is 4 helicopter return trips (Karratha-Wandoo A/B-Karratha) within the Wandoo Operational Area per week.

2.7 Maintenance, Inspection and Project Activities (Facility)

Extends to all maintenance, inspection and repair activities undertaken on WNA and WNB.

Projects may be required for significant activities on the facility, such as replacement or maintenance of major equipment or a significant portion of infrastructure. A project may be a single, integrated campaign with an indicative duration of up to 7 weeks including a range of the activities detailed within this section.

There will be up to 4 projects across the validity period of this EP in total (i.e., including facility and subsea projects).

2.7.1 Rigless Well Intervention Works

Most rigless well interventions at Wandoo are remedial operations performed on production wells with the intention of restoring or increasing production. A well may require intervention due to flow restrictions, replacement of ESP equipment, changes in reservoir characteristics, sand production, mechanical failure, or to access additional hydrocarbon pay zones.

Rigless well intervention techniques may include Light Well Interventions (LWI) or Heavy Well Interventions (HWI). Light Well Interventions would typically include operations utilising

- Electric (wire) line (EL)
- Slick line (SL)
- Pumping.
- Coiled tubing (CT)
- ESP replacement with Hydraulic Workover Unit (HWU)

Heavy Well Interventions would typically involve operations utilising:

- Workovers/recompletions with Hydraulic Workover Unit (HWU).
- Well abandonment with Hydraulic Workover Unit (HWU)

Rigless well intervention activities do not require the use of a MODU, and the equipment packages have the capability of performing down hole applications in live (under pressure) wells. However, typically well intervention operations at Wandoo are carried out following the depressuring of the wells. Although wells may be “depressurised” and effectively won’t flow to surface, intervention is still under pressure and requires the use of tested Pressure Control equipment per VOGA’s Well Operations Management Plan (WOMP).

SL is the most common rigless intervention activity carried out at Wandoo. The SL is run on a hydraulic powered winch system and is fed into the well through a set of pressure control equipment (stuffing box, lubricator and BOP). It involves the use of a thin (2.7 mm or 3.2 mm diameter) high strength chrome steel wire to convey tools into and out of the well. The SL cannot supply electricity to down-hole tools, although some tools are powered using independent power packs. It is primarily used for “through tubing operations” to conduct fishing, gauge cutting, setting or removing plugs, deploying or removing retrievable valves and memory logging operations and the maintenance/change-out of GLVs.

EL is a steel armoured mono or hepta core electric cable that can transmit well data continuously to the surface or conveying signals to down-hole tools. The EL is run on a hydraulic powered winch system and, during intervention operations, is typically fed into the well through a set of pressure control equipment (stuffing box, lubricator and BOP). It is primarily used for “through tubing operations”, taking production logs and setting/pulling plugs; it is also capable of conducting perforation operations. If EL activities need to be carried out below the production packer, the line must be conveyed into the well using electric powered down-hole tractors to pull the wire down-hole due to the angle of inclination of Wandoo wells.

A CT operation involves inserting a continuous and a flexible steel pipe into a well bore. The tubing is transferred off a hydraulic powered winch system and fed into the well by an injector head (a

powered set of chains and dies) through a BOP system. The tubing is a single length of high strength drawn steel that is flexible enough to be coiled onto a reel, with diameters that range from ¾" to 3-1/2". It is primarily used for "through tubing operations", taking production logs, pumping of fluids for stimulation or treatment purposes, setting/pulling plugs and conducting perforation operations.

An HWU operation involves the use of a hydraulic powered unit (often referred to as a Snubbing Unit). The unit uses hydraulic cylinders which carry gripper jaws that travel over a ~3 m stroke, to push and pull jointed sections of pipe into or out of a well. As with all other intervention activities, HWU operations are carried out through BOP system to provide well control capability. An intervention of this type may be used if the configuration of the well needs to be changed and requires the recovery/reinstallation of the completion string or for abandonment activities for a well. An HWU operation will also, typically, require the use of pumping, SL and/or EL as part of the activity. HWU operations are also used to run or retrieve ESP equipment into the ESP operated wells (B11/ST1, B12ST2/ST3, B15ST1 and B16ST2).

The type of operation to be undertaken determines which type of equipment package is selected.

The most common use of pumping operations on Wandoo is to kill and suspend an active well as part of a workover operation, or in preparation for a well construction campaign. It involves connecting an independent pumping unit (typically a diesel powered triplex unit) to the tree and wellhead system of the well via high pressure lines, and pumping kill weight fluid down the annulus and tubing of the well to push any hydrocarbons in the well back down below the production packer, leaving the well filled with kill weight fluid from the wellhead to the production packer. This type of equipment package may also be used for the pumping of fluids for stimulation or treatment purposes.

During well intervention works, biocide treated water is utilised in wells, risers and BOP to protect the reservoir. Following well intervention works, the well may be flowed via the process facilities to be cleaned up and the treated water is directed to either storage (CGS) or the PWTP.

Rigless well intervention works are conducted as required, historically once or twice per year.

2.7.2 Purging of Gas from Vessels and Tanks

Tanks and vessels at the Wandoo Facility need to be flushed and purged to remove hydrocarbon liquids and gas prior to activities such as confined space entry. The tanks and vessels are purged using an inert substance (e.g. Nitrogen or inhibited water) to displace the gas. The gas is purged to the flare or venting depending on the pressure.

2.7.3 Pigging with Biocide

At Wandoo pigging runs are used to clean the flowlines of bio-mass accumulation to reduce microbiologically influenced corrosion (MIC). Routine operational pigging of the production line from WNA to WNB commenced in early 2006 to reduce possible MIC. The pigs are inserted into the flowlines from a pig launcher on WNA and are used to remove obstructions and biofilm on internal pipe surfaces whilst the biocides are utilised to enhance biofilm removal by the pigs and to prevent further biofilm activity in the pipework and process fluids.

The biocide used is Tetrakis (Hydroxmethyl) Phosponium Sulphate (THPS). This biocide biodegrades rapidly, as it reacts readily with any organics, and has a very short half-life in the presence of seawater. The degraded by-products are non-toxic, and there is no bioaccumulation of this product.

Currently the biocide treatment is conducted during tanker loading as this procedure enables all PFW to be diverted inboard to the storage cells, where it mixes with ballast seawater. The pigging and biocide application is completed in the first half of the procedure, to allow active biocide maximum contact time with the seawater.

Once the active biocide is exhausted, the PFW and ballast water can be discharged to the natural environment in accordance with the Wandoo Platform Operations Manual.

Testing indicates that the biocide will remain active for 2-3 hours after injection and requires a minimum of 4 hours residence time in Shaft 4 before it can be discharged overboard.

Tanker loadings presently occur at two to eight-week intervals, enabling VOGA to conduct the pigging and biocide program at these intervals.

Intelligent pigging is also undertaken on the inter-field flowlines approximately every four years to measure the wall thickness of the flowlines and to identify if corrosion above expected limits has taken place. During the process the lines are flushed with biocide (THPS) treated seawater and this is directed to CGS storage where it mixes with ballast seawater and is both diluted and degraded before release.

2.7.4 Welding and Cutting

Arc welding and oxy-acetylene welding and cutting and will be undertaken at the Wandoo Facility.

Welding habitats or enclosures are used to contain sparks and welding debris. This waste is then transferred to the general waste containers on the platform and taken onshore for disposal.

2.7.5 Chemical Cleaning

Chemical cleaning is undertaken on the heat exchangers and various tanks and vessels throughout the Wandoo Facility as required. Sulphamic acid is used for chemical cleaning, is neutralised with caustic soda following chemical cleaning and discharged neutralised to the hazardous open drain system.

2.7.6 Deck Cleaning

Deck cleaning is undertaken at WNA and WNB once a week or more often if required. Drainage from the deck may contain oil, grease, detergents, dirt and other hazardous chemicals.

On WNA, deck drainage is collected through an open drain and stored in the open drain tank. The contents of the open drain tank are then transferred to a waste bulky for appropriate disposal.

On WNB, deck drainage is transferred to the hazardous and non-hazardous open drain systems. Any oily waste is separated from the collected fluid in the drains tank and systems. The oil is then

transferred to the CGS and the drains water discharged overboard. Daily sampling of these overboard discharge streams is recorded in the laboratory and daily report.

2.7.7 Topside Maintenance

2.7.7.1 Blasting

Blasting of topside infrastructure is undertaken regularly in preparation for spray painting. Methods used include:

- Abrasive blasting using sand or garnet
- Mechanical abrasion using wire brushes
- High pressure water blasting.

The preferred method is high pressure water blasting. If this is not effective, mechanical abrasion using wire brushes will be used. Alternatively, if mechanical abrasion is not effective then abrasive blasting using sand or garnet is used.

Containment barriers are used to trap and collect abrasive solids; this is then transferred to general waste containers on the platform before transport onshore for disposal at approved waste disposal sites.

2.7.7.2 Spray Painting

Spray painting is undertaken on a regular basis. Spray paint is stored in approved paint storage containers within dedicated bunds. Empty paint containers are disposed of as hazardous wastes.

2.7.7.3 Epoxy Wrap

The application of epoxy composite wraps may be used to repair topside equipment. The wrap process is an approved repair method (to ISO 24817) and consists of 4 main stages:

- Surface Preparation - Abrasive blasting of the surface will be performed to remove rust.
- Application of Primer and Filler - Immediately following surface preparation, a three-part epoxy primer will be mixed and applied.
- Pre-Impregnation of Tape - The reinforcement tape will be impregnated with two-part resin. The resin is mixed and applied to the reinforcement tape.
- Application of the Composite Wrap - The impregnated tape will be wrapped around the surface until the required thickness is achieved.

Any waste generated is transferred to the general waste containers on the platform and taken onshore for disposal.

2.7.7.4 Workshop

Mechanical and electrical workshops are located at the southern end of the WNB Mezzanine Deck. The repair, maintenance and calibration of plant and equipment are undertaken at these workshops.

2.7.8 Fire Protection Systems and Testing

The fire protection system consists of:

- Firewater pumps
- Deluge system
- Sprinkler system
- Monitors.

There are two 100% diesel driven vertical lines shaft type firewater pumps. The pumps are located at the south of the blast wall on the east and west sides of the Cellar Deck. The pumps are tested using the full flow discharge line which discharges the seawater overboard.

Deluge systems provided in areas where hazards from hydrocarbon pool and jet fires exist are designed to provide 'control of burning' protection. Each deluge system comprises a deluge valve, a distribution main and distribution deluge branches fitted with spray nozzles at designated intervals.

There are deluge systems distributed across the Wandoo Facility as follows:

- Cellar Deck – 5
- Mezzanine Deck – 1
- Main Deck – 2
- Over fire pumps and emergency generator enclosures.

A wet-type sprinkler system is installed in all accommodation spaces where the use of water to extinguish fires is appropriate.

There are two independent, 100%, duty water driven, manually activated, automatically oscillating type firewater monitors on the helideck. Each monitor is provided with a dedicated foam unit. The dedicated foam units have a foam storage capacity for 15 minutes supply of 1% Aqueous Film Forming Foam (AFFF). The monitors have a flow rate of 1,800 m^3/min and a throw of 48 m as a jet and 18 m as a spray.

The main deluges or hydrant systems are also used to deliver AFFF from the centralised system, which adds foam to the ring main if required. Twin outlet hydrants are provided at each fire point on the Wandoo Facility.

The components of the fire-fighting system that are tested, the frequency of tests and the discharge composition are outlined in Table 2-25 below. AFFF isn't run through the water lines unless the system is activated for fire-fighting.

Table 2-25: Fire protection system testing

Component	Frequency	Discharge composition
Firewater pumps	Fortnightly	Seawater discharged directly to sea
Deluge system	Biannually	Seawater discharged via deluge drains to sea

Component	Frequency	Discharge composition
Helideck	Annually	108 m^3/hr seawater. Test for five minutes, via helideck drain to sea

2.8 Maintenance, Inspection and Project Activities (Sea Level and Subsurface)

2.8.1 Overview

Extends to all sea level and subsea activities that may be undertaken to maintain the primary activities of processing, storage and export – including integrity management.

Projects may be required for significant sea level and subsea activities, such as replacement of major equipment or infrastructure. A project may be a single, integrated offshore campaign with an indicative duration of up to 7 weeks and including a range of the activities detailed within this section.

2.8.2 Metrology

Metrology includes laser and acoustic surveys undertaken to take measurements between subsea structures (primarily interconnecting flowlines). These may include laser, sonar, tape measure, inclinometer and taut lines.

2.8.3 Side-scan Sonar Surveys

Side-scan sonar is a marine geophysical technique that is used to produce an 'image' of the seafloor. Side-scan sonars may be used for environmental benthic habitat mapping, inspection of subsea infrastructure and site surveys of offshore exploration permits and licences.

Side-scan transducers may be mounted on Autonomous Underwater Vehicle (AUV) systems, support vessel hulls or more commonly using a towfish. The towfish is towed behind the vessel at low speeds. Towfish are generally towed at 10-20% of the swath width above the seabed.

The technique uses pulses of sound at perpendicular angles to the side-scan sonar system. Both transmit and receive sensors are contained within the same unit. When the return acoustic pulses are processed, they provide information on the amplitude of the return pulse which in turn provides information on the composition of the seabed. For example, a strong return pulse is generally associated with a harder seabed surface. Shadows on the acoustic signals can also be analysed to infer the heights of any objects on the seabed.

Side-scan sonar systems generally operate in the 100-500 kHz frequency range with a sound source level of around 220-226 dB re: 1µPa @ 1m (Department of Energy and Climate Change, 2011). Higher frequency side-scan sonars provide information at a higher resolution, but the swath width is generally smaller. Side-scan swath width is ultimately dependent on a combination of frequency and the height the towfish is towed above the seabed.

2.8.4 Sub-bottom Profiling Surveys

Sub-bottom profiling is a geophysical survey technique that is used to establish the geology of the seabed. Sub-bottom profiling techniques range considerably in terms of power and acoustic sources. Low-frequency systems can provide information to greater depths, whereas high-frequency systems give more detail at shallower depths but do not have the acoustic power to penetrate to deeper depths.

High-frequency systems such as Chirps and Pingers tend to operate in the 0.5 kHz to 25 kHz range. The sound source level of these high-frequency systems tends to be in the 210-220 dB re: 1µpa @ 1m range dependent on the specific system that is used. These systems are used for high resolution shallow surveys and are capable of penetration depths to 30 m. The acoustic source and receivers are generally enclosed within a single unit. These high-frequency systems can be mounted on a support vessel, AUV or mounted on a surface or deep tow towfish. Survey requirements will determine which system is used.

Lower-frequency systems such as Boomers and Sparkers tend to have a larger sound source and greater penetration of the seabed. These systems can also be mounted in surface tow or deep tow systems depending on survey water depth. Surface shallow water systems are generally used in water depths up to 100 m. These systems tend to operate in the 500 Hz to 4 kHz range. The SEL for these systems is generally in the range of 212-226 dB re: 1µpa @ 1m.

2.8.5 Multi-beam and Single-beam Echo Sounder Surveys

Multi-beam echo sounders (MBES) and Single-beam echo sounders (SBES) are hydroacoustic survey techniques used to determine water depth. MBES systems vary in frequency and frequency determines the resulting resolution and suitable depths. MBES are typically mounted on an ROV.

MBES used for Wandoo Facility operations typically operate in the range 10.5-200 kHz with a sound source level of 225-245 dB re 1µPa @ 1 m. SBES operate in the range 10-200 kHz with a sound range of 210-230 dB re 1µPa @ 1 m.

2.8.6 Metocean Monitoring

Metocean monitoring involves the deployment of instruments on small-scale moorings to measure currents, waves, tides and turbidity. The mooring designs are dependent on water depth and equipment configuration.

For deep water deployments, acoustic releases are usually connected to the anchor/clump weights. These are recovered once the activity is finished.

2.8.7 Diving and ROV

ROVs are utilised for routine inspections of flowlines, subsea valves, flowline alignment surveys, subsea infrastructure, platform substructure inspections and equipment and infrastructure replacement activities. Annual ROV inspections are undertaken to determine levels of seafloor scour.

ROVs are linked to an offshore support vessel by either a neutrally buoyant tether or often when working in rough conditions or in deeper water a load carrying umbilical cable is used along with

a Tether Management System (TMS). The purpose of the TMS is to lengthen and shorten the tether to minimise the effect of cable drag. The umbilical cable contains a group of cables that carry electrical power, video and data signals back and forth between the operator and the TMS. Where used, the TMS then relays the signals and power for the ROV down the tether cable. Once at the ROV the electrical power is split and distributed between different components of the ROV. However, in high power applications most of the electrical power is used to drive a high-powered electrical motor which in turn drives a hydraulic pump.

The hydraulic pump is used to power equipment such as torque tools, manipulator arms and thrusters (or other means of propulsion) which help position the ROV. Most ROVs are equipped with at least a video camera and lights. Additional equipment is commonly added to expand the vehicle's capabilities. These may include sonars, MBES, magnetometers, a still camera, a manipulator or cutting arm and water samplers. The class and size of the ROV used will be dependent on the survey requirements. ROVs can be launched from dynamically positioned support vessels when operating in deeper waters or from vessels that require a three to four anchor spread to secure the vessel on location when operating in shallower waters.

ROV surveys usually range from one day to several days at a single location but may extend to several weeks covering a variety of sites and offshore facilities.

Three main types of ROV will be used at Wandoo:

- Inspection class
- Light work class
- Work class.

ROVs may be wet-parked on the seabed.

2.8.8 MODU Activities

A jack-up MODU may be used for accommodation during project activities related to facility maintenance (Section 2.6.1.7). The MODU will be on location for up to 7 weeks for a single project (up to 4 projects during the validity period of this EP); this is in addition to the time a MODU is on location for well construction (drilling) activities. If a MODU is on location and conducting well construction (drilling) activities, the description of the activity and management of the associated environmental risks and impacts is addressed by Well Construction Environment Plan [WPA-7000-YH-0001].

Example specifications for a MODU suitable for operating at Wandoo are provided in Table 2-26. The example MODUs are those typically used on the NWS, with minor variations in jack up size not considered to result in any material changes in environmental impact.

Table 2-26: Example specifications for a MODU that may be used as an accommodation during project activities

Rig type	Jack-up – Keppel FELS KFELS MOD V Super B Class or Friede & Goldman JU3000N designs or similar
Personnel on board	Up to 150 persons
Rig dimensions (typical)	Length ~75 to 85 m Breadth ~70 m Depth ~8 to 10 m 3 legs in triangular format up to 150 m long Leg Spacing Longitudinal centre ~37 to 45 m, transverse centre ~40 to 45 m Spud-cans ~15 m diameter x ~6 m high
Fuel consumption	Typical – 12 to 18 m^3/day
Method of crew changes	Helicopter from Dampier

It is expected the MODU will operate with up to 150 persons on board (POB).

The MODUs that will be used will be jack-up rigs. They have three legs fabricated in a lattice structure terminating with a spud-can or foot at the base. Each spud-can is approximately 15 m in diameter and terminates in a point. Each of the 3 MODU legs is individually controlled.

A MODU is typically towed between two locations with its legs well clear of the seabed. Mobilisation of the MODU from either international or Australian territorial waters remains the responsibility of the contracted MODU Operator. Once the MODU is in waters adjacent to the Operational Area, the MODU is moved into the PSZ under the direction of VOGA in accordance with the rig move plan. Once in the Operational Area, the management of the MODU is within scope of this EP. As it nears the planned location the tow speed will be slowed to allow the MODU to be positioned over the desired location, at which time the move is stopped, and the legs are jacked down to contact the seabed. Within the Operational Area, the MODU will be towed by 3 vessels, one on each corner of the MODU.

After confirming the integrity of the seabed, the MODU hull will be jacked up to working height. At the completion of operations, arrangements will be made for the MODU to move off location and, when ready, the hull will be jacked down into the water, and hull integrity tests are carried out while 2 vessels are connected to the hull The legs will then be raised clear of the seabed and the tow vessels will move the MODU to its next location. At the desired location the legs will be lowered, and process repeated.

The seabed disturbance caused by the MODU legs may be up to 435 m^2 per location. The MODU legs will be placed within a few metres of the positions occupied in previous campaigns (e.g. Wandoo well construction campaigns).

Activities associated with standard MODU operations include:

- Navigational lighting
- Atmospheric emissions
- Operational discharges:
  - Sewage, greywater and food waste

- Cooling water and reverse osmosis brine
- Deck drainage.

2.8.9 Cleaning and Marine Growth Removal

Subsea cleaning and marine growth removal are undertaken approximately every five years on the external surface of subsea infrastructure to prevent overloading of structures and moorings.

Marine growth that has established on the Wandoo Facility will be removed via three methods:

- Diver operated removal tools
- Abrasive blasting
- ROV or diver operated water blasting.

Divers will use of variety of tools (scrapers, shovels, brushes, etc.) to manually remove marine growth.

Abrasive blasting will be used at shallow depths (<10 m) and will involve air entrained sand or garnet being directed under pressure at infrastructure with marine growth until marine growth is removed. At greater depths the air medium will be replaced by water and sand or garnet blasted at marine growth.

Water blasting under pressure (<10,000 psi) and ultra-high pressure (>10,000 psi) will be used as the third method of cleaning. Ultra-high pressure cleaning will only be carried out by ROV.

2.8.10 Subsea Welding and Cutting

Underwater welding is not routinely undertaken but may be required for the repair or replacement of assets or equipment. Underwater welding is undertaken at elevated pressure and temperatures and is predominantly referred to as hyperbaric welding. Hyperbaric welding can either take place wet in the water itself or dry inside a specially constructed positive pressure enclosure and hence a dry environment. Dry hyperbaric welding is used in preference to wet underwater welding when high quality welds are required because of the increased control over conditions that can be exerted, such as through application of prior and post weld heat treatments. Dry hyperbaric welding involves welding at a prevailing pressure in a chamber filled with a gas mixture around the structure being welded. Wet underwater welding commonly uses a variation of shielded metal arc welding, employing a waterproof electrode.

Subsea cutting at the Wandoo Facility may be undertaken via three methods; mechanical cutting, ultra-thermic cutting and water jet cutting.

Ultra-thermic cutting uses rods at a temperature in excess of 5,600°C to cut or melt through material. The rod design feature alloy core wires retained by circular crimps.

A water jet cutter is an industrial tool capable of cutting through a variety of materials using a high-pressure jet of water.

Metal filings (known as swarf) may be generated during cutting activities, which would settle on the seabed.

2.8.11 Flowline Stabilisation and Support

Grout bags, form work and structural steel may be used for flowlines stabilisation and freespan support. The installation of grout bags involves the pumping of grout through a hose from the support vessel to fill the grout bags underwater.

Flowline stabilisation is estimated to occur 1-2 times per 5 years. Stabilisation will be installed at or adjacent to existing infrastructure.

2.8.12 Scour Protection

Scour protection may consist of grout bags, fabric formwork, fabric frond matting and crushed rock or iron ore. Scour protection has been installed around the CGS and around the subsea flow lines to prevent scouring of the seabed.

Scour protection is estimated to occur 1-2 times per 5 years. Scour protection will be installed at or adjacent to existing infrastructure.

2.8.13 Subsea Inspection, Repair and Replacement

General inspection techniques used for subsea assets include:

- General and Close video inspection, including the use of dual diode lasers for sizing
- Ultrasonic wall thickness measurements, including Time of Flight Defraction (ToFD)
- Crack detection inspections, including Magnetic Particle Inspection (MPI), Eddy Current Inspection (ECI) and Alternating Current Field Measurement (ACFM)
- Wet storing, removal and replacement of subsea assets.

Sections of the subsea flow lines, floating hose or subsea marine hose may be identified as requiring replacement during underwater inspection and maintenance works on the Wandoo Facility. Replacement involves diver disconnection of the hose or flow line section involved and installation of the new section. Disconnection and installation of the flow line section may involve welding and cutting. To ensure the potential for release of hydrocarbons from the hoses and flow lines during replacement works is minimised, the hoses will be flushed, and blinds installed prior to disconnection. This may involve the use of treated water to prevent corrosion which is directed to storage or the PWTS.

Replacement of significant pieces of infrastructure or works of a significant scale will be carried out within a project if needed.

Equipment may be stored subsea on a temporary or long-term basis as part of offshore subsea projects or during situations such as a cyclone approaching.

2.8.13.1 Epoxy Wrap

The application of epoxy composite wraps may be used to repair subsea pipelines and equipment. The wrap process is an approved repair method (to ISO 24817) consisting of 4 main stages:

- Surface Preparation: Divers would conduct abrasive blasting of the surface to remove rust and marine growth. This step will generate small quantities of paint flakes (~500-600 g) and garnet

particles that may enter the marine environment. Abrasive medium is typically Almandite Garnet, and ~25 kg of abrasive medium is expected to be used.

- Application of Primer and Filler: Immediately following surface preparation, a three-part epoxy primer would be mixed topside and delivered to divers for application using saturated sponges. Approximately 0.5 kg of primer will be prepared, with less than 100 g estimated being applied based on a total primer film thickness of <200 µm. Where pitting is present, a subsea filler would be pre-mixed topside, spread onto a plate, and applied by divers over the defect. Ratchet belts will secure a plate until the filler cures (1–8 hours depending on temperature). Approximately 2.5 kg of filler will be prepared, with less than 500 g estimated being applied based on estimated pit depth volumes.
- Pre-Impregnation of Tape: The reinforcement tape would be impregnated topside with two-part resin. The resin is mixed and applied to the reinforcement tape out of water to avoid uncured resin entering the marine environment. The impregnated tape is then rolled and handed to divers for installation. Approximately 2.0 kg of resin would be prepared and impregnated into approximately 25 m of tape.
- Application of the Tape: Divers would helically wrap the impregnated tape around the pipeline with 50% overlap (minimum width of 128 mm). Wrapping continues until the required thickness is achieved (12 layers). Approximately 15 m (3.5 kg) of tape/wrap could be applied, based on a 150 mm wide, 12 mm thick (12 layer) wrap at a density of 1.52 g/cm³. Gel time ranges from 20–35 minutes depending on temperature, with full light-load cure occurring in approximately 30 hours at 25°C.

2.8.14 Cathodic Protection

Cathodic Protection (CP) is a technique used to control the corrosion of a metal surface. The protected metal is connected to a more easily corroded “sacrificial metal” to act as the anode. The sacrificial anode then corrodes instead of the protected metal. Sacrificial anodes have been installed in certain Wandoo Facility systems and components to prevent corrosion. The PLEM, CALM Buoy, flow lines and all the risers on WNA and WNB are fitted with sacrificial anodes. The anode is composed of magnesium or aluminium and has a lifetime of approximately 20 years. The anode dissolves into the sea over time.

The basic chemical reaction at the anode is:

$Al_{(s)} \rightarrow Al^{3+} + 3e^-$ (second half of the CP reaction)

$2Al^{3+} + 3H_2O + 6e^- \rightarrow Al_2O_{3(s)} + 3H_{2(g)}$ (soluble aluminium oxidising)

Most of the aluminium oxidises close to the anode surface, resulting in the relatively benign aluminium oxide (alumina, Al_2O_3) as well as some intermediate aluminium hydroxide compounds ($Al_n(OH)_m$) covering the anode as a white scale. The intermediate hydroxides will continue to oxidize with water to end as aluminium oxide. The oxide scale is somewhat amorphous and will wear off with time (ocean currents, contact with marine life, etc.). The aluminium oxide is a very stable in neutral pH water. The anode depletion rates are outlined in Table 2-27.

Anodes are removed and replaced as required using divers/ROV.

Table 2-27: Anode depletion rates

	Expected depletion rate (kg/yr)	Actual depletion rate (kg/yr)
Total (all infrastructure)	2,280.9	1,112.3

2.8.15 Flushing and Leak Testing

Hydrotesting, pressure and leak testing is undertaken to test the integrity of flowlines, risers, piping and any other components of the Wandoo Facility as part of the quality assurance process. This involves filling lines or vessels with seawater (treated with biocide and/or fluorescein dye) and pressurising to above operating pressure to assess whether there are any leaks.

Flushing is undertaken as part of testing, repairs and equipment replacement with the flowline, piping or vessel flushed with treated seawater to send the oil and gas back to the process prior to removal or testing. The seawater is treated using biocide and occasionally the water is treated using a combination of biocide and corrosion inhibitor.

The treated seawater from flushing and testing activities is directed primarily to either storage or the PWTS.

Drain down following backflush of the export system may be required. The backflush activity displaces Wandoo crude from the export system back to WNB and may be required before maintenance or repair. The activity will result in discharge of 5 m^3 of seawater to the marine environment. The seawater may contain residual oil. This activity may be required up to once per year.

2.8.16 Anchoring/Mooring

Most of the support vessels working within the Wandoo Field maintain station using Dynamic Positioning (DP) Systems. Vessels supporting the works may be required to anchor in the vicinity of the Wandoo Facility, this would involve the placement of up to three anchors on the sea floor.

If an accommodation vessel is required for project activities, it would be moored and potentially connected to a facility by a gangway for up to 7 weeks.

Clump weights are also occasionally used as a temporary mooring for light vessels and during CALM Buoy maintenance work. Table 2-28 lists the moorings presently in place.

2.9 Decommissioning

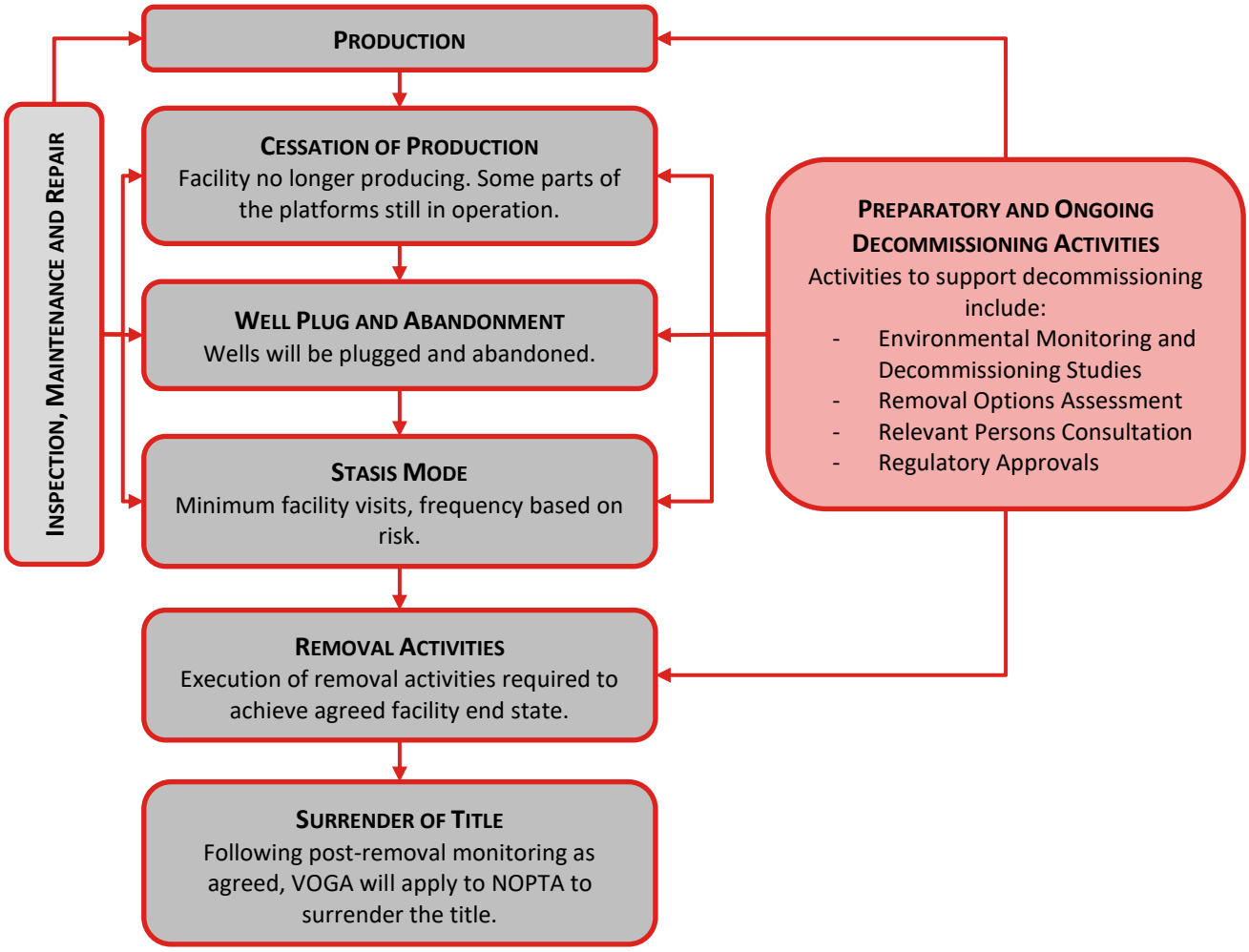
2.9.1 Decommissioning Strategy

VOGA recognises its obligations under the OPGGS Act related to the decommissioning of offshore infrastructure, and has developed the Wandoo Production Facility Decommissioning Strategy [AUFZ23002-VOG-1000-RH-0014] to assist planning for the Wandoo decommissioning program and to align with the OPGGSA and OPGGS(E)R.

2.9.1.1 Decommissioning Phases

The decommissioning phases in the lifecycle of the Wandoo Field have been illustrated in Figure 2-13 and summarised below.

Figure 2-13: Stages of activity in the lifecycle of the Wandoo Production Facility



Cessation of Production

The Cessation of Production (CoP) stage of decommissioning will commence when the Wandoo Facility is no longer producing oil. Facility preparation activities are likely to include, but are not limited to:

- Flushing hydrocarbons from topside and subsea infrastructure to ALARP
- Preparation of the topsides for lifting activities
- Property that does not require the use of a Heavy Lift Vessel or specialist equipment is assessed for removal on an ongoing basis
- Any other activities required to prepare the facilities for decommissioning.

A number of well activities may be undertaken during CoP, including:

- Well securement
- Well care and preservation.

The CoP activities will be undertaken in parallel with inspection, maintenance and repair activities to preserve the facility for a period of potential stasis mode. In accordance with Section 572(2) of the OPGGS Act and NOPSEMA Guidance *Section 572 Maintenance and removal of property* (PL1903) (2025), VOGA will manage and maintain the assets within the Wandoo Field to economic End of Field Life (EOFL) via the Asset integrity Management System (AIMS) and maintenance management processes. These mechanisms ensure asset(s) are maintained and monitored to EOFL, as well as ensuring assets are suitably maintained for decommissioning.

Well Plug and Abandonments

The well plug and abandonment phase will incorporate all well activities associated with the permanent plugging and abandoning of the wells. These activities shall include:

- Well plug and abandonment
- Well conductor pull.

It is expected that well abandonment will be grouped logically to avoid unnecessary mobilisations of vessels or MODUs to conduct work on a small number of wells. Therefore, wells may be temporarily suspended once they have ceased producing, then fully abandoned at a later date in a focused decommissioning campaign.

Stasis Mode

Facilities and pipelines are considered to be 'not in use, nor to be used' in connection with the operations (as per Section 572 of the OPGGS Act) when the stasis mode stage of activity is reached. This indicates the Wandoo Facility is ready for decommissioning.

Inspection, maintenance and repair occurs throughout both CoP and stasis mode stages. This ensures safety and environmental risks are managed to ALARP and acceptable levels.

These activities could include well integrity testing, structural and corrosion control maintenance/repair as required, and checks on operating systems such as fuel gas, air compressors, crane and lifting equipment, open and closed piles, and safety systems.

Once WNB is de-staffed, periodic platform visits will be conducted for operations and maintenance to facilitate upstream platform operations and/or maintain equipment for future decommissioning preparation activities. Platform visits may be conducted as day trips, or by temporarily re-staffing the facility for days to weeks.

Removal Activities

NOPSEMA's Decommissioning Compliance Strategy (NOPSEMA, 2023) sets the following targets:

- Assets or production systems no longer producing:
  - Floating infrastructure is removed as soon as practicable and within 12 months of permanently ceasing production

- All wells will be plugged and abandoned within 3 years of the production system ceasing production
- All structures, equipment and property (including pipelines, platforms and all other subsea infrastructure) that forms part of a production system decommissioned to approved end-state as soon as reasonably practicable and no later than 5 years from that production system permanently ceasing production.

- Redundant (non-producing) wells and infrastructure within a producing asset or production system:
  - Redundant wells are suspended with downhole barriers within 12 months of loss of real-time monitoring wherever practicable. Any wells that cannot be monitored in real time and are not suspended are monitored at least annually until downhole barriers can be installed.
  - Regardless of other work being carried out in the field, each well must be plugged and abandoned as soon as practicable.

These targets may not be achievable for the Wandoo facilities. For example, the CALM buoy will only be removed when the facility infrastructure has been sufficiently flushed. Scheduling of these activities will be determined closer to CoP.

Removal activities required to achieve the agreed end state of facilities will be undertaken by specialist third party contractors with the appropriate vessels, equipment and expertise to undertake this work during decommissioning campaigns.

The recycling and disposal of recovered infrastructure will require assessment and consideration, including analysis and recommendations regarding the recycling, reuse and disposal of all recovered infrastructure. This will be used to inform detailed project planning, future environmental risk management plans and relevant persons communications and engagement.

Post-removal monitoring may be required following the removal or leave in situ of facilities. These will be considered, proposed and agreed as part of later EP revisions.

Surrender of Titles

Section 270 of the OPGGS Act provides that the Joint Authority may consent to the surrender of petroleum licence, if it is satisfied there are sufficient grounds to warrant giving consent.

Following the completion of removal activities and agreement with NOPSEMA, VOGA will apply to the National Offshore Petroleum Titles Administrator (NOPTA) to surrender the relevant petroleum title.

2.9.1.2 Decommissioning Schedule

VOGA does not plan to undertake any decommissioning activities within the next 5 years. Currently, there are no subsea or sea-surface assets in the field that are due for permanent removal within the in-force validity of this EP; or prior to economic EOFL. There may be requirements under maintenance or repair activities to remove and replace, as contemplated within the Activity Description (Section 2.7 and 2.8).

2.9.2 Assets

VOGA maintains an asset register which contains assets list for items within the Wandoo Field. Following major projects where new equipment is added, for example well construction campaigns, the MoC process identifies updates required to the asset register.

Table 2-28 provides a list of assets within WA-14-L for the purposes of exploration, field development and operation of the field. The asset list below reflects the discrete equipment groups that are considered as standalone tasks in decommissioning. For example, as decommissioning will involve the disconnection of WNA and WNB topsides from their respective structures as a unit (with topsides equipment attached), the individual process equipment on the topside is not listed. VOGA will continue to manage this list and additional property added will be incorporated.

Table 2-28: Wandoo facilities asset register

Item	Status	Inspection, Maintenance and Repair Plans In Place	Wandoo Facility EP Section Ref.
Platforms			
WNA topside structure	Currently utilised	In place	2.4.1
WNA substructure	Currently utilised	In place	2.4.1
WNA riser caisson (1)	Currently utilised	In place	2.4.1
WNB topside structure and equipment	Currently utilised	In place	2.4.2.3
WNB substructure	Currently utilised	In place	2.4.2.1
WNB CGS	Currently utilised	In place	2.4.2.1 and 2.4.2.2
WNB external conductors (4)	Three currently utilised – one to be installed	In place	2.4.2
Flowlines			
WNA–WNB production flowline	Currently utilised	In place	2.5.4
WNB–WNA gas lift flowline	Currently utilised	In place	2.5.4
WNA–WNB test line	Currently utilised – not used for hydrocarbon service	In place	2.5.4
Export flowlines (2)	Currently utilised	In place	2.5.11.1
Export System			
PLEM	Currently utilised	In place	2.5.11.1
Mid depth buoyancy tank	Currently utilised	In place	2.5.11.1
SHA	Currently utilised	In place	2.5.11.1
CALM Buoy	Currently utilised	In place	2.5.11.2
FHA	Currently utilised	In place	2.5.11.1

Item	Status	Inspection, Maintenance and Repair Plans In Place	Wandoo Facility EP Section Ref.
Wells			
Wandoo A			
WNA wells (5)	Currently utilised	In place	0
Wandoo B			
WNB wells (18) – one proposed	Currently utilised	In place	0
Unutilised			
Wandoo-1	Suspended well	In place	2.4.4.1
Wandoo-2	P&A	Not required	N/A
Wandoo-3	P&A	Not required	N/A
Wandoo-4	Wandoo-4 P&A, then Wandoo-4A redrilled, renamed as Wandoo-1	Not required	N/A
Wandoo-5	P&A	Not required	N/A
Wandoo-6	P&A	Not required	N/A
Wandoo-7	P&A	Not required	N/A
Wandoo North-1	P&A	Not required	N/A
Wandoo South-1	P&A	Not required	N/A
Enderby-1	P&A	Not required	N/A
Tingle-1	P&A	Not required	N/A
Whitewood-1	P&A	Not required	N/A
WNA North-East Single-point mooring clump weight and chain	Not currently used	In place	N/A
WNB East Single-point mooring clump weight and chain	Not currently used	In place	N/A
WNB South Single-point mooring clump weight and chain	Not currently used	In place	N/A

2.9.3 Unutilised Assets

Wandoo-1 well is the only unutilised subsea asset in Wandoo. Wandoo-1 well was the discovery well drilled in May 1991 which was abandoned with downhole cement plugs in accordance with standards at the time as detailed in VOGA Wandoo-1 Well Operations Management Plan (WOMP; VOG-1000-YG-007).The wellhead remains on seafloor. Description of Wandoo-1 is provided Section 2.4.4.1 of this EP.

Wandoo-1 does not introduce any new hazard or any additional risk than those contemplated in Section 5 of this EP.

VOGA plan to continue to manage the well under its accepted WOMP and this EP, until such a time that it is deemed feasible (from cost and technical risk perspective) to complete abandonment of the well and retrieve the wellhead. VOGA anticipate the Wandoo-1 complete abandonment to be carried out when the WNA wells are permanently abandoned; following CoP from the Wandoo Field, for the following key reasons:

- Wandoo-1 is effectively abandoned from the reservoir (the reservoir abandonment barrier and the shallow and surface suspension barriers being in place).
- Further degradation of wellhead is unlikely to compromise successful completion of well abandonment.
- The relatively low risk and impact footprint of the wellhead on sea floor. Wandoo-1 impact is marginal in comparison to field infrastructure and is within the long-term PSZ.
- There are operational challenges and risks associated with conducting abandonment prior to end of field life of WNA and WNA-WNB flowlines due to:
  - SIMOPS - positioning the MODU at Wandoo-1 would be challenging due to the proximity of infrastructure in place and field congestion limiting rig and associated vessel manoeuvrability
  - Close proximity of jack-up MODU, support vessels and the WNA monopod
  - Lifts over intrafield flowlines.

Titleholders must maintain in good condition and repair all structures, equipment and other property in the title area that are used for activities authorised by the relevant title, in accordance with the provisions of Section 572 of the OPGGS Act. The final end state of Wandoo-1 has not yet been identified and is not within the scope of this EP. Regardless, Wandoo-1 wellhead is part of the visual inspection activities and monitored by ROV once every two years.

Section 3 Description of the Environment

3.1 Overview

The OPPGGS(E)R define 'environment' as the ecosystems and their constituent parts, natural and physical resources, qualities and characteristics or areas, the heritage value of places and includes social, economic and cultural features of those matters. In accordance with the Regulations, the Description of the Environment describes the ecological and social components of the environment relevant to the activity and achieves the following:

- Provides adequate information about the environment that may be affected (EMBA) by the activity in sufficient detail to inform the evaluation of environmental impacts and risks. This includes the environment that may be affected by planned components of the activities, and the area that may be exposed during unplanned events such as a hydrocarbon spill.
- Adequately defines the environment that may be exposed to hydrocarbons in the event of a significant incident and the geographic extent of response and monitoring activities
- Provides sufficient detail regarding relevant threatened or migratory species and their defined Biologically Important Areas (BIA) and/or habitat critical for species survival
- Identifies all values and sensitivities (if any) within the environment including matters protected under Part 3 of the EPBC Act
- Enables relevant persons and members of the public to understand the environmental values and sensitivities that may be affected by the activity.

Using the Project Areas described below (Section 3.1.1), the nature and scale of information provided in this section has been determined to ensure that adequate information is provided to support the assessment of impacts and risks associated with the scope of this EP.

3.1.1 Project Areas

Project Areas are the different areas, or zones, defined for this EP as areas of potential hazard or exposure to receptors. The existing environment within each project area is described in this section. For this EP, the following Project Areas have been defined:

- Operational Area: the physical footprint area in which planned activities, as described in Section 2 of this EP, will occur. Defined as the area within the existing Petroleum Safety Zone (PSZ), which is defined as a 500 m radius around WNA, WNB and the CALM Buoy (Figure 3-1). The Operational Area is located within the Permit Area of WA-14-L.
- Hydrocarbon Area: this area has been defined to include the worst-case extent of predicted hydrocarbon exposure from planned and unplanned activities at exposure values that may have ecological or social impacts. The Hydrocarbon Area has been defined based on the combined outcomes of stochastic modelling for each credible scenario (i.e. cumulative extent of a total of 100 model simulations per season for both scenarios) using moderate exposure values for each of the modelled oil components (10 g/m^2 floating, 50 ppb dissolved, 100 ppb

entrained, 100 g/m^2 shoreline) which are threshold levels anticipated to result in behavioural changes and sub-lethal and lethal effects to biota and includes all probabilities of exposure.

- Environment that may be Affected (EMBA): the area within which a change in ambient environmental conditions could occur as a result of planned or unplanned activities. It is noted that changes in ambient conditions, as defined for the EMBA, does not imply that an adverse impact will occur. The EMBA has been defined based on the combined outcomes of stochastic modelling for each credible spill scenario (Section 4.12) (i.e., cumulative extent of a total of 100 model simulations per season for each scenario) using low exposure values for each of the modelled oil components (1 g/m^2 floating, 10 ppb dissolved, 10 ppb entrained, 10 g/m^2 shoreline). These are threshold levels used to establish the range of socio-economic effects and establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers.

Environmental hazards have the potential to result in impacts or risks to environmental receptors, if they are present within the spatial or temporal boundaries of the environmental hazard.

By using the defined Project Areas (Figure 3-2), it is possible to identify receptors which may typically be impacted, depending on behaviour. This process guides the nature and scale of details provided in the Description of the Existing Environment, ensuring that our understanding of receptors within the Existing Environment of each Project Area is sufficient to undertake the impact assessment

Figure 3-1: Operational Area for the Wandoo Facility

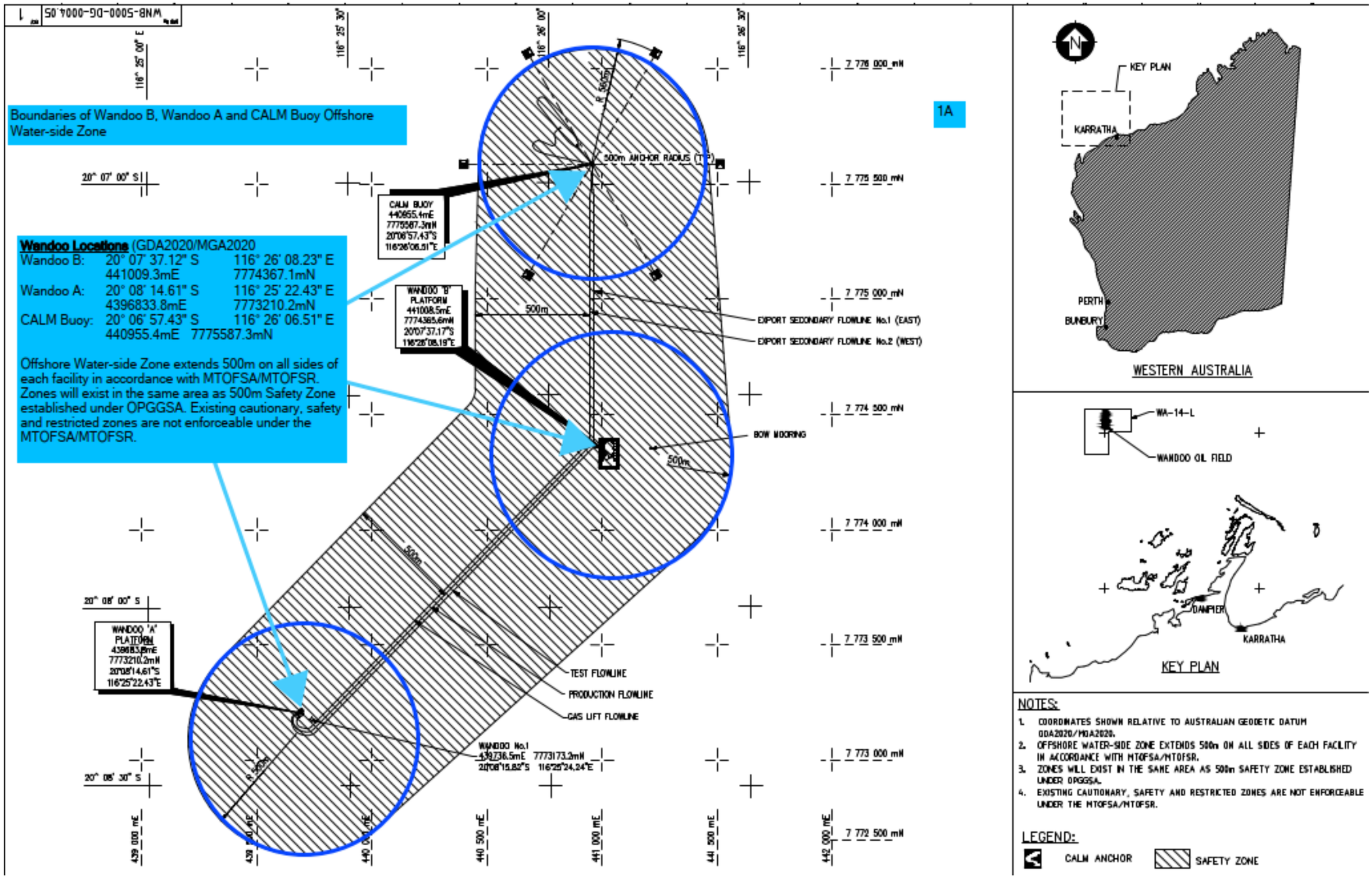
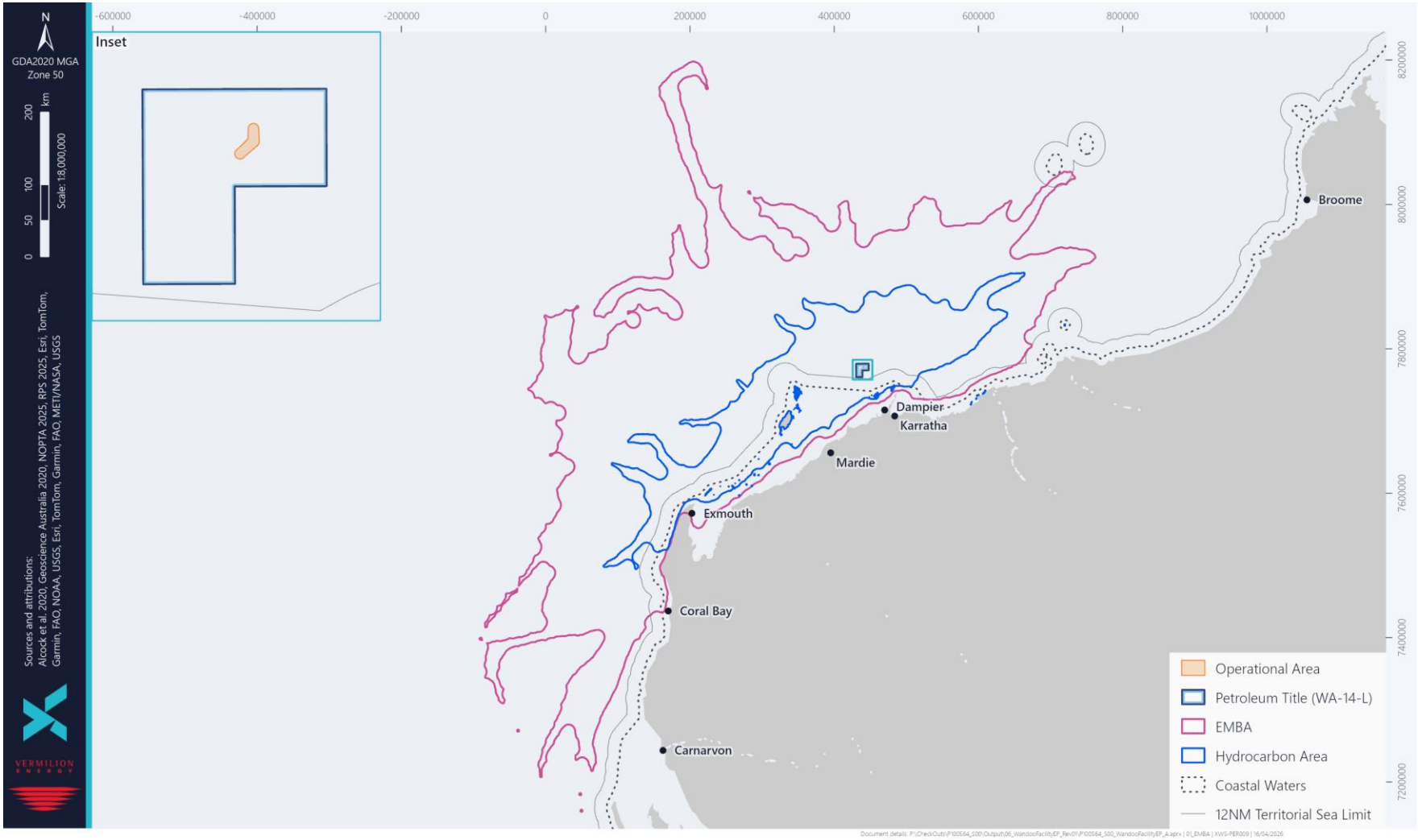


Figure 3-2: Project areas



3.1.2 Relevant Receptors

Protected matters searches using the EPBC Act Protected Matters Search Tool (PMST) were undertaken for the EMBA, Hydrocarbon Area and Operational Area. The search results are provided in Appendix D.

For each receptor or receptor group known to occur within the defined Project Areas, their presence/absence is identified in Table 3-1. This, combined with the understanding of how each receptor is affected by environmental hazards, guides the nature and scale of information provided throughout this section. Receptors identified in this section may have associated threat abatement plans, threatened species recovery plans and species conservation advices which are detailed in Section 1.6.

Table 3-1: Receptor presence or absence within Project Areas

Receptor Group	Operational Area	Hydrocarbon Area	EMBA
Physical environment	• Climate • Ambient water quality • Ambient sediment quality • Ambient air quality • Ambient noise • Ambient light.	• Climate • Ambient water quality • Ambient sediment quality • Ambient air quality • Ambient noise • Ambient light.	• Climate • Ambient water quality • Ambient sediment quality • Ambient air quality • Ambient noise • Ambient light.
Key benthic habitats	• Subtidal soft sediment and benthic fauna.	• Subtidal soft sediment and benthic fauna • Corals • Seagrasses • Macroalgae.	• Subtidal soft sediment and benthic fauna • Corals • Seagrasses • Macroalgae.
Key coastal communities	• None	• Mangroves • Sandy beaches • Rocky shorelines/ intertidal reef platforms • Intertidal beaches/ mudflats.	• Mangroves • Sandy beaches • Rocky shorelines/ intertidal reef platforms • Intertidal beaches/ mudflats.
Key marine fauna	• Benthic invertebrates • Marine reptiles • Birds • Fish, sharks and rays • Marine mammals.	• Benthic invertebrates • Marine reptiles • Birds • Fish, sharks and rays • Marine mammals.	• Benthic invertebrates • Marine reptiles • Birds • Fish, sharks and rays • Marine mammals.

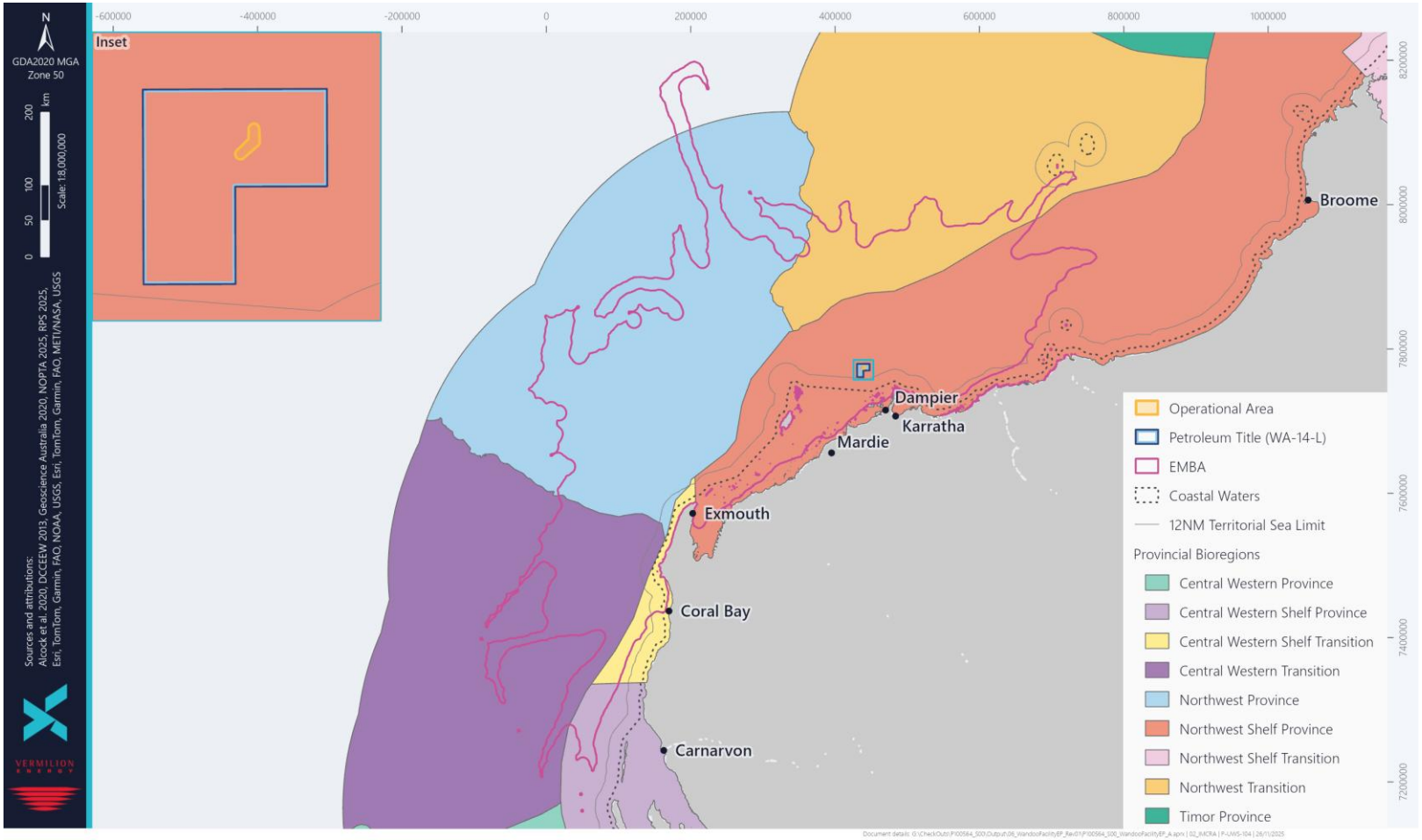
Receptor Group	Operational Area	Hydrocarbon Area	EMBA
Protected and significant areas	• None identified	• World Heritage properties • National Heritage Places • Underwater cultural heritage • Australian Marine Parks • State Marine Protected Areas • Key Ecological Features (KEFs).	• World Heritage properties • National Heritage places • Underwater cultural heritage • Australian Marine Parks • State Marine Protected Areas • KEFs.
First Nations Cultural Heritage	• None identified	• Marine Park Cultural Heritage Values.	• Registered Aboriginal Cultural Heritage sites • Marine Park Cultural Heritage Values.

3.2 Regional Context

Operational activities are undertaken by VOGA at the Wandoo field within Permit WA-14-L, which is located in Commonwealth waters in the Carnarvon Basin off the northwest coast of Western Australia (WA), approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island. The EMBA extends from offshore of Carnarvon to Imperieuse Reef.

The Operational Area and EMBA overlap one marine region and six Integrated Marine and Coastal Regionalisation of Australia (IMCRA) provincial bioregions, as displayed in Figure 3-3. Descriptions of these regions are provided in the sections below.

Figure 3-3: IMCRA provincial bioregions



3.2.1 Marine Regions

3.2.1.1 North-West Marine Region

The Operational Area lies within the North-west Marine Region (NWMR). The NWMR lies within Commonwealth waters from the border of WA and the Northern Territory (NT) to Kalbarri, covering approximately 1.07 million km^2 of tropical and sub-tropical waters. The region is characterised by shallow-water tropical marine ecosystems and high species richness, thought to be associated with the diversity of habitats available (DSEWPC, 2012a).

Sixty-one percent of the seafloor within the region is continental slope, of which extensive terraces and plateaux make up a large proportion. A majority of shallow waters are focused adjacent to the Pilbara and Kimberly regions (~30% of the total region) with the narrowest shelf margin of the region and Australia located at Ningaloo Reef. A majority of the region is relatively shallow with over 50% having water depths of less than 500 m. The sections of the Argo and Cuvier plains which lie within the region make up 10% of its total area and are the deepest sections of the region reaching depths of almost 6,000 m (DEWHA, 2012).

3.2.2 IMCRA Bioregions

The Integrated Marine and Coastal Regionalisation of Australia (IMCRA) is a biogeographic regionalisation of oceanic waters within Australia's Exclusive Economic Zone (EEZ). IMCRA further classifies Australia's marine regions into smaller scale bioregions based on fish, benthic habitat and oceanographic data at a scale that is useful for regional conservation planning and management (DEWHA, 2008).

The Operational Area is located within the Northwest Shelf province. The EMBA overlaps a further five provincial bioregions:

- Central Western Shelf Province
- Central Western Shelf Transition
- Central Western Transition
- Northwest Province
- Northwest Shelf Province
- Northwest Transition.

3.2.2.1 Central Western Shelf Province

The Central Western Shelf Province lies entirely within the continental shelf between Kalbarri and Coral Bay, covering an area of 50,516 km^2. The maximum water depth in the region is 100 m (DEWHA, 2012). The benthic environment is predominantly flat and consists mainly of sand with some mud and gravel. The width of the shelf varies along its length, from less than 20 km near the shoreline to approximately 125 km adjacent to Shark Bay.

The dominant geomorphic feature is the Dirk Hartog Shelf. Other features include a small area of reef and tidal sand banks near the entrance to Shark Bay, as well as banks and shoals offshore from Kalbarri. This bioregion is strongly influenced by the Leeuwin Current, Ningaloo Current and

Capes Current. The Central Western Shelf Province lies within a major biogeographic transition between tropical and temperate marine species. Shark Bay is a World Heritage Area and supports diverse habitats including rocky shorelines, sandy plains and extensive seagrass meadows in both high and low energy zones. Biological communities within Shark Bay are well documented, and endemism among demersal fish communities is lower than in bioregions further north. Commercial fishing is the primary industry within the bioregion (DEWHA, 2012).

3.2.2.2 Central Western Shelf Transition

Of all the provincial bioregions, the Central Western Shelf Transition is the smallest, covering an area of 9,698 km^2, located entirely on the continental shelf between the North-West Cape and Coral Bay. The maximum water depth in the region is 100 m (DEWHA, 2012).

This bioregion is strongly influenced by the Leeuwin Current and Leeuwin Undercurrent interacting with the northward flowing Ningaloo Current. It lies within a significant biogeographic transition between tropical and temperate species. The bioregion is largely covered by the Ningaloo Marine Park and Ningaloo Reef. Ningaloo Reef is an area of high biodiversity with over 200 species of coral and more than 460 species of reef fish. Other fauna which may occupy the reef environments within the region include marine turtles, dugongs and dolphins with the potential for whale sharks and manta rays to occupy outer reef areas. Commercial fishing and petroleum are important industries in some parts of the bioregion (DEWHA, 2012).

3.2.2.3 Central Western Transition

The Central Western Transition Province is located between Shark Bay and North-West Cape covering 162,891 km2 of continental slope and abyss. Almost half of the region has water depths of more than 4,000 m, with maximum recorded water depths within the region of 5,330 m. As a result of the proximity of deep ocean areas to the continental slope and shelf, distinctive biological communities may have developed. The major geomorphic features of the bioregion are Carnarvon Terrace, Wallaby Saddle, the Cuvier Abyssal Plain and the Cloates and Cape Range Canyons (DEWHA, 2012).

The Leeuwin Current, flowing south along the slope, is the dominant oceanographic feature in the region. Interactions between the Leeuwin Current, Leeuwin Undercurrent and the nearshore Ningaloo Current facilitate vertical mixing of water layers and are thought to be linked with bursts in productivity (particularly during summer). This bioregion also lies within the biogeographic transition between tropical and temperate marine species. The level of endemism within demersal fish communities on the slope is less than that in bioregions further north. Major industries in the bioregion are commercial fishing and petroleum (DEWHA, 2012).

3.2.2.4 Northwest Province

The Northwest Province lies offshore between Exmouth and Port Hedland, entirely on continental slope. The region covers an area of 178,651 km2 with water depths ranging from 1,000–3,000 m (DEWHA, 2012).

The dominant geomorphic feature is the Exmouth Plateau. The Montebello Trough and Swan Canyon are also important features of the region. The Exmouth Plateau contains the steepest shelf break in the Marine Region along the Cape Range Region near Ningaloo Reef. Dominant surface flow of the region includes circulation and recirculation (via the South Equatorial Current)

of the Indonesian Throughflow. As a result of the predominantly southward moving surface waters, waters consolidate along the narrow shelf break adjacent to Cape Range Peninsular to form the Leeuwin Current which is a significant feature for the bioregion and areas further south (DEWHA, 2012).

Canyons in the bioregion are thought to aid in the channelling of water onto the Exmouth Plateau and certainly into the shelf along Ningaloo Reef, which aids in enhancing localised biological production. The Northwest Province represents the beginning of a transition between tropical and temperate marine species with high endemism in demersal fish communities on the slope evident in this bioregion. Commercial fishing and petroleum are important industries in some parts of the bioregion (DEWHA, 2012).

3.2.2.5 Northwest Shelf Province

The Operational Area is located within NWS Province. The NWS Province lies predominantly on the continental slope, extending from the North-West Cape to Cape Bougainville, covering an area of 238,759 km2. The width of the bioregion varies along its length from approximately 50 km at the Exmouth Gulf to more than 250 km off Cape Leveque. About half the bioregion has water depths between 50 m and 100 m, with maximum depths reaching 200 m (DEWHA, 2012).

The bioregion is a dynamic oceanographic environment and is influenced by cyclonic storms, strong and internal tides and long period swell. Its waters derive from the Indonesian Throughflow and are warm, oligotrophic and circulate throughout the bioregion via branches of the South Equatorial and Eastern Gyral currents (DEWHA, 2012).

Fish communities in the bioregion are diverse, comprising of both benthic and pelagic fish. Humpback whales migrate through the area with the Exmouth Gulf considered an important resting area, particularly for mothers and calves on their southern migration. Several important breeding sites for seabirds are located within the region (outside Commonwealth waters), including Eighty Mile Beach and the Montebello, Barrow and Lacepede islands (DEWHA, 2012).

Industries that utilise the resources found in bioregion include the petroleum industry, commercial fishers and shipping, with nationally significant ports of Dampier and Port Hedland present (DEWHA, 2012).

3.2.2.6 Northwest Transition

The Northwest Transition Province covers an area of 184,424 km2 and predominantly occurs on the continental slope (52%), with smaller areas in the north-west located on the Argo Abyssal Plain and continental rise (DEWHA, 201208). Water depths vary, generally ranging from 200 m depths at the shelf break to more than 1,000 m over the continental slope with a maximum depth of 5,980 m (DEWHA, 2012).

The seafloor topography of the bioregion is complex with a range of features including carbonate banks, submerged terraces, pinnacles, sand banks and reefs. The pinnacles and carbonate banks of the Joseph Bonaparte Gulf are distinctly different in morphology and character to other parts of the Region and are believed to support a high diversity of marine species(DEWHA, 2012).

Biological communities of the region are typical to that of Indo-west Pacific tropical flora and fauna. Marine environments include a range of soft bottom and hard substrate habitats. The WA

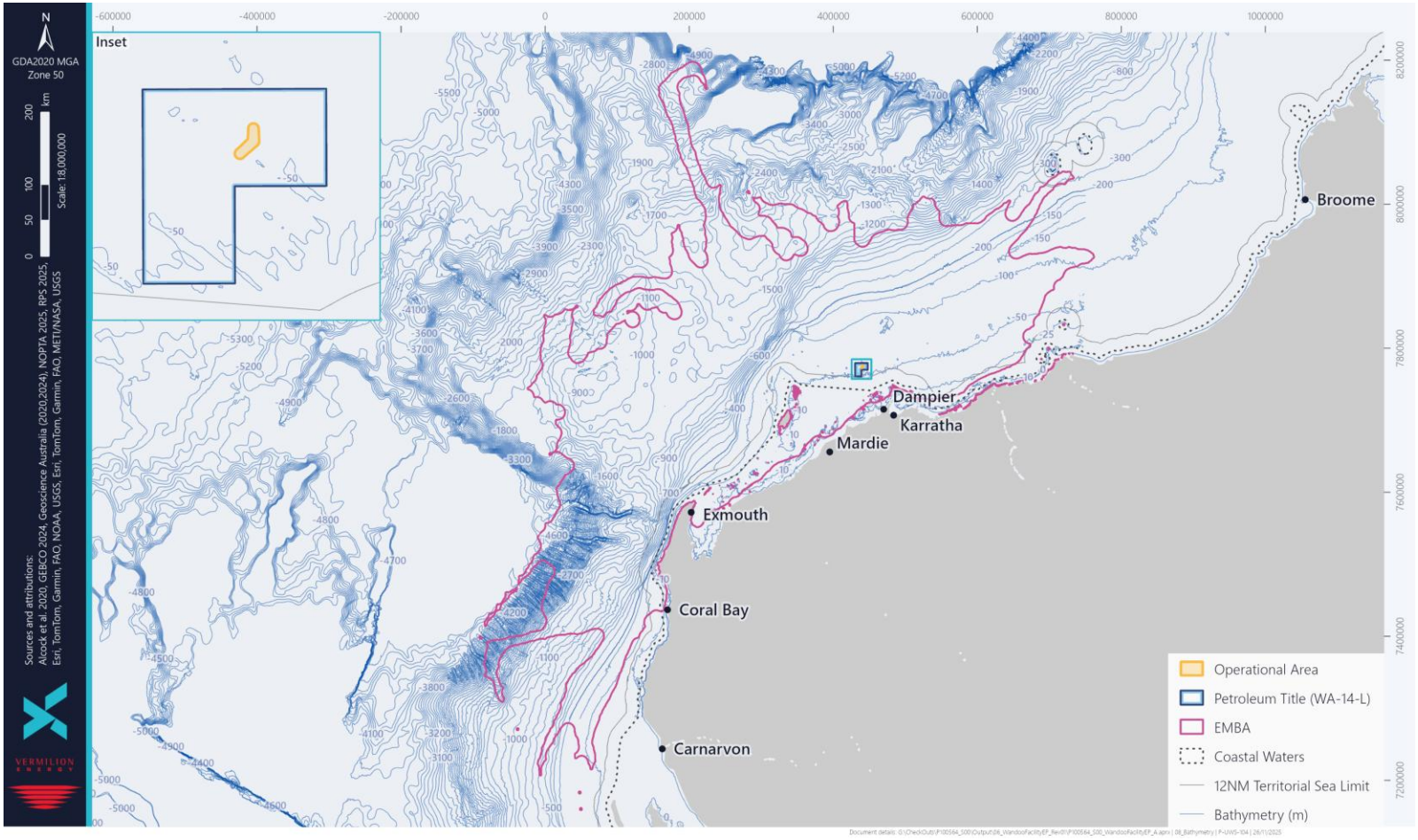
population of humpback whales mate and give birth in the inshore waters off the Kimberley. In addition, the NWS Transition is important for commercial fisheries, defence, and the petroleum industry (DEWHA, 2012).

3.3 Physical Environment

Table 3-1 identifies that the physical environment includes receptors within the Operational Area, Hydrocarbon Area and EMBA that may be relevant to aspects of the Petroleum Activity. The descriptions below provide sufficient details to assess all impacts and risks to these receptors.

The Operational Area lies within the NWS approximately 65 km northwest of the port of Dampier, in water depths of approximately 50-60 m (Figure 3-4).

Figure 3-4: Seabed bathymetry



3.3.1 Climate

The climate of the Pilbara region of WA is classified as arid tropical with two distinct seasons: a hot, wet summer (October to April); and a mild, dry winter (May to September) (Bureau of Meteorology, 2024).

Based on long-term climatic data from the nearest Bureau of Meteorology weather station at Karratha Airport (Station 004083), approximately 79 km south-southeast of the Operational Area, the mean annual rainfall since 1972 is 288.5 mm. The mean maximum temperatures range between 26.5°C in July and 36.2°C in December, and average above 30°C for much of the year (Bureau of Meteorology, 2024). Minimum temperatures range between 13.9°C in July and 26.9°C in January.

Winds vary seasonally, with a tendency for westerly winds in summer and southerly winds in winter (Pearce et al., 2003). There are often distinct 'transition' periods between the summer and winter regimes, which are characterised by calmer periods. Rainfall is low and unpredictable, with most rainfall occurring between January and May, often associated with the passage of tropical cyclones (Pearce et al., 2003).

3.3.2 Ambient Water Quality

Water quality within the EMBA is expected to be representative of the typically pristine water found offshore WA. Variations to this state (e.g. increased turbidity) may occur in coastal regions that are subject to large tidal ranges, terrestrial runoff or anthropocentric factors (i.e. ports, industrial discharges, etc.).

Water quality surveys undertaken in February and June of 2003 and October 2024 (Worley, 2025) show that:

- The concentration of total recoverable hydrocarbons in the end of the pipe sample onboard the Wandoo Facility was 6,842 µg/L but this rapidly diluted in receiving waters
- There were slightly elevated levels of zinc recorded at Wandoo Facility with a value of 5 µg/L (above the guideline value of 3.3 µg/L)
- Water quality sampling in waters surrounding the Wandoo Production Facility indicated that copper and zinc were elevated above the Default Guideline Value (DGV) but only within 70 m of the Wandoo Facility.
- Water quality profiles showed warm saline, low turbidity surface layer, with no evidence of thermoclines or upwelling/downwelling within surveyed layers of water.
- Water quality in the coastal waters of the NWS is generally of very high quality (Wenziker et al., 2006).

3.3.3 Ambient Sediment Quality

Several surveys have been undertaken within the vicinity of the Operational Area. In addition to the Bowman Bishaw Gorham (BBG) (1996) baseline sediment survey, a post-commissioning sediment survey was undertaken by Sinclair Knight Merz (SKM) in 1996. BBG (1996) found the sediments were comprised of a mixture of fine, medium, coarse and very coarse sands. This is

consistent with sediments found throughout the NWS Province where sediment is dominated by sand (Baker et al., 2008). Particle size data from the study undertaken by SKM (1996) indicated that sediments are typically comprised of unconsolidated to coarse sands. This shift towards a coarser grain size is indicative of discharge received from drilling at Wandoo.

Sediment metal, petroleum hydrocarbon and Polycyclic Aromatic Hydrocarbons (PAH) levels were also tested during both studies (BBG, 1996; SKM, 1996). Sediment metal levels have increased since the baseline survey; however, they were within the trigger values outlined in the former ANZECC/ARMCANZ (2000) sediment quality guidelines which have since been revised in the Water Quality Guidelines (ANZG, 2018). These metal concentrations reflect background levels of the region (Long et al., 1995). Petroleum hydrocarbons and PAH levels were below detection limits in all samples collected during the surveys (BBG, 1996; SKM, 1996).

An additional survey for the Wandoo Facility was undertaken in 2015 and in 2024 to assess changes that may have occurred since the original baseline and post-commissioning surveys undertaken in the 1990s (Worley, 2025). Hydrocarbons in sediments at all sites were below the laboratory Limit of Reporting (LOR) or below the available Sediment Quality Guideline for the highest level of protection in the former ANZECC/ARMCANZ (2000) guidelines. Sediment metal/metalloid concentrations at all sites were below the former respective trigger values, or where no guidelines existed lower or similar to previous studies with the exception of Barium. This was likely due to the presence of residual drilling muds (containing barium) at the time of the post-commissioning survey.

There was an overall increase in sediment metal concentrations compared to the baseline survey 20 years ago (BBG, 1996), however, no trend has been identified in direction or distance from the Wandoo B platform. Furthermore, of the metals that have increased in sediments since the baseline survey, none are currently at concentrations exceeding the recommended guideline for the 99% species protection level.

In 2015 and 2024, sediment infauna abundance and species richness were significantly higher than during the baseline survey in 1996 and the post-commissioning survey in 1998.

3.3.4 Ambient Air Quality

The majority of the offshore NWS Province region is relatively remote and therefore air quality in the Operational Area is expected to be high. Anthropogenic sources (e.g. vessels, industry developments) would contribute to local variations in air quality. However, results of previous monitoring within the region suggest that the concentration of air quality parameters remains low. Measured levels of nitrogen dioxide (NO_2) and ozone (O_3) during a Pilbara air quality study were found to be below the National Environment Protection Measure (NEPM) standards (DoE, 2004).

More recently, Chevron published results of air quality monitoring on Barrow Island (within the EMBA, 116 km southwest of the Operational Area) which showed no values that exceeded the NEPM standards for NO_2, O_3, sulphur dioxide (SO_2), carbon monoxide (CO), hydrogen sulphide (H_2S) or Aromatic Hydrocarbons (BTEX) (Chevron Australia, 2022). Chevron's monitoring showed exceedances of PM_{10} levels (particulate matter less than 10 µm) around some facilities on the island, however, these were attributed to localised unsealed road dust and regional events (Chevron Australia, 2022).

3.3.5 Ambient Underwater Noise

The Operational Area is relatively remote and therefore ambient underwater noise levels are expected to be low. Ambient noise within the NWS Province region is expected to be dominated by natural physical (e.g. wind, waves, rain) and biological (e.g. echo location and communication noises generated by cetaceans and fish) sources. Anthropogenic noise sources that are also likely to be experienced in the area include low-frequency noise from vessels.

3.3.6 Ambient Light

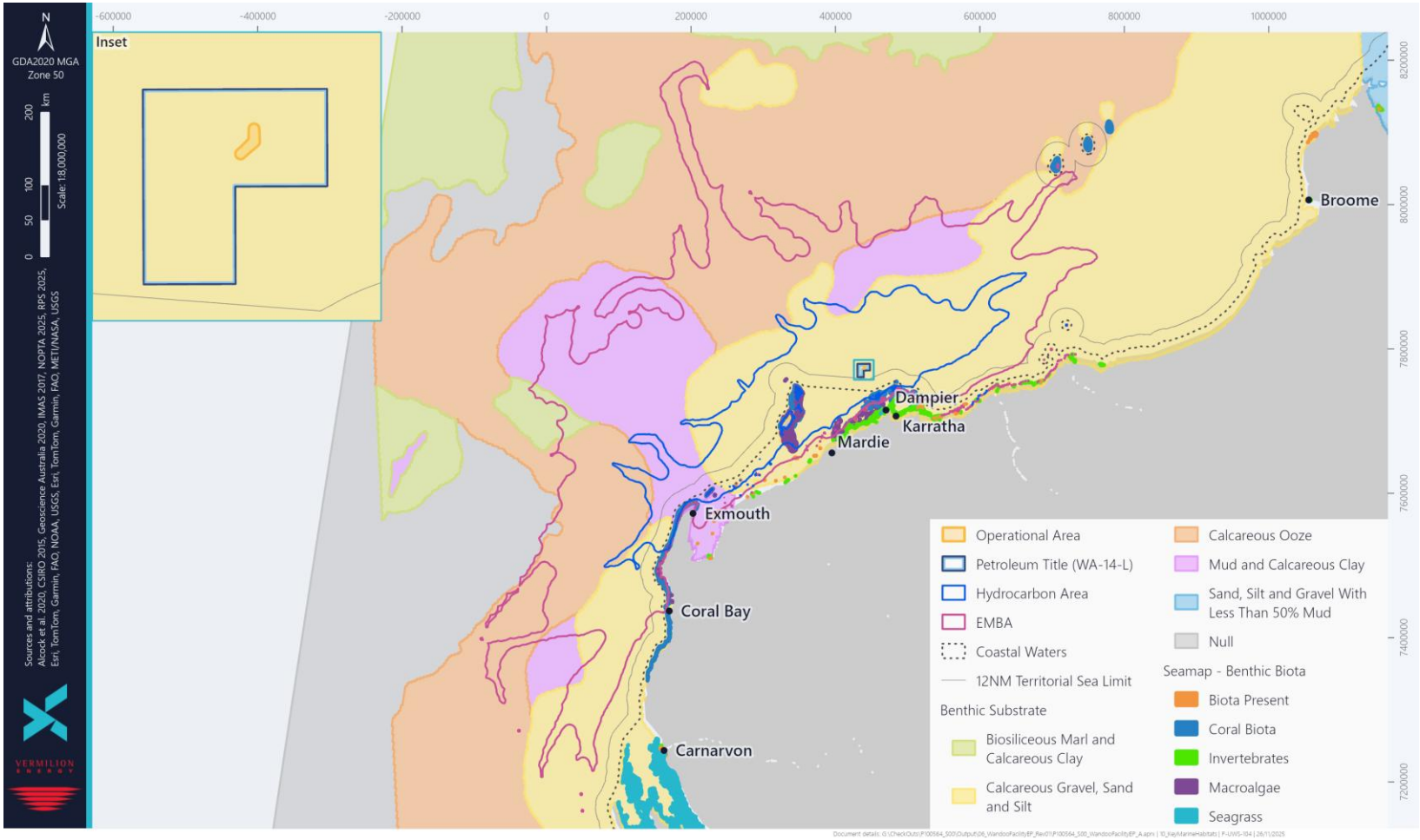
Ambient light within the NWS Province region is expected to predominantly be from solar/lunar luminance due to the remote location of the Operational Area (80 km northwest of Dampier). However, ambient light is expected to be slightly elevated due to artificial light sources associated with anthropogenic activities, including both permanent (e.g. onshore/offshore developments) and temporary (e.g. vessels) light sources including light sources associated with Wandoo facilities and petroleum activities, and the Jadestone Energy Stag A facility located 22 km southwest of the Operational Area.

3.4 Ecological Environment

3.4.1 Key Benthic Habitats

Table 3-1 identifies that key benthic habitats are receptors within the Operational Area, Hydrocarbon Area and EMBA that may be relevant to aspects of the activities. Four key marine habitats are described below. The description provides sufficient details to assess all impacts and risks to key marine habitats Figure 3-5 shows benthic biota and benthic substrate within the EMBA.

Figure 3-5: Key benthic habitats



3.4.1.1 Subtidal Soft Sediment and Benthic Fauna

ROV surveys on the NWS, at similar water depths to those in the Operational Area, indicate the sea floor is comprised of fine silt/sand substrates (RPS, 2012 unpublished data). The sediments were variously bioturbated, however benthic communities were generally sparse with low densities of organisms (e.g. crustaceans, molluscs, and polychaetes). According to the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Marine Benthic Substrate Database (CSIRO, 2015), the sea floor sediment type within the Operational Area is calcareous gravel, sand and silt (Figure 3-5).

Unconsolidated sediments support diverse benthic fauna living both in the sediments (infauna) and on the sediment surface (epifauna). Infauna species consist predominantly of mobile burrowing species including molluscs, crustaceans (crabs, shrimps and smaller related species), polychaetes, sipunculid and platyhelminth worms, asteroids (sea stars), echinoids (sea urchins) and other small animals. Epifauna species include small crustaceans and molluscs, echinoderms and larger sessile organisms such as sponges, corals, sea whips and sea squirt (DEC, 2007a).

Soft sediment habitats that support infauna are widespread in deeper offshore areas and in more protected environments throughout the region (CALM and MPRA, 2005; DEC, 2007a). The sediments range from clays to silts and fine sands. The depths of the Argo Abyssal Plain support sparsely distributed sessile organisms such as filter-feeding and deposit-feeding species (DEWHA, 2012). The spatial and temporal distribution and density of infauna depends not only on sediment composition but also on factors such as season, water depth, water temperature and wave-induced currents (Ward and Rainer, 1988; Rainer, 1991; Kinhill, 1997). Communities in shallower areas (less than 30 m deep) are likely to be dominated by sessile filter-feeding species such as sponges, sea pens and ascidians. Sediments in deeper water are typically finer (muddier) and the benthic community is dominated by benthic scavengers and deposit feeders including polychaete worms, crustaceans, molluscs and echinoderms (DEWHA, 2012).

The sea floor of the deeper waters of the NWS is primarily a soft sediment habitat that can support scavengers, benthic filter feeders and epifauna communities (Brewer et al., 2007). Any areas of exposed hard substrate are likely to be colonised by deep water filter-feeding organisms, such as hydroids and sponges.

A monitoring survey undertaken in 2024 using box coring samples showed benthic infauna increases in species richness and abundance at sites further away from the Wandoo Production Facility, which may be influenced by sediment composition and particle size distribution with higher proportions of silt and clay at sites 500 m or more from the Wandoo Facility (Worley, 2025). Benthic infauna composition was considerably different from previous surveys with amphipods being the most abundant infauna group. In comparison, a 1996 survey showed the most abundant taxon was crustaceans, polychaete was the most abundant taxon in a 1998 survey, and nematodes the most dominant group in a 2015 survey (Worley, 2025).

3.4.1.2 Corals

No naturally occurring coral reef communities are found in the Operational Area. The nearest areas of significant coral reef located in proximity to the Operational Area, are the Glomar Shoals (approximately 45 km northeast), Dampier Archipelago (approximately 38 km southeast),

Barrow/Montebello Islands (approximately 92 km southwest) and Ningaloo Reef (approximately 296 km southwest). Coral reef communities are widespread throughout the EMBA.

Corals are generally divided into two broad groups: the zooxanthellate ('reef-building', 'hermatypic' or 'hard') corals and the azooxanthellate ('ahermatypic' or 'soft') corals. The hard corals contain symbiotic microalgae (zooxanthellae) that enhance growth and allow the coral to secrete large amounts of calcium carbonate. The soft corals are generally smaller and often solitary (Tzioumis and Keable, 2007). Hard corals are generally found in shallower (<50 m) waters while the soft corals are found at most depths, particularly those below 50 m (Tzioumis and Keable, 2007).

Hard corals are widespread within the EMBA, with significant coral reefs occurring at a number of sites including within the Ningaloo Marine Park near Exmouth (Section 3.6.4), the Montebello/Barrow/Lowendal islands, Muiron island, the Dampier Archipelago, Glomar Shoals and Rankin Bank. The upwelling of cooler, nutrient-rich water from the Indian Ocean along the continental shelf break provides preferential conditions for the development of hard corals (DEWHA, 2012). In the NWS region, coral reefs in clearer, offshore waters typically have higher coral density and diversity than reefs associated with turbid near-shore waters (Woodside, 2006).

The Ningaloo Reef is unique in that it is a mainland fringing coral reef, the largest of its kind in Australia (CALM and MPRA, 2005). The Ningaloo Reef extends over 260 km and is the only large reef in the world found so close to the western coast of a continental land mass (within 100 m at closest point). The Reef includes intertidal and deeper sub-tidal corals, with over 300 species representing 54 genera recorded (UNESCO, 2025).

In addition to the larger coral reefs that have regional significance, smaller reefs and individual coral colonies are found throughout areas where water quality and benthic substrate are conducive to coral survival. Intertidal hard corals also occur within the EMBA, typically as individual colonies on rocky shores. These intertidal corals do not form a large habitat class within the region, with beaches/mudflats and mangroves the most common shoreline habitat.

Significant coral spawning occurs in autumn for a number of species, although some taxa such as Porites and Acropora spp. may spawn in spring and summer (Baird et al., 2011; Rosser and Gilmour, 2008). Spawning events have been observed throughout the Dampier Archipelago in March and April (Stoddart and Gilmour, 2005) and along the Ningaloo Coast during March (Simpson et al., 1993).

3.4.1.3 Seagrasses

Seagrasses are widespread throughout the shallower areas of the EMBA. No seagrasses are present within the Operational Area (Figure 3-5).

Seagrasses are marine flowering plants, with about 30 species found in Australian waters (Huisman, 2000). Seagrass generally grows in soft sediments within intertidal and shallow subtidal waters where there is sufficient light and are common in sheltered coastal areas such as bays, lees of islands and fringing coastal reefs (McClatchie et al., 2006; McLeay et al., 2003). Seagrasses are important primary producers in tropical in-shore waters as they provide energy and nutrients for detrital grazing food webs. Seagrass meadows are important in stabilising seabed sediments, and providing nursery grounds for fish and crustaceans, and a protective habitat for the juvenile fish

and invertebrates species (Huisman, 2000; Kirkman, 1997). Seagrasses also provide important habitat for fish and dugongs within the NWS Province (DEWHA, 2012).

Seagrass species within the EMBA exhibit seasonal trends in abundance and distribution (Orth et al., 2006). Natural disturbance events such as cyclones and dugong grazing can also affect local seagrass distribution and abundance.

Ideal conditions for seagrasses include clear waters, low nutrients, protection from heavy seas and swells, and sandy substrate. Many seagrass species are perennial (grow all year round) and cover extensive areas, such as those of Shark Bay and Exmouth Gulf. Seagrasses can also be found adjacent to offshore islands, including Dampier Archipelago and the Montebello and Barrow islands (CALM and MPRA, 2005; DEC, 2007a).

Coastal shallow-water seagrass habitats account for only 0.2% of Australia's coastlines (Duke et. al., 2010). Montebello and Barrow Islands contain sparse seagrass habitat (McMahon et al., 2017), however, the closest known key areas of seagrass habitat to the Operational Area are the Exmouth Gulf and Ningaloo Reef area.

3.4.1.4 Macroalgae

Macroalgae are not found within the Operational Area, however, are widespread within shallower areas within the EMBA (Figure 3-5). Macroalgae are generally found where hard substrates occur; although macroalgae such Caulerpa, Halimeda, Udotea and Penicillus can anchor in soft sediments or attach to shell fragments or rubble. Subtidal macroalgae often occur with coral reefs, colonising dead coral and coral rubble for attachment. Intertidal macroalgae may also occur throughout the EMBA, as there is widespread intertidal hard substrate and intertidal rock platforms suitable for macroalgal growth. Macroalgae are important primary producers and support diverse and abundant fauna of small invertebrates that are the principal food source for many in-shore fish species.

A large number of tropical macroalgal species have been recorded from the region, with over 200 species documented in the Pilbara alone (Huisman, 2004; Huisman and Borowitzka, 2003). Macroalgal habitat within the region may occur in subtidal or intertidal areas of hard substrate where sufficient light is available for photosynthesis. Such areas are likely to include shallow (<25 m) subtidal reefs and rocky intertidal shores and be widespread throughout the region.

Due to the widespread nature of macroalgal habitat within the EMBA, there are no identified areas of significant environmental value.

3.4.2 Key Coastal Communities

Table 3-1 identifies that key coastal communities are receptors within the Hydrocarbon Area and EMBA that may be relevant to aspects of the activities. The description below provides sufficient details to assess all impacts and risks to key coastal communities.

3.4.2.1 Mangroves

The closest regionally significant mangroves to the Operational Area occur within the Dampier Archipelago (64 km southeast). Other areas of mangrove habitat occurring within the EMBA

include Barrow Island, and the Montebello Islands (Figure 3-6) (EPA, 2001). No mangrove communities occur within the Operational Area.

WA does not support any unusual, endemic or restricted mangrove species. All mangrove species within WA are common and widespread elsewhere, either in northern Australia or in the Indo-Pacific region near northern Australia.

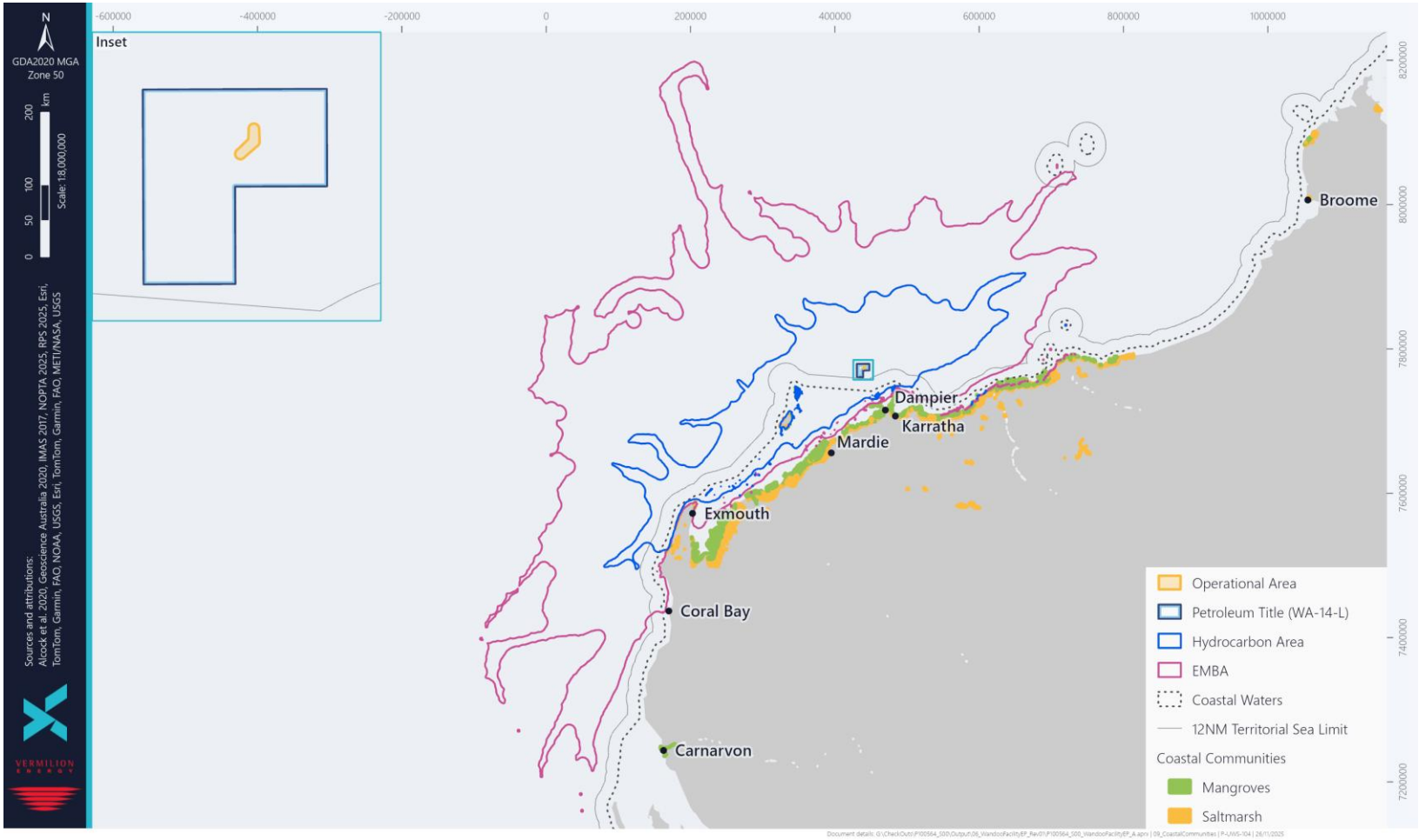
Mangroves are recognised as significant because they are productive coastal forest systems, providing habitat and shelter for infauna, epifauna, gastropods, crustaceans, fish and other marine species. Mangroves are important nursery areas for fish, lobster and prawn species, some of which are targeted by recreational and commercial fishers (Nagelkerken et al., 2008; DEC, 2007a). Mangroves may also provide shelter for other species such as juvenile turtles (DEC, 2007a). Ospreys (Pandion haliaetus) and white-bellied sea eagles (Haliaeetus leucogaster) roost in mangroves, while brahminy kites (Haliastur indus) and a range of smaller birds nest in them (DEC, 2007a). Mangroves are also recognised for their capacity to protect coastal areas from erosion due to storms and storm surge.

3.4.2.2 Saltmarsh

Saltmarsh habitat is common within tidal flats or wetland habitats along the Pilbara coast. Within the EMBA, the closest saltmarsh communities in proximity to the Operational Area are located only on Barrow Island (115 km southwest) (Figure 3-6). No saltmarsh communities occur within the Operational Area or Hydrocarbon Area.

Saltmarshes are terrestrial halophytic (salt-adapted) ecosystems that mostly occur in the upper-intertidal zone. They are typically dominated by dense stands of halophytic plants such as herbs, grasses and low shrubs. The diversity of saltmarsh plant species increases with increasing latitude (in contrast to mangroves). The vegetation in these environments is essential to the stability of the saltmarsh, as they trap and bind sediments. The sediments supporting saltmarsh are generally sandy silts and clays and can often have high organic material content. Saltmarshes provide a habitat for a wide range of both marine and terrestrial fauna, including infauna and epifaunal invertebrates, fish, and birds (DEE, 2016).

Figure 3-6: Key coastal communities



3.4.2.3 Intertidal Beach/Mudflat

Intertidal beaches and mudflats are widespread in the region, due to limited shoreline contact they only occur on Montebello Islands (~92 km southwest of the Operational Area) and Barrow Island (~115 km southwest of the Operational Area) within the Hydrocarbon Area and EMBA (Figure 3-7). Intertidal beaches and mudflats host a range of infauna, including molluscs and polychaetes that are likely to be an important food source for wading birds (DoE, 2015b). No intertidal beaches or mudflats are located within the Operational Area.

One intertidal beach/mudflat area of international conservation significance occurs within the Hydrocarbon Area, Bandicoot Bay. These habitats are recognised as an important resource for a diverse range of migratory bird species, the majority of which feed in the area after migrating from the northern hemisphere (DoE, 2015b). Bandicoot Bay is a Conservation Reserve within the Montebello/Barrow Islands Marine Management Area.

3.4.2.4 Rocky Shorelines/Intertidal Reef Platforms

Rocky shorelines and intertidal reef platforms are present within the Hydrocarbon Area and EMBA, occurring on island shores, including at Montebello Islands (~92 km southwest of the Operational Area) and Barrow Island (~115 km southwest of the Operational Area) (Figure 3-7).

Rocky shoreline formations offer habitat to a range of intertidal species including invertebrates and shorebirds. Rocky shorelines are often indicative of high-energy areas (wave action) where sediment deposition is limited or restricted. They are formed from limestone pavement extending out from the beach into subtidal zones, e.g. along the Ningaloo Coast and North-West Cape. Higher relief platforms (>0.5 m off the high-water mark) are also present at several headlands along the North-West Cape (DEC, 2007a).

3.4.2.5 Sandy Beaches

Sandy beaches are found within the Hydrocarbon Area and EMBA on some islands, including Montebello Islands (~92 km southwest of the Operational Area) and Barrow Island (~115 km southwest of the Operational Area) (Figure 3-7).

Sandy beaches are those areas within the intertidal zone where unconsolidated sediment has been deposited by wave and tidal action. Sandy beaches can vary from low to high energy zones which will influence the profile of each beach through varying rates of erosion and accretion. They are generally interspersed among areas of hard substrate (e.g. sandstone) that form intertidal platforms and rocky outcrops.

Sandy beaches provide habitat for a variety of burrowing invertebrates and subsequently provide foraging areas for seabirds. Crested terns are known to nest on sandy beaches. Further detail on breeding and nesting sites for seabirds and shorebirds are provided in Section 3.4.3.3

Sandy beaches can also provide a turtle nesting habitat, particularly at the Barrow/Montebello/ Lowendal islands and Ningaloo Coast. Further information on turtle nesting areas is provided in Section 3.4.3.6.

Figure 3-7: Shoreline types



3.4.3 Key Marine Fauna

Table 3-1 identifies key marine fauna that may occur that may occur within the Operational Area, Hydrocarbon Area and/or EMBA. The descriptions below provide sufficient details to assess all impacts and risks to key marine fauna.

3.4.3.1 Plankton

Plankton species, including both phytoplankton and zooplankton, are a key component in oceanic food chains. Phytoplankton are autotrophic planktonic organisms living within the photic zone; and reside at the start of the food chain in the ocean (McClatchie et al., 2006). Phytoplankton communities are largely comprised of protists, including green algae, diatoms, and dinoflagellates (McClatchie et al., 2006). There are three size classes of phytoplankton: microplankton (>20 µm), nanoplankton (2–20 µm) and picoplankton (<2 µm) (Broatas et al., 2022). Diatoms and dinoflagellates are the most abundant of the micro and nanoplankton size classes and are generally responsible for the majority of oceanic primary production (McClatchie et al., 2006). Phytoplankton are dependent on oceanographic processes (e.g. currents and vertical mixing), that supply nutrients needed for photosynthesis. Thus, phytoplankton biomass is typically variable (spatially and temporally), but greatest in areas of upwelling, or in shallow waters where nutrient levels are high.

Zooplankton is the faunal component of plankton, comprised of small protozoa, crustaceans (e.g. krill) and the eggs and larvae of other taxa such as fish, corals, and molluscs. Zooplankton includes species that drift with the currents and those that are motile. Zooplankton within the EMBA may include organisms that complete their lifecycle as plankton (e.g. copepods, euphausiids) as well as larval stages of other taxa such as fishes, corals, and molluscs (CALM and MPRA, 2005). Peaks in zooplankton can occur from mass coral spawning events (typically occurring in March – April and September – November) (Rosser and Gilmour, 2008). Fish larvae abundance occurs throughout the year (Harris et al., 2005; Rosser and Gilmour, 2008; Simpson et al., 1993). Some of these taxa are commercially and recreationally important species in the region.

Primary productivity of the NWMR is generally low and appears to be largely driven by offshore influences (Brewer et al., 2007), with periodic upwelling events and cyclonic influences driving coastal productivity through nutrient recycling and advection. Within the region, peak primary productivity along the shelf edge occurs in late summer/early autumn. Variation in productivity can also be linked to higher biologically productive period in the area (e.g. mass coral spawning events).

3.4.3.2 Benthic Invertebrates

The benthic invertebrates of the NWS region are of low abundance but highly diverse and comprised largely of borrowing polychaete worms and crustaceans (Rainer, 1991). Echinoderms and molluscs are also common on the continental shelf and slope in this region. The diversity and abundance of benthic invertebrates decreases with distance from the coast over most of the NWS – this may be attributed to increasing depth or increasing distance from terrestrial and coastal organic input (SKM, 1996).

A baseline survey, conducted in May 1996 (BBG, 1996) prior to installation of the Wandoo facilities, concluded that the infauna assemblage was depauperate, with low numbers of species

and low abundance. Most of the common species (small crabs, shrimps and polychaetes) are detritivores, feeding on organic matter in the surface layers of the sediment. This survey also found that most areas were bare of epifauna but occasional epifauna mainly sponges and corals were observed.

Subsequent environmental surveys conducted in 1998 (SKM, 1998), 2015 (Aurecon, 2016) and 2024 (Worley, 2025) showed benthic infauna composition that was considerably different, with amphipods being the most abundant infauna group. In the 1996 survey, the most abundant taxon was crustaceans, the 1998 survey showed polychaete was the most abundant taxon, and nematodes the most dominant group in the 2015 survey. The overall abundance and richness of infauna was higher in the 2024 survey than the previous surveys (Worley, 2025). On a regional scale, the infauna community in the vicinity of the Operational Area is also comparable to those at similar sites on the NWS.

It is unlikely that the infauna community would have changed significantly from the baseline survey as the infauna assemblage was depauperate, with low numbers of species and low abundance.

3.4.3.3 Seabirds and Shorebirds

Seabird and shorebird species presence within the Project Areas are shown in Table 3-2. The presence of most species, particularly within the Operational Area are expected to be of a transitory nature only. Table 3-7 identified BIAs for 8 species that overlap EMBA. The Wedge-tailed shearwater has a breeding BIA that overlaps the Operational Area. These species are discussed further below.

Table 3-2: Seabird and shorebird species or species habitat that may occur within the Project Areas

Scientific name	Common name	EPBC Act Status			EPBC Act Status		
		Threatened Species	Migratory Species	Listed Marine Species	Operational Area	Hydrocarbon Area	EMBA
Actitis hypoleucos	Common Sandpiper	-	✓(M)	✓	MO	KO	KO
Anous stolidus	Common Noddy	-	✓ (M)	✓	MO	LO	LO
Anous tenuirostris melanops	Australian Lesser Noddy	V	-	✓	-	-	MO
Apus pacificus	Fork-tailed Swift	-	✓ (M)	✓	-	LO	LO
Ardenna carneipes	Flesh-footed Shearwater	-	✓ (M)	✓	-	LO	LO
Ardenna pacifica	Wedge-tailed Shearwater	-	✓ (M)	✓	-	BKO	BKO
Arenaria interpres	Ruddy Turnstone	V	✓ (W)	✓	-	-	KO
Bubulcus ibis	Cattle Egret	-		✓	-	MO	MO
Calidris acuminata	Sharp-tailed Sandpiper	V	✓(W)	✓	MO	KO	KO
Calidris alba	Sanderling	-	✓(W)	✓	-	-	KO
Calidris canutus	Red Knot	V	✓(W)	✓	MO	KO	KO
Calidris falcinellus	Broad-billed Sandpiper	-	✓(W)	✓	-	-	KO

Scientific name	Common name	EPBC Act Status			EPBC Act Status		
		Threatened Species	Migratory Species	Listed Marine Species	Operational Area	Hydrocarbon Area	EMBA
Calidris ferruginea	Curlew Sandpiper	CE	✓(W)	✓	MO	KO	KO
Calidris melanotos	Pectoral Sandpiper	-	✓(M)	✓	MO	KO	MO
Calidris ruficollis	Red-necked Stint	-	✓ (W)	✓	-	-	KO
Calidris subminuta	Long-toed Stint	-	✓ (W)	✓	-	-	KO
Calidris tenuirostris	Great Knot	V	✓ (W)	✓	-	-	KO
Calonectris leucomelas	Streaked Shearwater	-	✓ (W)	✓	LO	LO	LO
Chalcites osculans	Black-eared Cuckoo	-	✓ (W)	✓	-	KO	KO
Charadrius leschenaultii	Greater Sand Plover	V	✓ (W)	✓	-	KO	KO
Charadrius mongolus	Lesser Sand Plover	E	✓ (W)	✓	-	-	KO
Charadrius ruficapillus	Red-capped Plover	-	-	✓	-	-	KO
Charadrius veredus	Oriental Plover, Oriental Dotterel	-	✓ (W)	✓	-	MO	MO
Chroicocephalus novaehollandiae	Silver Gull	-	-	✓	-	BKO	BKO
Cuculus optatus	Oriental Cuckoo	-	✓ (T)	-	-	-	MO
Erythrotriorchis radiatus	Red Goshawk	E	-	-	-	MO	MO
Falco hypoleucos	Grey Falcon	V	-	-	-	KO	KO
Fregata ariel	Lesser Frigatebird	-	✓(M)	✓	LO	LO	KO
Fregata minor	Great Frigatebird	-	✓ (W)	✓	MO	MO	MO
Glareola maldivarum	Oriental Pratincole	-	✓ (W)	✓	-	MO	KO
Haliaeetus leucogaster	White-bellied Sea-Eagle	-	✓ (T)	✓	-	KO	KO
Himantopus himantopus	Pied Stilt	-	-	✓	-	-	KO
Hirundo rustica	Barn Swallow	-	✓ (M)	✓	-	MO	KO
Hydroprogne caspia	Caspian Tern	-	✓ (W)	✓	-	BKO	BKO
Larus pacificus	Pacific Gull	-	-	✓	-	-	BKO
Limnodromus semipalmatus	Asian Dowitcher	V	✓ (W)	✓	-	KO	KO
Limosa lapponica	Bar-tailed Godwit	-	✓ (W)	✓	-	KO	KO
Limosa lapponica menzbieri	Northern Siberian Bar-tailed Godwit	E		-	-	KO	KO
Limosa limosa	Black-tailed Godwit	E	✓ (W)	✓	-	-	KO
Macronectes giganteus	Southern Giant-Petrel	E	-	-	MO	MO	LO
Macronectes halli	Northern Giant Petrel	V	✓(M)	✓	-	-	MO

Scientific name	Common name	EPBC Act Status			EPBC Act Status		
		Threatened Species	Migratory Species	Listed Marine Species	Operational Area	Hydrocarbon Area	EMBA
Malurus leucopterus edouardi	White-winged Fairy-wren (Barrow Island)	V	-	-	-	LO	LO
Merops ornatus	Rainbow Bee-eater	-	-	✓	-	MO	MO
Motacilla cinerea	Grey Wagtail	-	✓ (T)	✓	-	MO	MO
Motacilla flava	Yellow Wagtail	-	✓(W)	✓	-	MO	KO
Numenius madagascariensis	Eastern Curlew	CE	✓ (M)	✓	MO	KO	KO
Numenius minutus	Little Curlew, Little Whimbrel	-	✓ (M)	✓	-	-	KO
Numenius phaeopus	Whimbrel	-	✓ (M)	✓	-	-	KO
Onychoprion anaethetus	Bridled Tern	-	✓ (M)	✓	-	BKO	BKO
Onychoprion fuscatus	Sooty Tern	-	-	✓	-	BKO	BKO
Papasula abbotti	Abbott's Booby	E	-	✓	-	-	MO
Pandion haliaetus	Osprey	-	✓ (W)	✓	MO	BKO	BKO
Pezoporus occidentalis	Night Parrot	CE	-	-	-	MO	MO
Phaethon lepturus	White-tailed Tropicbird	-	✓(M)	✓	MO	KO	KO
Phaethon lepturus fulvus	Christmas Island White-tailed Tropicbird	E	-	✓	MO	MO	MO
Phaethon rubricauda westralis	Red-tailed Tropicbird (Indian Ocean)	E	✓(M)	✓	LO	LO	KO
Phaethon rubricauda	Red-tailed tropicbird	-	-	✓	LO	LO	KO
Phalaropus lobatus	Red-necked Phalarope	-	✓ (W)	✓	-	-	KO
Pluvialis fulva	Pacific Golden Plover	-	✓(M)	✓	-	-	KO
Pluvialis squatarola	Grey Plover	V	✓(M)	✓	-	-	KO
Pterodroma mollis	Soft-plumaged Petrel	V	-	✓	-	LO	LO
Recurvirostra novaehollandiae	Red-necked Avocet	-	-	✓	-	-	KO
Rostratula australis	Australian Painted Snipe	E	-	✓	-	LO	LO
Sterna dougallii	Roseate Tern	-	✓(M)	✓	-	BKO	BKO
Sternula albifrons	Little Tern	V	✓(M)	✓	-	BKO	BKO
Sternula nereis	Fairy Tern	-	-	-	-	BKO	BKO
Sternula nereis nereis	Australian Fairy Tern	V	-	-	FLO	BKO	BKO
Stiltia isabella	Australian Pratincole	-	-	✓	-	-	KO
Sula dactylatra	Masked Booby	-	✓(M)	✓	-	BKO	BKO
Sula leucogaster	Brown Booby	-	✓(M)	✓	-	BKO	KO

Scientific name	Common name	EPBC Act Status			EPBC Act Status		
		Threatened Species	Migratory Species	Listed Marine Species	Operational Area	Hydrocarbon Area	EMBA
Thalassarche carteri	Indian Yellow-nosed Albatross	V	✓(M)	✓	-	MO	MO
Thalassarche cauta	Shy Albatross	E	✓(M)	✓	-	-	MO
Thalassarche impavida	Campbell Albatross	V	✓(M)	✓	-	MO	BKO
Thalassarche melanophris	Black-browed Albatross	V	✓(M)	✓	-	-	MO
Thalassarche steadi	White-capped Albatross	V	✓(M)	✓	-	-	MO
Thalasseus bengalensis	Lesser Crested Tern	-	-	✓	-	BKO	BKO
Thalasseus bergii	Greater Crested Tern	-	✓ (W)	✓	-	BKO	LO
Tringa brevipes	Grey-tailed Tattler	-	✓ (W)	✓	-	-	KO
Tringa glareola	Wood Sandpiper	-	✓ (W)	✓	-	-	KO
Tringa nebularia	Common Greenshank	E	✓(M)	✓	-	LO	KO
Tringa stagnatilis	Marsh Sandpiper	-	✓ (W)	✓	-	-	KO
Xenus cinereus	Terek Sandpiper	V	✓ (W)	✓	-	-	KO

Threatened species:
V Vulnerable
E Endangered
CE Critically Endangered

Migratory species:
M Marine
W Wetland
T Terrestrial

Type of presence:
MO Species of species habitat may occur within area
LO Species or species habitat likely to occur within area
KO Species or species habitat known to occur within area
FMO Foraging, feeding or related behaviour may occur within area
FLO Foraging, feeding or related behaviour likely to occur within area
FKO Foraging, feeding or related behaviour known to occur within area
BLO Breeding likely to occur within area
BKO Breeding known to occur within area
RLO Roosting likely to occur within area
RKO Roosting known to occur within area
CKO Congregation or aggregation known to occur within area

Brown Booby

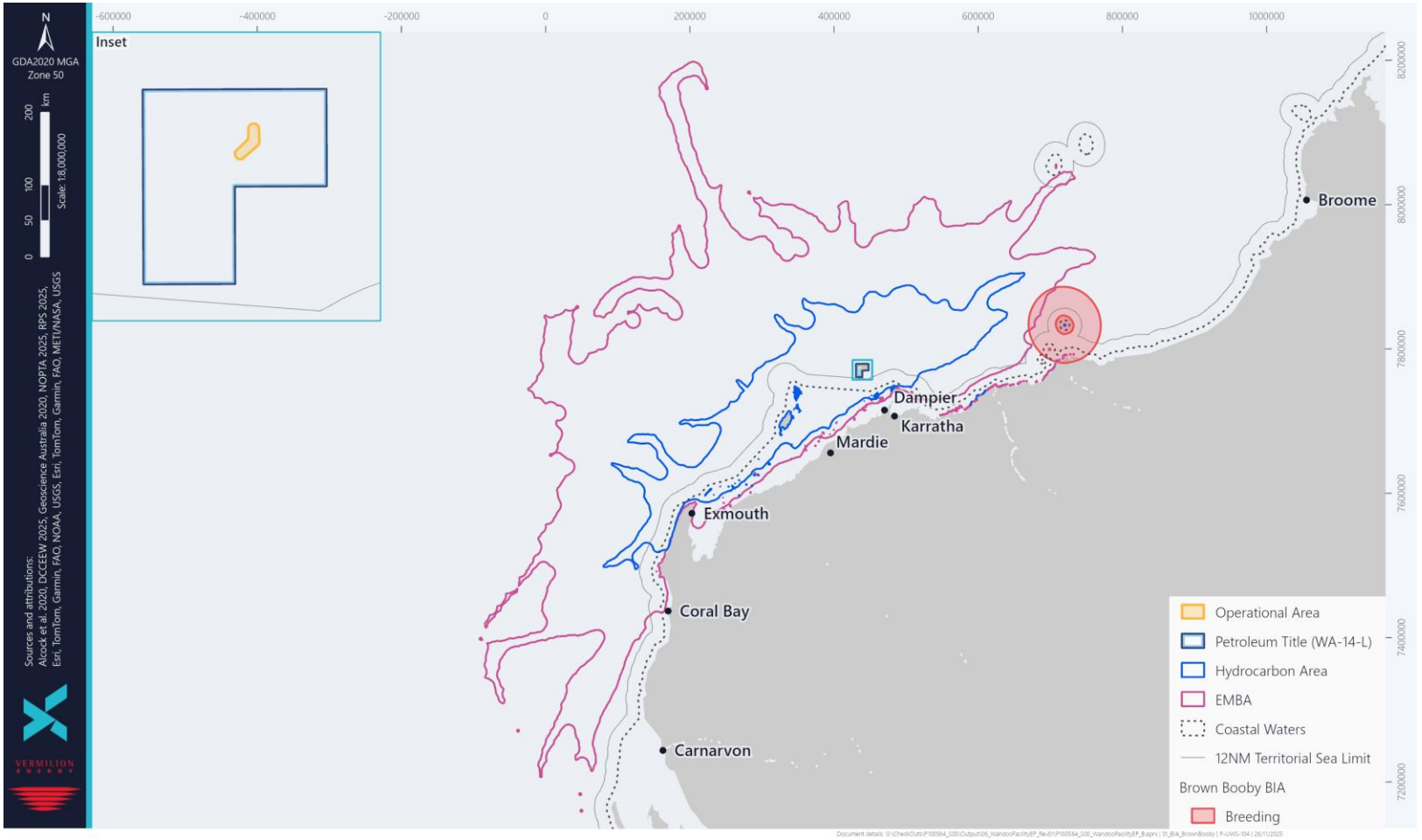
The brown booby is an EPBC listed migratory seabird recorded within the Hydrocarbon Area and EMBA. This species is widely distributed across tropical oceans and is generally considered to occur between latitudes 30° N and 30° S. In Australia, the brown booby is found along the northern coastline where it uses both terrestrial and marine habitats, typically remaining near breeding islands (DoE, 2026a). The species breeds on islands, sand cays and atolls, nesting directly on the ground. PMST results indicate that breeding behaviour may occur within the EMBA.

Several islands off the Western Australian coast are recognised brown booby breeding sites, including the Lacepede Islands, Bedout Island, White Island and Ashmore Reef (DoE, 2026a). The

EMBA overlaps with a breeding BIA that covers the Kimberley and northern Pilbara coasts and islands, including Ashmore Reef (Figure 3-8). The breeding season for brown boobies varies and egg laying is recorded throughout the year at many locations (CoA, 2012).

In Western Australia, brown boobies are most commonly found between 18 and 36 km offshore (DCCEEW, 2024e). They rely on cooler water conditions that support nutrient cycling and plankton growth, which are critical for feeding, particularly during the breeding season when adults may feed chicks up to two times per day (DoE, 2026a).

Figure 3-8: BIA for the brown booby



Fairy Tern

Breeding BIAs for the fairy tern (*Sterna nereis*) (Figure 3-9) intersect the Hydrocarbon Area and EMBA. The fairy tern is Marine-listed under the EPBC Act and the subspecies Australian fairy tern (*Sterna nereis nereis*) is listed as vulnerable. The WA breeding population (approximately 5,000–6,000 mature individuals) is dispersed over approximately 2,500 km of coastline (Greenwell, 2021). Within WA, the subspecies comprises a sedentary Pilbara population and a partially-migratory population extending from Exmouth to Point Malcolm. Individuals of the partially-migratory population may occasionally migrate into the southern region of the NWMR during the winter months (Greenwell, 2021).

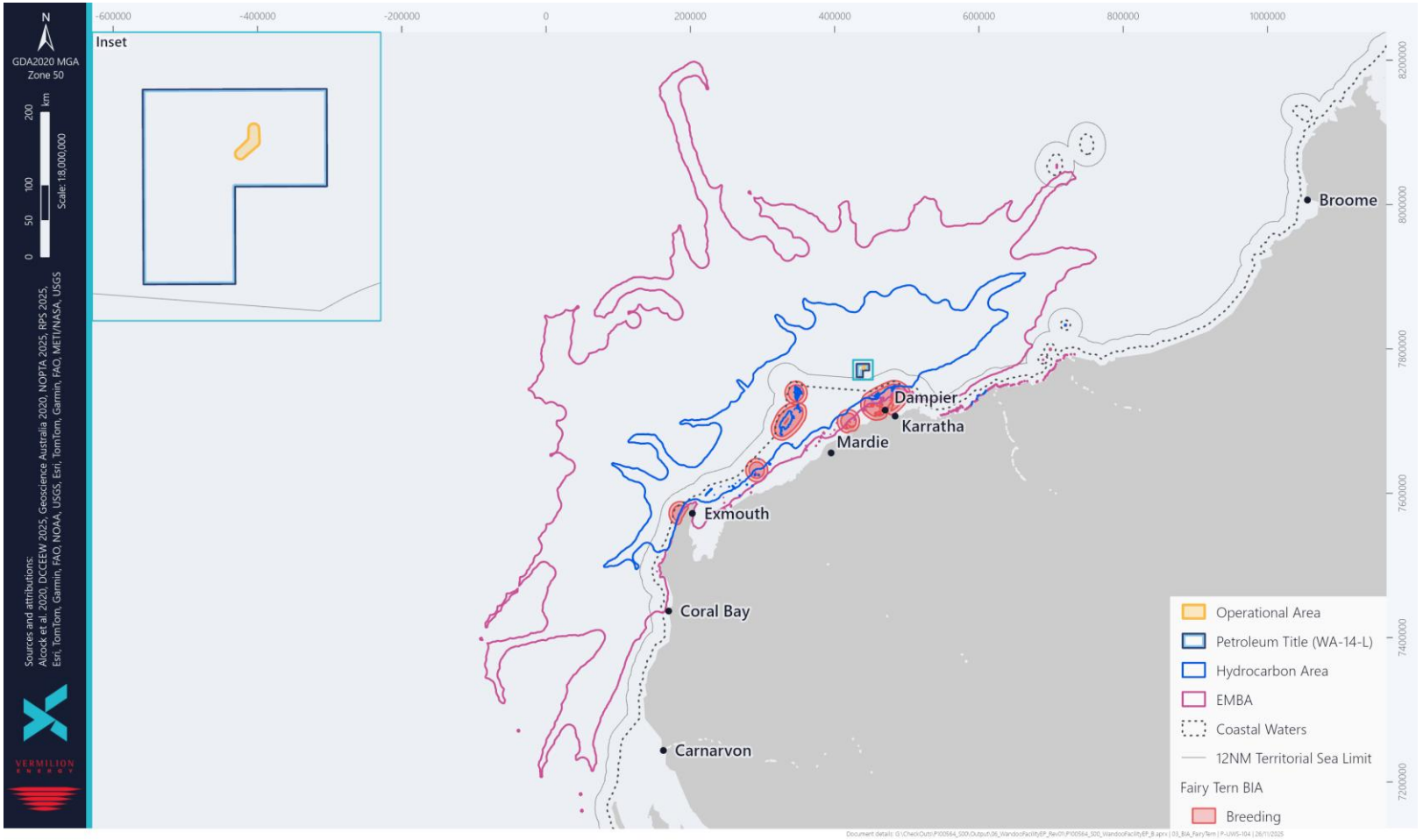
The partially-migratory population is widely distributed and winters primarily around the northern Houtman Abrolhos Islands (Greenwell, 2021). These birds migrate to breeding areas as far south as Point Malcolm on the eastern south coast and as far north as the Ningaloo coast, while others remain within the Houtman Abrolhos Archipelago (Greenwell, 2021).

Within the NWMR breeding occurs in small colonies between June and September on offshore islands, including Simpson Island, Barrow Island, the Montebello Islands, the Lowendal Islands, Thevenard Island, Serrurier Island, the islands in the Dampier Archipelago, Maryanne Shoals and Egret Island (Dunlop, 2018; Johnstone et al., 2013). Colonies tend to occupy areas rather than fixed sites, and nest sites can be abandoned after one or more years, even if they have been successful (Saunders and de Rebeira, 1985).

While information regarding foraging ecology of this species within the NWMR is lacking, the fairy tern has been studied in South Australia. Here, the species typically forages in inshore waters and has been reported to rarely travel beyond 2 km during the breeding season in South Australia (Paton and Rogers, 2009).

Fairy terns are diurnal plunge diving, feeding exclusively on small (<60 mm) surface schooling bait fishes throughout their range. Prey include species of sprats, hardy heads and larval prey of some demersal fish species. Unlike many other terns, fairy terns are not dependent upon large pelagic fishes to drive their prey to the surface (Paton and Rogers, 2009).

Figure 3-9: BIA for the fairy tern



Lesser Crested Tern

Breeding BIAs for the lesser crested tern (*Thalasseus bengalensis*) (Figure 3-10) intersect the Hydrocarbon Area and a breeding and foraging BIA intersects the EMBA.

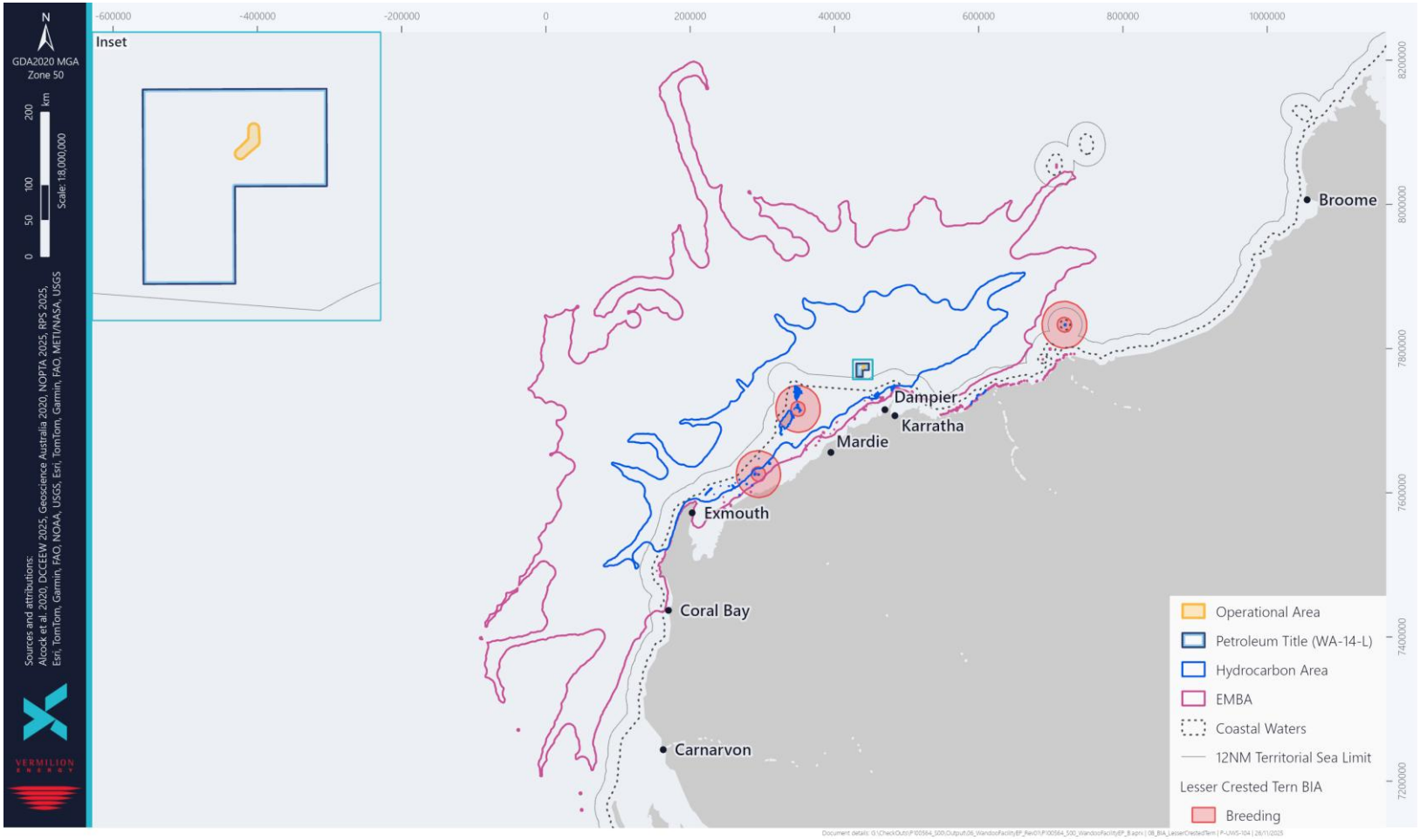
Many populations remain sedentary in their breeding areas or disperse locally (del Hoyo et al., 1996), although some are more migratory (Urban et al., 1986). The species breeds in large, dense colonies, or in small groups of fewer than 10 pairs amidst colonies of other species, such as silver gull (del Hoyo et al., 1996). Colonies are located on islands, including those as far offshore as Bedout, Legendre and the Montebello and Lowendal islands (Johnstone et al., 2013). Adult breeders have shown both high site fidelity and also flexibility in their breeding localities, depending upon the spatial and temporal reliability of food resources (Crawford et al., 2002).

Breeding occurs from late March to May (Johnstone et al., 2013). During breeding, crested terns conduct short, diurnal foraging trips close (<40 km) to the colony (Surman and Wooller, 2003; Mcleay et al., 2010) with most foraging behaviour displayed by individuals at distances >5 km (Mcleay et al., 2010).

The chicks are predominantly fed pelagic fish, a diet that varies among colonies and years (Chiaradia et al., 2002; McLeay et al., 2010). Adults may forage more widely on inshore reef fish (Surman and Wooller, 2003), crustaceans and cephalopods using a plunge diving method (Commonwealth of Australia, 2020).

There is no conservation listing for this species.

Figure 3-10: BIA for the lesser crested tern

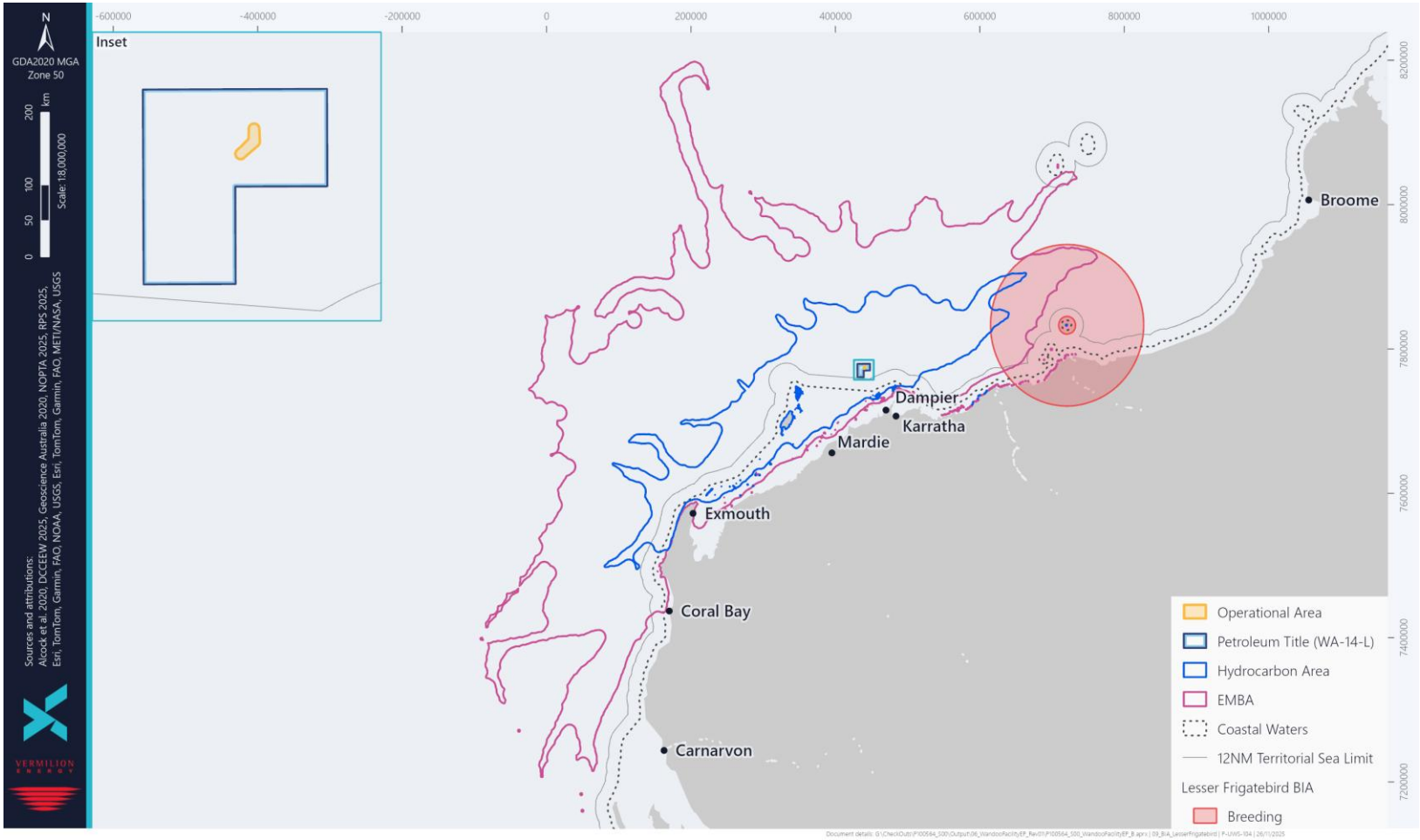


Lesser Frigatebird

Breeding BIAs for the lesser frigatebird (*Fregata ariel*) (Figure 3-11) intersect the hydrocarbon area, and a foraging BIA intersects the EMBA. The lesser frigatebird is listed migratory under the EPBC Act and BC Act. The species is typically found throughout tropical waters with breeding populations on small, remote tropical and sub-tropical islands, in mangroves or bushes, and on bare ground (Commonwealth of Australia, 2020).

The lesser frigatebird is observed to remain further out to sea during the day and move to inshore waters during rough weather or in the late evening (Chatto, 2001). The species is known to breed on Bedout island between March and September and may also be present during the non-breeding season (Marchant and Higgins, 1990; Mustoe and Edmunds, 2008). The lesser frigatebird generally forages close to breeding colonies feeding on fish and squid in flight (Jaquemet et al., 2005; Marchant and Higgins, 1990).

Figure 3-11: BIA for lesser frigatebird



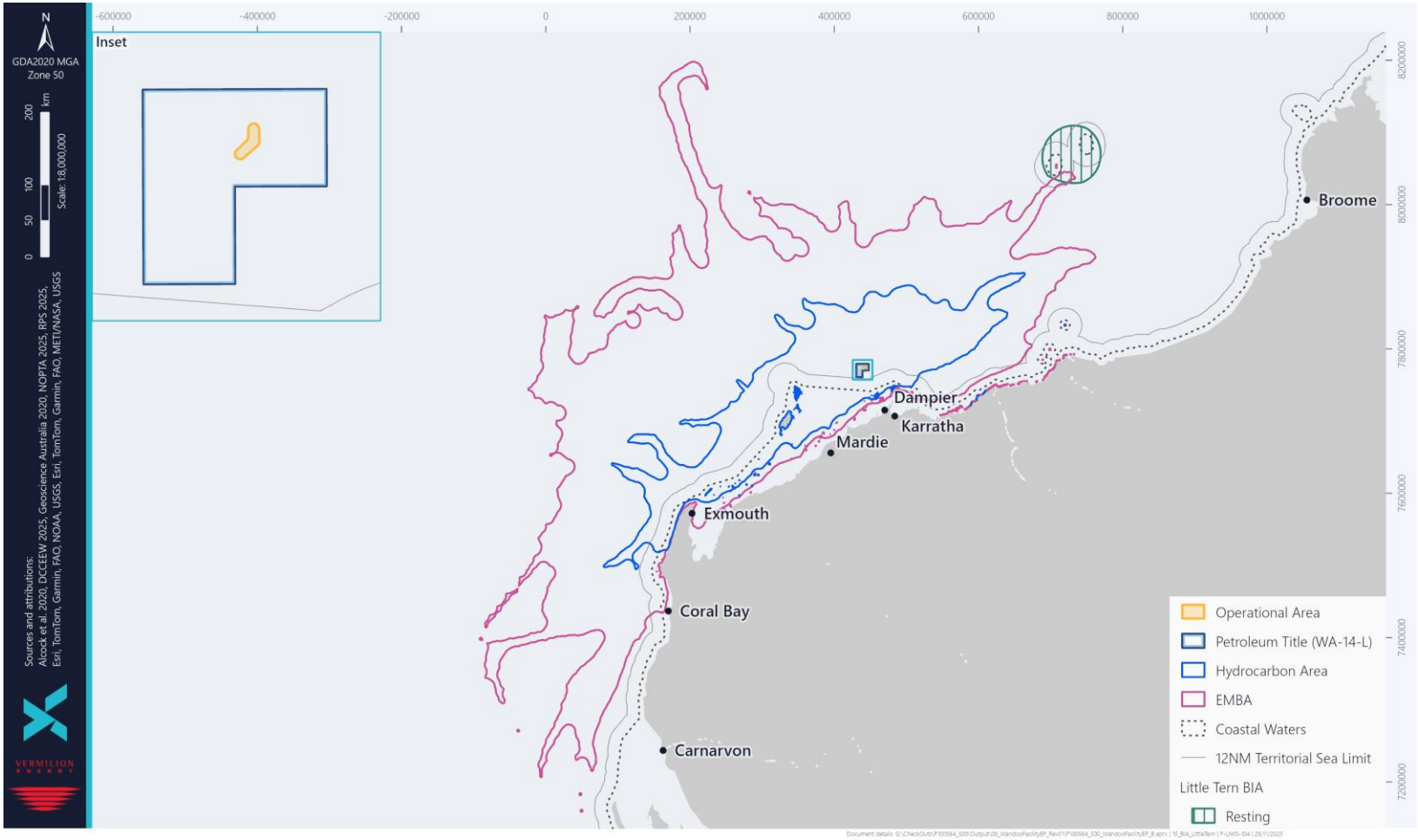
Little Tern

The little tern is an EPBC listed vulnerable, migratory species that been recorded within the EMBA. The species has a patchy global distribution and typically occupies sheltered coastal environments including estuaries, lagoons, bays and inlets. In Australia, the little tern is widespread with records from both northern and southern regions. It generally breeds along coastlines on sparsely vegetated or bare beaches, islands, saltmarshes, coral reefs and estuarine areas (CoA, 2020).

Breeding has been documented across several Australian states, including Western Australia and the Northern Territory, where the breeding period usually spans from April to January (DoE, 2026b)).

Little terns tend to forage in shallow coastal waters such as estuaries, lagoons and lakes, often remaining close to breeding sites. Their diet consists mainly of small fish and crustaceans. They may also forage along the coastline, particularly near river mouths, although they are less frequently observed feeding at sea and usually remain within 50 m of the shoreline (DoE, 2026b). A resting BIA for the little tern has been recorded within the EMBA in Figure 3-12.

Figure 3-12: BIA for the little tern



Roseate Tern

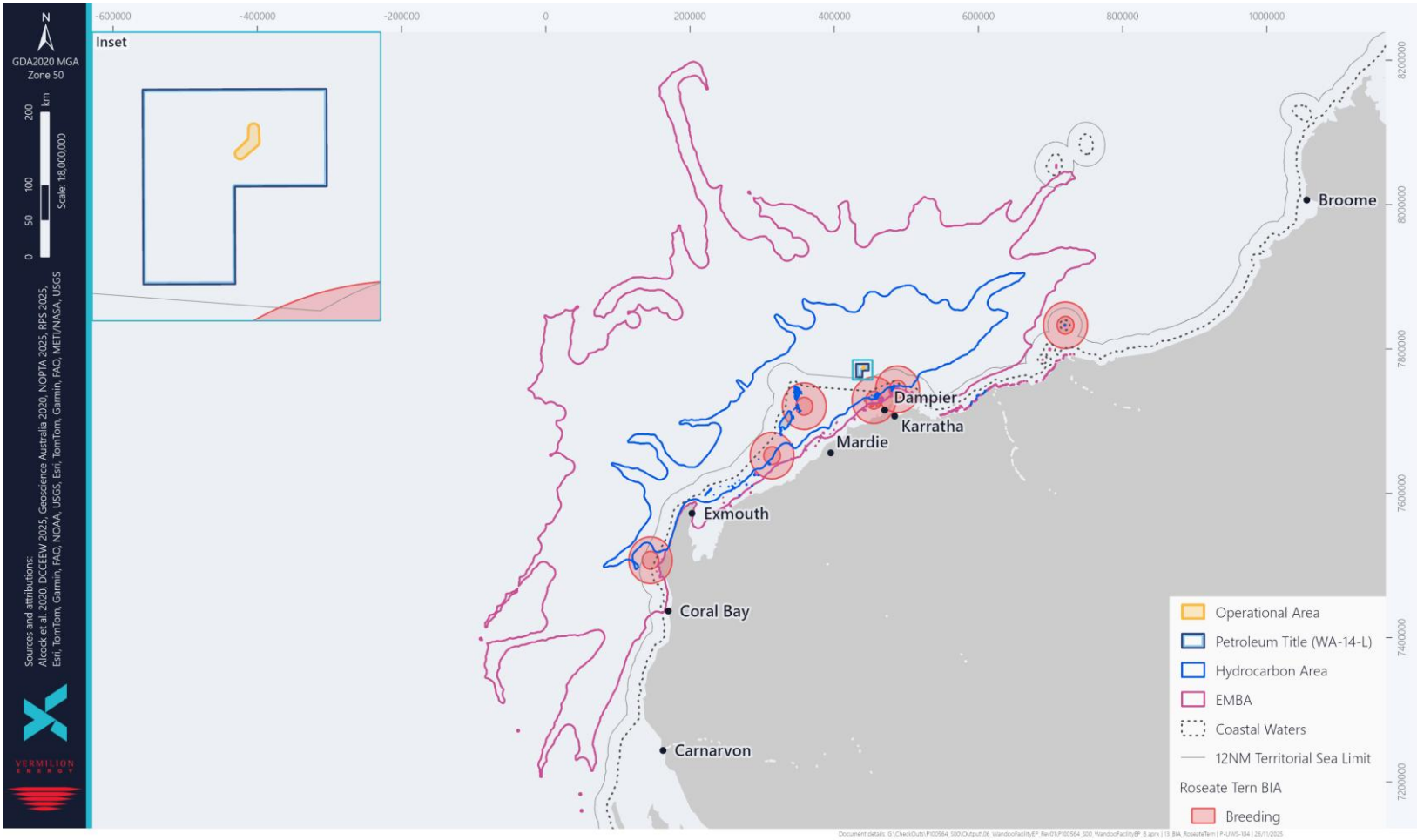
A Breeding BIA for the roseate tern (*Sterna dougallii*) (Figure 3-13) intersect the Hydrocarbon Area and and a breeding BIA and foraging BIA intersects the EMBA. The roseate tern is listed migratory under the EPBC Act and BC Act. This species is generally sub-tropical in distribution and there are many breeding populations in the NWMR, including Ashmore Reef, Bonaparte Archipelago, Lacepede Islands, Dampier Archipelago and the Lowendal Islands.

The largest roseate tern breeding colony in WA is in the Houtman Abrolhos Islands (Surman and Nicholson, 2009). Large colonies breed within the Lowendal Island and Montebello Island region where there is a stronghold for this species (Higgins and Davies, 1996). A large breeding colony has also been recorded on Goodwyn Island on the Dampier Archipelago (Higgins and Davies, 1996). Peak breeding times across the NWMR area are between May to August.

Birds are known to usually move away from breeding colonies following breeding, but their non-breeding range is not well defined (Higgins and Davies, 1996). Roseate terns will forage diurnally, up to 60 km from their colonies and always over deeper shelf waters, rather than shallow coastal areas (Surman and Wooller, 2003). Roseate terns will also readily raft (roost in flocks on the seas surface) after foraging episodes (Commonwealth of Australia, 2020).

Roseate terns predominately eat small pelagic fish taken by plunge diving or surface dipping, typically foraging in dense flocks overflying predatory fishes that push their prey to the surface. Roseate terns may plunge to 20 cm depth.

Figure 3-13: BIA for the roseate tern



Wedge-tailed Shearwater

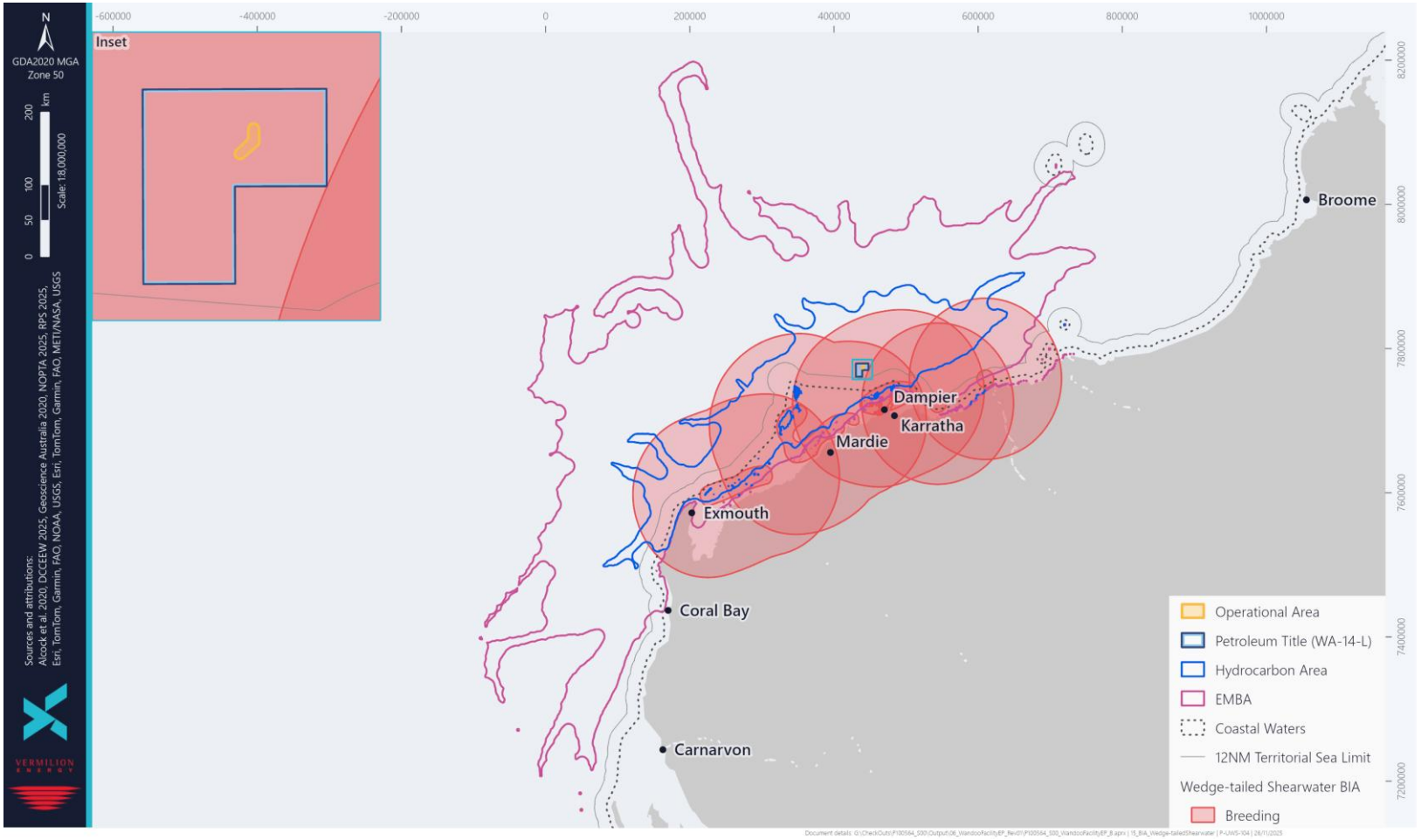
A Breeding BIA for the wedge-tailed shearwater (*Ardenna pacifica*) (Figure 3-14) intersects with the Operational Area, Hydrocarbon Area and the EMBA. This BIA is based on buffer areas surrounding the offshore islands (e.g. within Dampier Archipelago) that are used for nesting by this species.

The wedge-tailed shearwater is a pelagic species, listed as migratory under the EPBC Act and has widespread distribution across the Indian and Pacific oceans with a global population of 2.6 million pairs. Of this population, approximately 1 million pairs breed in Australia, predominantly on islands off the coast of WA between Ashmore Reef and Rottnest Island. The largest breeding populations are found on the Houtman Abrolhos (~600,000 pairs) (Surman and Nicholson, 2009) and throughout the NWS region of the NWMR, where large populations exist on Muiron Islands (300,000 pairs) and Serrurier Island (60,000 pairs) (Surman and Nicholson, 2009; 2015).

Adults are absent from their breeding colonies during the interbreeding period and return from their tropical Indian Ocean over-wintering grounds from late June onwards to re-excavate their burrows. This species is highly synchronous in timing of breeding; all eggs within a colony are laid within a 10-day period. Once hatched, adults leave the burrows to forage locally during the day returning at night to feed chicks until they are ready to fledge (Nicholson, 2002). Due to the high synchronicity in egg laying, fledging is restricted to the first two weeks of April (Nicholson, 2002).

Following breeding, wedge-tailed shearwaters on the Houtman Abrolhos Islands and Varanus Island migrate 4,500 km northwest to equatorial waters of the Indian Ocean around 90°E (Surman et al., 2018), traversing the NWMR.

Figure 3-14: BIA for the wedge-tailed shearwater

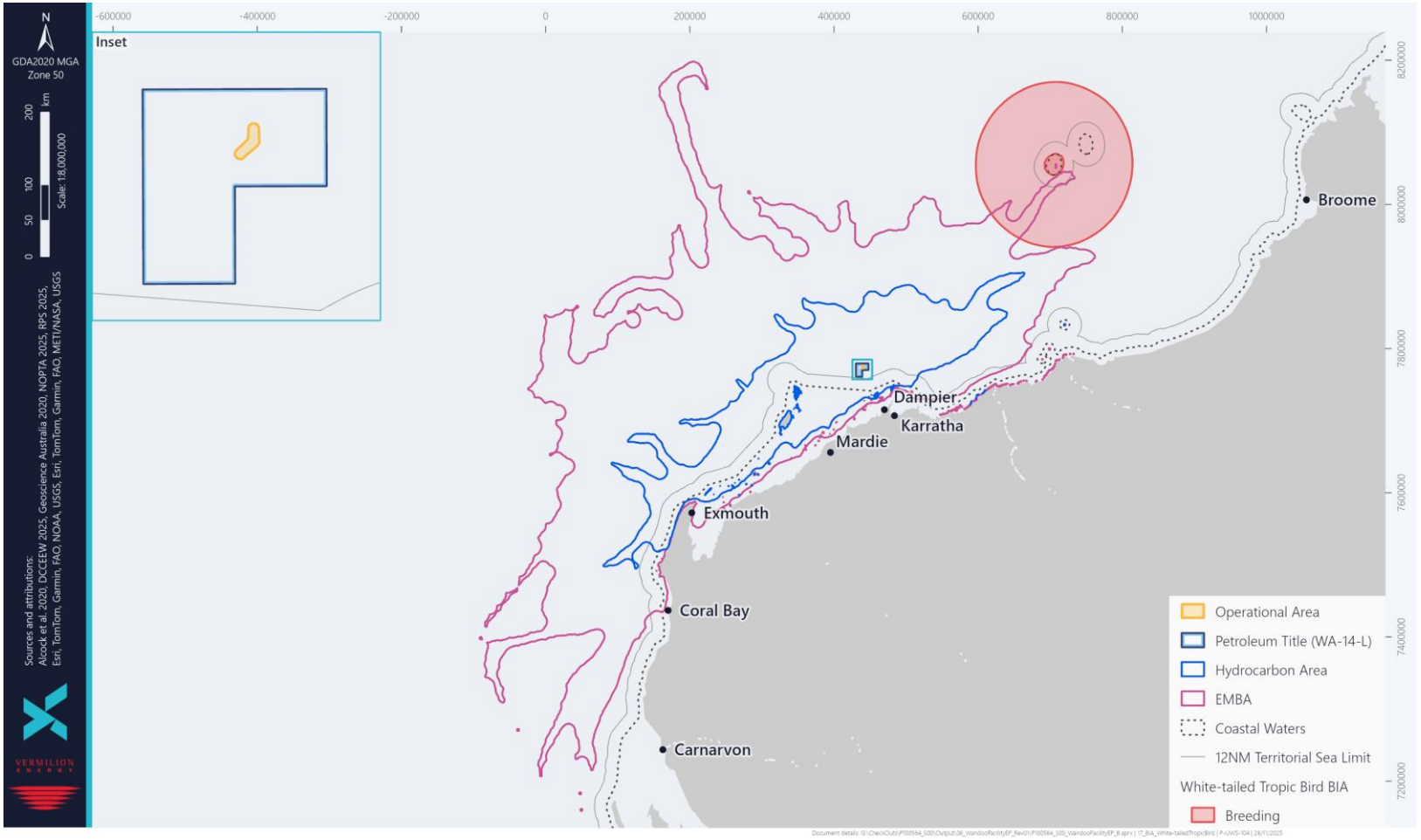


White-tailed tropicbird

The white-tailed tropicbird is a migratory species that may be present within the EMBA. This species is primarily pelagic, occurring in tropical ocean waters, and is most frequently recorded in northern Australia. Breeding colonies are located on islands and atolls, where the species uses a range of terrestrial habitats for nesting. White-tailed tropicbirds are seldom observed on land and generally approach coastal areas only during the breeding period. Their movements once they leave breeding sites are not well understood (CoA, 2020).

The species predominantly feeds on fish and cephalopods, which it captures through deep plunge diving (CoA, 2020). A breeding BIA has been recorded for the white-tailed tropicbird within the EMBA (Figure 3-15).

Figure 3-15: BIA for the white-tailed tropicbird



3.4.3.4 Fish and Sharks

Fish, shark and ray species presence within the Project Areas is shown in Table 3-3. Table 3-7 identified BIAs for one species (whale shark) that overlap the Operational Area, Hydrocarbon Area and EMBA. The whale shark is discussed further below.

Table 3-3: Shark and ray species or species habitat that may occur within the Project Areas

Scientific name	Common name	EPBC Act Status			Project Areas		
		Threatened Species	Migratory Species	Listed Marine Species	Operational Area	Hydrocarbon Area	EMBA
Sharks and rays							
Anoxypristis cuspidata	Narrow Sawfish	-	✓(M)	✓	MO	KO	KO
Carcharhinus longimanus	Oceanic Whitetip Shark	-	✓(M)	✓	LO	LO	LO
Carcharias taurus (west coast population)	Grey Nurse Shark (west coast population)	V	-	✓	LO	CKO	CKO
Carcharias taurus	Grey Nurse Shark	-	✓(M)	✓	LO	CKO	CKO
Carcharodon carcharias	White Shark	V	✓(M)	✓	MO	KO	KO
Centrophorus uyato	Little Gulper Shark	CD	-	-	-	-	LO
Isurus oxyrinchus	Shortfin Mako	-	✓(M)	✓	LO	LO	LO
Isurus paucus	Longfin Mako	-	✓(M)	✓	LO	LO	LO
Lamna nasus	Porbeagle, Mackerel Shark	-	✓ (M)	✓	-	MO	MO
Mobula alfredi	Reef Manta Ray	-	✓(M)	✓	KO	KO	KO
Mobula birostris	Giant Manta Ray	-	✓(M)	✓	LO	KO	KO
Pristis clavata	Dwarf Sawfish	V	✓(M)	✓	KO	KO	KO
Pristis pristis	Largetooth Sawfish, Freshwater Sawfish	E	✓(M)	✓	MO	LO	LO
Pristis zijsron	Green Sawfish	V	✓(M)	✓	KO	KO	KO
Rhincodon typus	Whale Shark	V	✓(M)	✓	FKO	FKO	FKO
Sphyrna lewini	Scalloped Hammerhead	CD	-	-	LO	KO	KO
Other							
Acentronura larsonae	Helen's Pygmy Pipehorse	-	-	✓	MO	MO	MO
Bhanotia fasciolata	Corrugated Pipefish	-	-	✓	-	-	MO
Bulbonaricus brauni	Braun's Pughead Pipefish	-	-	✓	MO	MO	MO
Campichthys galei	Gale's Pipefish	-	-	✓	-	-	MO
Campichthys tricarinatus	Three-keel Pipefish	-	-	✓	MO	MO	MO

Scientific name	Common name	EPBC Act Status			Project Areas		
		Threatened Species	Migratory Species	Listed Marine Species	Operational Area	Hydrocarbon Area	EMBA
Choeroichthys brachysoma	Pacific Short-bodied Pipefish	-	-	✓	MO	MO	MO
Choeroichthys latispinosus	Muiron Island Pipefish	-	-	✓	MO	MO	MO
Choeroichthys suillus	Pig-snouted Pipefish	-	-	✓	MO	MO	MO
Corythoichthys amplexus	Fijian Banded Pipefish	-	-	✓	-	-	MO
Corythoichthys flavofasciatus	Reticulate Pipefish	-	-	✓	MO	MO	MO
Corythoichthys intestinalis	Australian Messmate Pipefish	-	-	✓	-	-	MO
Corythoichthys schultzi	Schultz's Pipefish	-	-	✓	-	-	MO
Cosmocampus banneri	Roughridge Pipefish	-	-	✓	MO	MO	MO
Doryrhamphus dactyliophorus	Banded Pipefish	-	-	✓	MO	MO	MO
Doryrhamphus excisus	Bluestripe Pipefish	-	-	✓	MO	MO	MO
Doryrhamphus janssi	Cleaner Pipefish	-	-	✓	MO	MO	MO
Doryrhamphus multiannulatus	Many-banded Pipefish	-	-	✓	MO	MO	MO
Doryrhamphus negrosensis	Flagtail Pipefish	-	-	✓	MO	MO	MO
Festucalex scalaris	Ladder Pipefish	-	-	✓	MO	MO	MO
Filicampus tigris	Tiger Pipefish	-	-	✓	MO	MO	MO
Halicampus brocki	Brock's Pipefish	-	-	✓	MO	MO	MO
Halicampus dunckeri	Red-hair Pipefish	-	-	✓	-	-	MO
Halicampus grayi	Mud Pipefish	-	-	✓	MO	MO	MO
Halicampus nitidus	Glittering Pipefish	-	-	✓	MO	MO	MO
Halicampus spinirostris	Spiny-snout Pipefish	-	-	✓	MO	MO	MO
Haliichthys taeniophorus	Ribboned Pipehorse	-	-	✓	MO	MO	MO
Hippichthys penicillus	Beady Pipefish	-	-	✓	MO	MO	MO
Hippocampus angustus	Western Spiny Seahorse	-	-	✓	MO	MO	MO
Hippocampus histrix	Spiny Seahorse	-	-	✓	MO	MO	MO
Hippocampus kuda	Spotted Seahorse	-	-	✓	MO	MO	MO
Hippocampus planifrons	Flat-face Seahorse	-	-	✓	MO	MO	MO
Hippocampus spinosissimus	Hedgehog Seahorse	-	-	✓	MO	MO	MO
Hippocampus trimaculatus	Three-spot Seahorse	-	-	✓	MO	MO	MO

Scientific name	Common name	EPBC Act Status			Project Areas		
		Threatened Species	Migratory Species	Listed Marine Species	Operational Area	Hydrocarbon Area	EMBA
Lissocampus fatiloquus	Prophet's Pipefish	-	-	✓	-	-	MO
Micrognathus micronotopterus	Tidepool Pipefish	-	-	✓	MO	MO	MO
Milyeringa justitia	Barrow Cave Gudgeon	E	-	-	-	KO	KO
Milyeringa veritas	Cape Range Cave Gudgeon	V	-	-	-	KO	KO
Nannocampus subosseus	Bonyhead Pipefish	-	-	✓	-	-	MO
Ophisternon candidum	Blind Cave Eel	V	-	-	-	KO	KO
Phoxocampus belcheri	Black Rock Pipefish	-	-	✓	MO	MO	MO
Solegnathus hardwickii	Pallid Pipehorse	-	-	✓	MO	MO	MO
Solegnathus lettiensis	Gunther's Pipehorse	-	-	✓	MO	MO	MO
Solenostomus cyanopterus	Robust Ghostpipefish	-	-	✓	MO	MO	MO
Stigmatopora argus	Spotted Pipefish	-	-	✓	-	-	MO
Syngnathoides biaculeatus	Double-end Pipehorse	-	-	✓	MO	MO	MO
Trachyrhamphus bicoarctatus	Bentstick Pipefish	-	-	✓	MO	MO	MO
Trachyrhamphus longirostris	Straightstick Pipefish	-	-	✓	MO	MO	MO

Threatened species:
V Vulnerable
E Endangered
CE Critically Endangered

Migratory species:
M Marine
W Wetland
T Terrestrial

Type of presence:
MO Species of species habitat may occur within area
LO Species or species habitat likely to occur within area
KO Species or species habitat known to occur within area
FMO Foraging, feeding or related behaviour may occur within area
FLO Foraging, feeding or related behaviour likely to occur within area
FKO Foraging, feeding or related behaviour known to occur within area
BLO Breeding likely to occur within area
BKO Breeding known to occur within area
RLO Roosting likely to occur within area
RKO Roosting known to occur within area
CKO Congregation or aggregation known to occur within area

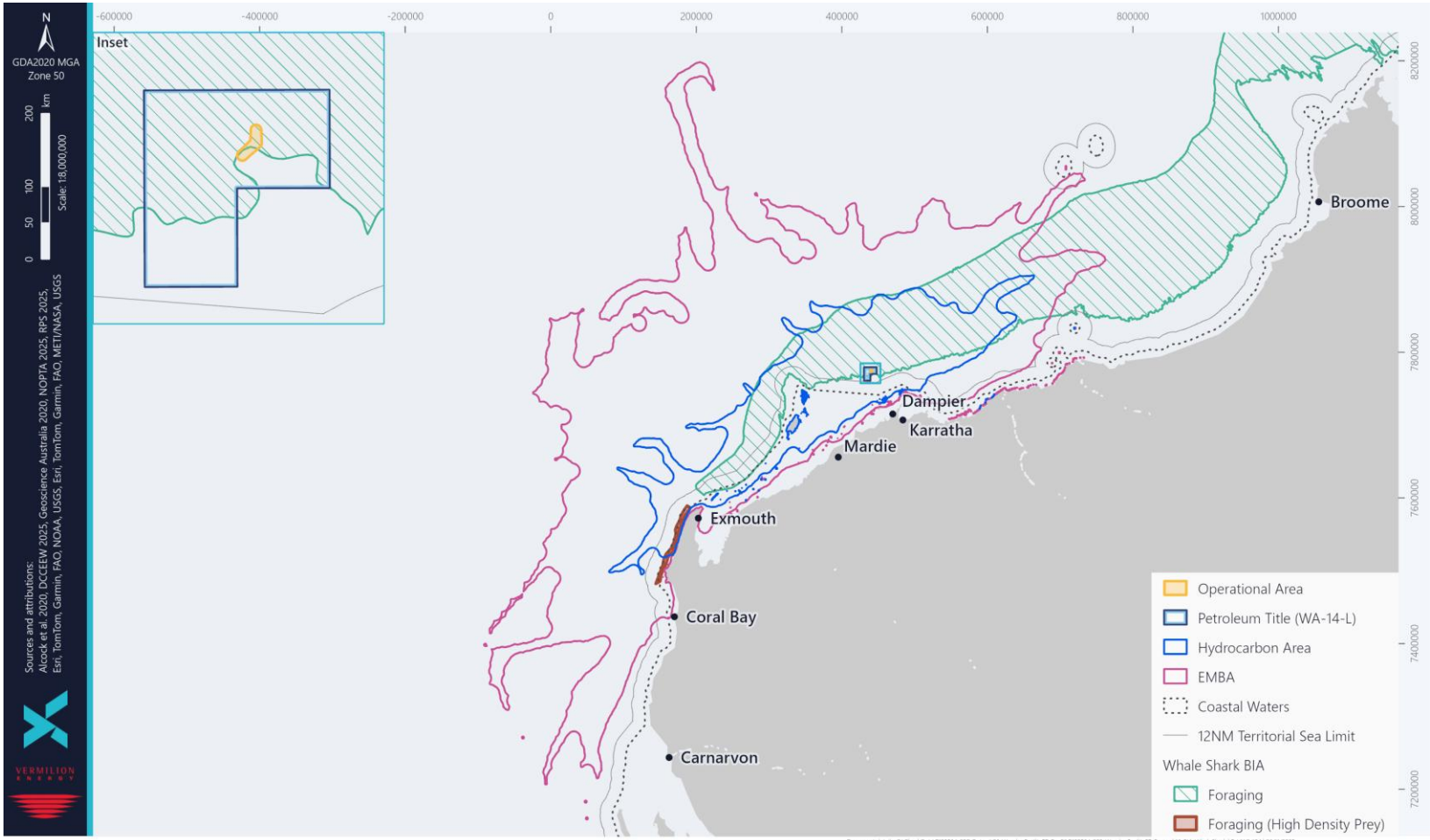
Whale Shark

A Foraging BIA for the whale shark (Rhincodon typus) intersects the Operational Area (Table 3-7, Figure 3-16). However, it is known that the whale sharks are more common migrating along the 200 m depth contour, which is further offshore from the Operational Area (TSSC, 2015b). The whale shark is widely distributed in Australian waters; but Ningaloo Reef is the main known

aggregation area in WA. Whale sharks aggregate at Ningaloo between March and July each year to feed. Aggregations occur due to seasonal concentrations of planktonic prey such as krill and zooplankton which are a source of food for the whale shark. The whale shark also aggregates in the coastal waters off Christmas Island between December and January. The whale shark is a filter feeder and feeds at or close to the water's surface by swimming forward with mouth agape, sucking in prey. While the species is generally encountered close to or at the surface, it will regularly dive and move through the water column (DoE, 2024).

An observational study by D'Antonio et al. (2025) investigated the influences of geomorphological features and oil and gas platforms on whale shark movement patterns and habitat connectivity. Natural geomorphological features such as pinnacles, canyons, and seamounts were identified to promote habitat connectivity and strongly influence habitat use by whale sharks across regional and local spatial scales. Offshore oil and gas platforms were also observed to have a similar effect, enhancing habitat connectivity. The offshore oil and gas platforms most visited by whale sharks were located close to the edge of the continental shelf and near natural geomorphological features. Through the study by D'Antonio et al. (2025) it is possible that these offshore oil and gas platforms act like 'stepping-stones' during migration and may increase vessel collision risks.

Figure 3-16: BIA for the whale shark



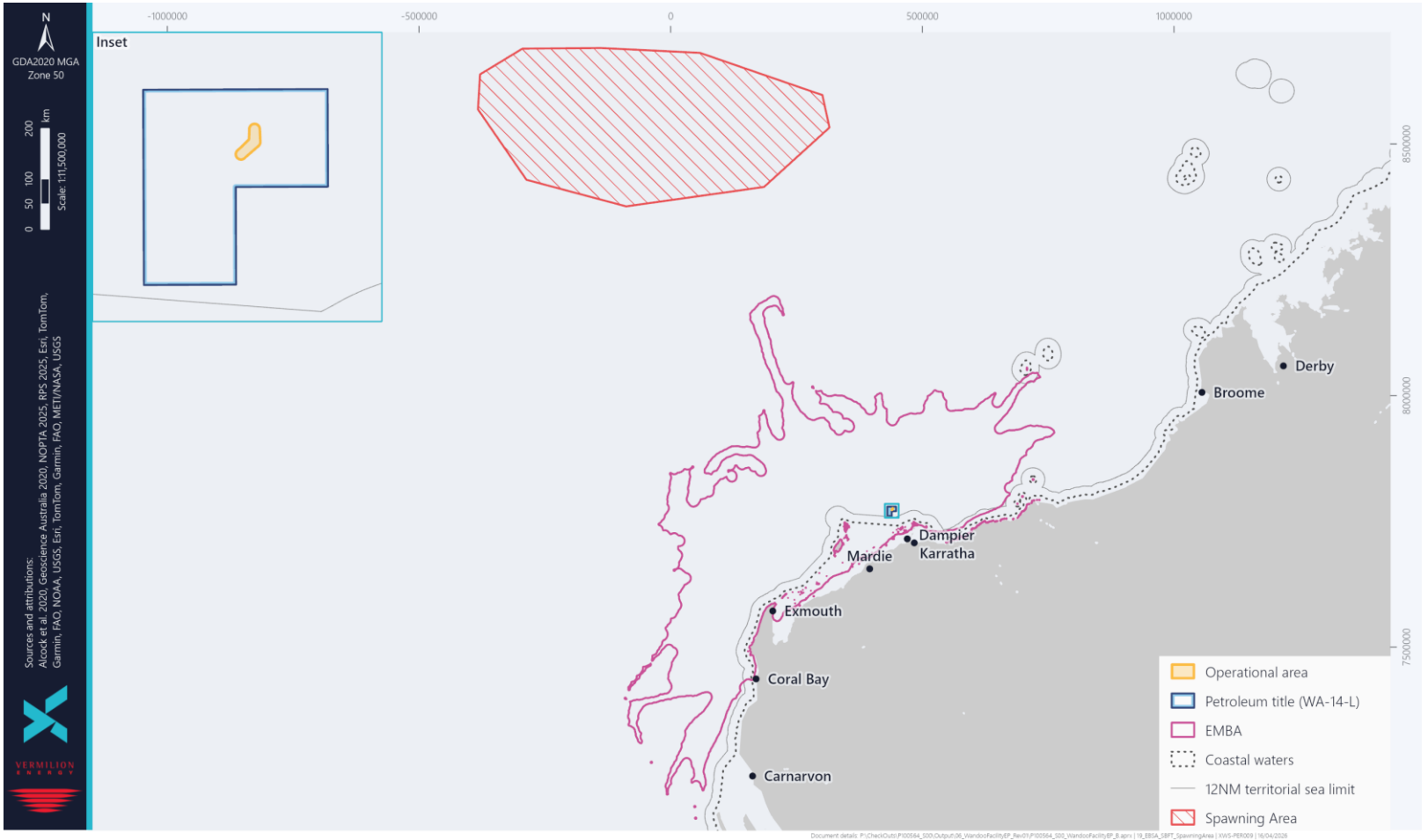
Commercially Significant Fish – Southern Bluefin Tuna

Southern bluefin tuna (SBT) (*Thunnus maccoyii*) are a long-lived species that live upwards of 40 years and mature between 11-12 years of age. The SBT are a highly migratory species found in southern hemisphere waters primarily between 30° and 50°S. SBT are suggested to congregate at seamounts, lumps and reefs in the Great Australian Bight where prey species also congregate. Congregation is also influenced by water masses such as nutrient rich sub-Antarctic waters and sea temperatures. SBT range is associated with age and feeding patterns with adult SBT waters ranging widely from northern WA to the southern Australian coastlines, including Tasmania to northern NSW (DoE, 2026c).

The only known spawning area, as shown in Figure 3-17, is located south-east of Java, Indonesia in the Indian Ocean between 12°S -17°S and 107° - 117°E, 555.19 km and 687.75 km northwest of the EMBA and Operational Area, respectively (CBD, 2025). Spawning occurs between August and April with a peak occurring between October and February. Spawning occurs close to the water surface in temperatures of 24°C and above, which is suggested to be critical for egg and larvae survival. Females can release up to 15 million eggs during a spawning period. The females move to cooler waters to feed and regain body condition post spawning. Juvenile SBT move away from spawning grounds within a few months of hatching, likely using the Leeuwin current to migrate south down the west coast of Australia (DoE, 2026c). The juvenile SBT are known to congregate near the surface off the southern Australian coastlines during summer months (December to April), while spending winter months in deeper, temperate oceanic waters (CCSBT, 2025). Tagging data has shown that juvenile SBT undertake a seasonal migration between the southern coastlines of Australia and the central Indian Ocean (CCSBT, 2025; DoE, 2026c). After the age of 5, SBT are rarely found in nearshore surface waters, with their distribution extending over the southern circumpolar area throughout most of the Pacific, Indian and Atlantic Oceans (CCSBT, 2025).

Global data shows that between 1952 and 2024, 76.6% of SBT catch was collected using longline, 10.5% by purse-seine, and 12.9% using other gears. Majority of the catch (78%) was recorded in the Indian Ocean, with 17% in the Pacific Ocean, and 5% recorded in the Atlantic Ocean. Since 1968, the reported catch in the Indian Ocean has declined from approximately 45,000 t to less than 10,000 t (CCSBT, 2025).

Figure 3-17: Southern bluefin tuna spawning area ecologically or biologically significant marine area (CBD, 2025)



3.4.3.5 Marine Mammals

Marine mammal species presence within the Project Areas is shown in Table 3-4. Table 3-7 identified BIAs for 4 species that overlap the EMBA and one of those species (the humpback whale) has a BIA within the Operational Area. These species are discussed further below.

Table 3-4: Marine mammal species or species habitat that may occur within the Project Areas

Scientific name	Common name	EPBC Act Status			Project Areas		
		Threatened Species	Migratory Species	Listed Marine Species	Operational Area	Hydrocarbon Area	EMBA
Cetaceans							
Balaenoptera acutorostrata	Minke Whale	-	-	-	MO	MO	MO
Balaenoptera bonaerensis	Antarctic Minke Whale	-	✓(M)	-	-	LO	LO
Balaenoptera borealis	Sei Whale	V	✓(M)	-	MO	FLO	FLO
Balaenoptera edeni	Bryde's Whale	-	✓(M)	-	MO	LO	LO
Balaenoptera musculus	Blue Whale	E	✓(M)	-	LO	KO	KO
Balaenoptera omurai	Omura's Whale	-	✓	-	LO	LO	LO
Balaenoptera physalus	Fin Whale	V	✓(M)	-	MO	FLO	FLO
Delphinus delphis	Common Dolphin	-	-	-	MO	MO	MO
Eubalaena australis	Southern Right Whale	E	✓(M)	-	-	LO	LO
Feresa attenuata	Pygmy Killer Whale	-	-	-	-	MO	MO
Globicephala macrorhynchus	Short-finned Pilot Whale	-	-	-	-	MO	MO
Grampus griseus	Risso's Dolphin	-	-	-	MO	MO	MO
Indopacetus pacificus	Longman's Beaked Whale	-	-	-	-	-	MO
Kogia breviceps	Pygmy Sperm Whale	-	-	-	-	MO	MO
Kogia sima	Dwarf Sperm Whale	-	-	-	-	MO	MO
Lagenodelphis hosei	Fraser's Dolphin	-	-	-	-	MO	MO
Megaptera novaeangliae	Humpback Whale	-	✓(M)	-	BKO	BKO	BKO
Mesoplodon densirostris	Blainville's Beaked Whale	-	-	-	-	MO	MO
Mesoplodon ginkgodens	Gingko-toothed Beaked Whale	-	-	-	-	-	MO
Orcaella heinsohni	Australian Snubfin Dolphin	V	✓(M)		MO	KO	KO
Orcinus orca	Killer Whale, Orca	-	✓(M)	-	MO	MO	MO
Peponocephala electra	Melon-headed Whale	-	-	-	-	MO	MO

Scientific name	Common name	EPBC Act Status			Project Areas		
		Threatened Species	Migratory Species	Listed Marine Species	Operational Area	Hydrocarbon Area	EMBA
Physeter macrocephalus	Sperm Whale	-	✓(M)	-	-	MO	MO
Pseudorca crassidens	False Killer Whale	-	-	-	LO	LO	LO
Sousa sahulensis	Australian Humpback Dolphin	V	✓(M)	-	MO	KO	KO
Stenella attenuata	Spotted Dolphin	-	-	-	MO	MO	MO
Stenella coeruleoalba	Striped Dolphin	-	-	-	-	MO	MO
Stenella longirostris	Long-snouted Spinner Dolphin	-	-	-	-	MO	MO
Steno bredanensis	Rough-toothed Dolphin	-	-	-	-	MO	MO
Tursiops aduncus	Indian Ocean Bottlenose Dolphin	-	-	-	LO	LO	LO
Tursiops aduncus (Arafura/Timor Sea populations)	Spotted Bottlenose Dolphin (Arafura/Timor Sea populations)	-	✓(M)	-	LO	KO	KO
Tursiops truncatus s. str.	Bottlenose Dolphin	-	-	-	MO	MO	MO
Ziphius cavirostris	Cuvier's Beaked Whale	-	-	-	-	MO	MO
Sirenia							
Dugong dugon	Dugong	-	✓(M)	□	-	BKO	BKO

Threatened species:	Type of presence:
V Vulnerable	MO Species of species habitat may occur within area
E Endangered	LO Species or species habitat likely to occur within area
CE Critically Endangered	KO Species or species habitat known to occur within area
	FMO Foraging, feeding or related behaviour may occur within area
	FLO Foraging, feeding or related behaviour likely to occur within area
Migratory species:	FKO Foraging, feeding or related behaviour known to occur within area
M Marine	
W Wetland	BLO Breeding likely to occur within area
T Terrestrial	BKO Breeding known to occur within area
	RLO Roosting likely to occur within area
	RKO Roosting known to occur within area
	CKO Congregation or aggregation known to occur within area

Humpback Whale

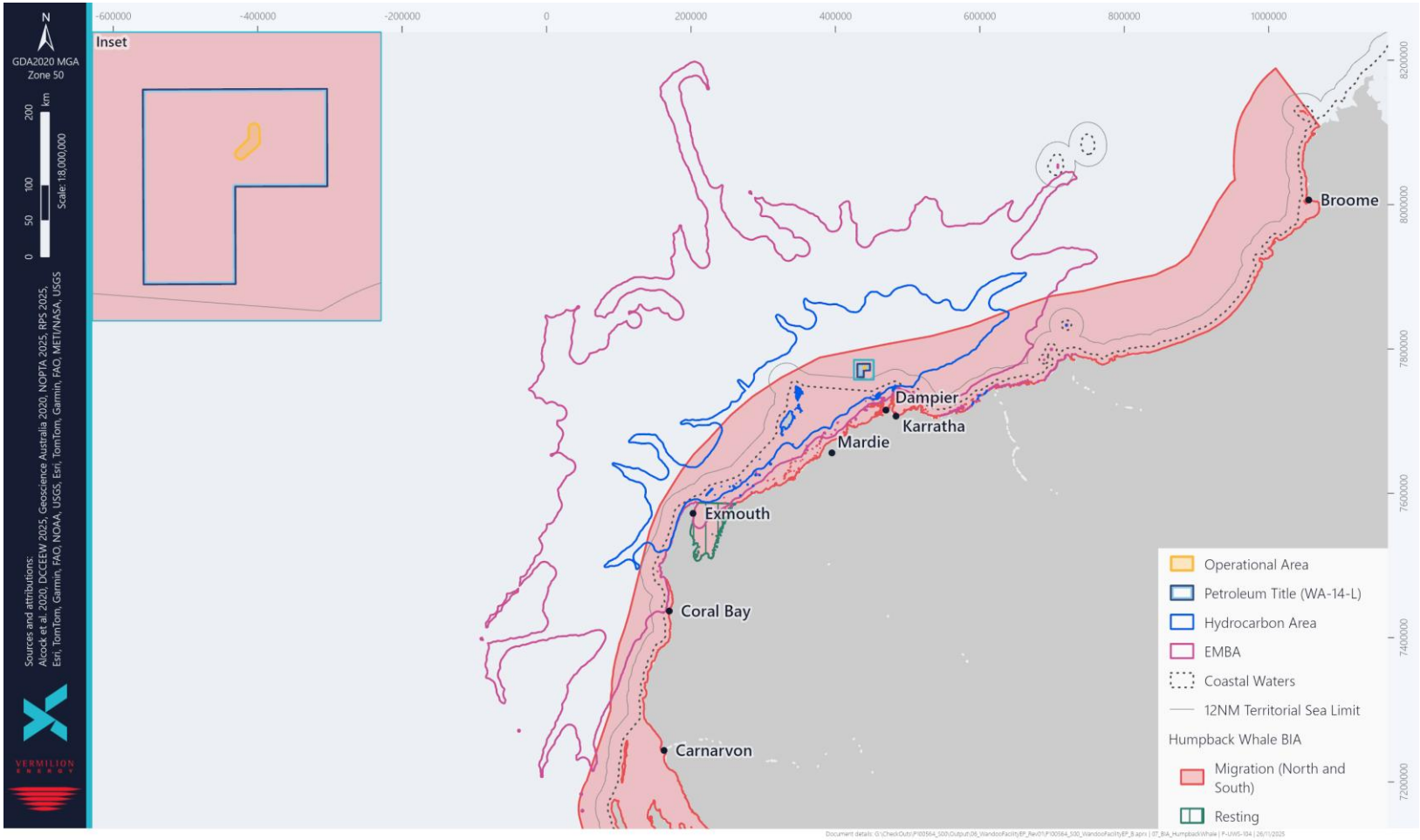
The humpback whale (*Megaptera novaeangliae*) has a migration BIA that intersects the Operational Area, Hydrocarbon Area and EMBA, and a Resting BIA that intersects the EMBA

(Figure 3-18). Listing advice details that the humpback whale is no longer listed as vulnerable and has been removed from the EPBC threatened species list. However, the species remains a matter of national environmental significance under the EPBC Act as a migratory listed species (DoE, 2026d).

The species migrates north through the EMBA from their Antarctic feeding grounds around May each year, reaching the waters of the NWMR in early-June (DoE, 2026d). However, the exact timing of the migration period can vary from year to year. From the North-West Cape, northbound humpback whales travel along the edge of the continental shelf passing to the west of the Muiron, Barrow and Montebello Islands, peaking in late July (Jenner et al., 2001).

Breeding and calving grounds are estimated to extend south from Camden Sound to at least North-West Cape (Irvine et al., 2018); with breeding and calving occurring between August and September (DoE, 2026d). This also coincides with the start of the southern migration. Exmouth Gulf and Shark Bay are both important resting areas for migrating humpbacks, particularly for cow-calf pairs on the southern migration (DoE, 2026d). The southerly migration, from around the Lacepede Islands (north of Broome) extends parallel to the coast on approx. the 20–30 m depth contour (Jenner et al., 2001; DoE, 2026d). Southbound migration is more diffuse and irregular, lacking an obvious peak. An increase in southerly migrating individuals may be observed between the North-West Cape and the Montebello Islands around November (Jenner et al., 2001).

Figure 3-18: BIAs for the humpback whale



Pygmy Blue Whale

A foraging and migration BIA for the pygmy blue whale (*Balaenoptera musculus*) intersects the Hydrocarbon Area and the EMBA (Figure 3-19).

During the northern migration, pygmy blue whales are generally around the Perth Canyon area from January to May prior to transiting north past the North-West Cape between April to August. The southern migration typically occurs from October to late-December (DoE, 2026e). The migratory path for the pygmy blue whales generally occurs in deeper waters, typically 500–1,000 m (Thums et al., 2022a) with the whales being reported as far as 400 km offshore during their southern migration (McCauley et al., 2018).

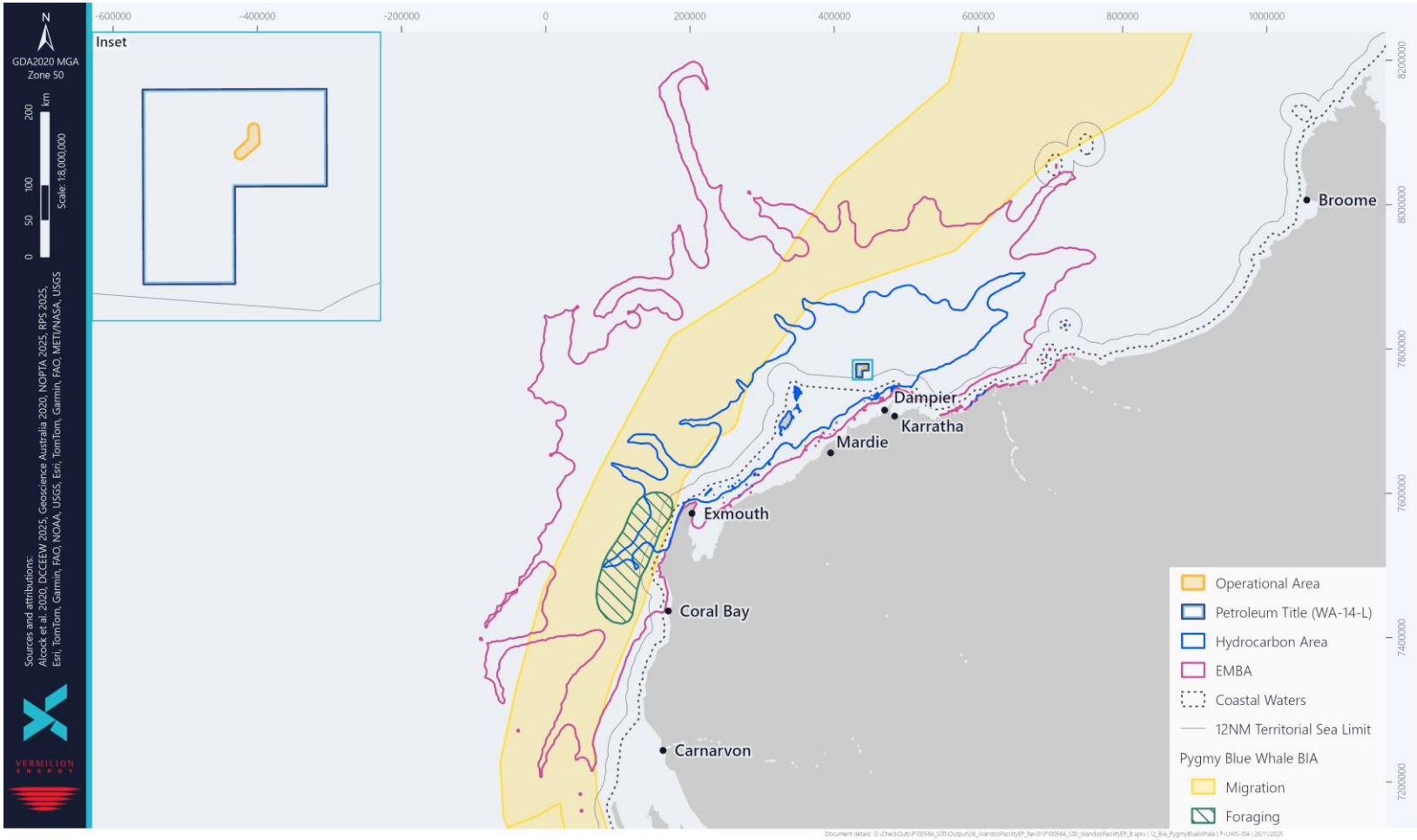
Pygmy blue whales appear to feed regularly along their migration route (i.e. at least once per week or more frequently) and are likely to have multiple food caches along their migratory route (e.g. Rowley Shoals and Ningaloo Reef) (ConocoPhillips, 2018).

Recognised feeding areas of significance to this species, include Ningaloo Reef (DoE, 2015a). The Ningaloo Reef area has the capacity to offer feeding opportunities to pygmy blue whales through unique biophysical conditions able to support large biomasses of marine species (Double et al., 2014).

Surface lunge feeding of pygmy blue whales has been observed at North-West Cape and Ningaloo Reef in June (Double et al., 2014). Outside of the recognised feeding areas, possible foraging areas for pygmy blue whales include the greater region off Exmouth (DoE, 2015a). The steep gradient features tend to stimulate upwelling and therefore increased productivity (seasonally variable) (ConocoPhillips, 2018). Hence, they provide a favourable foraging area.

It is likely that migratory individuals may transit through the Operational Area during the north and south bound migratory seasons. Individuals migrating northbound predominantly display fast and direct travel interspersed with short rest periods of low move persistence indicating foraging (Thums et al., 2022).

Figure 3-19: BIA for the pygmy blue whale



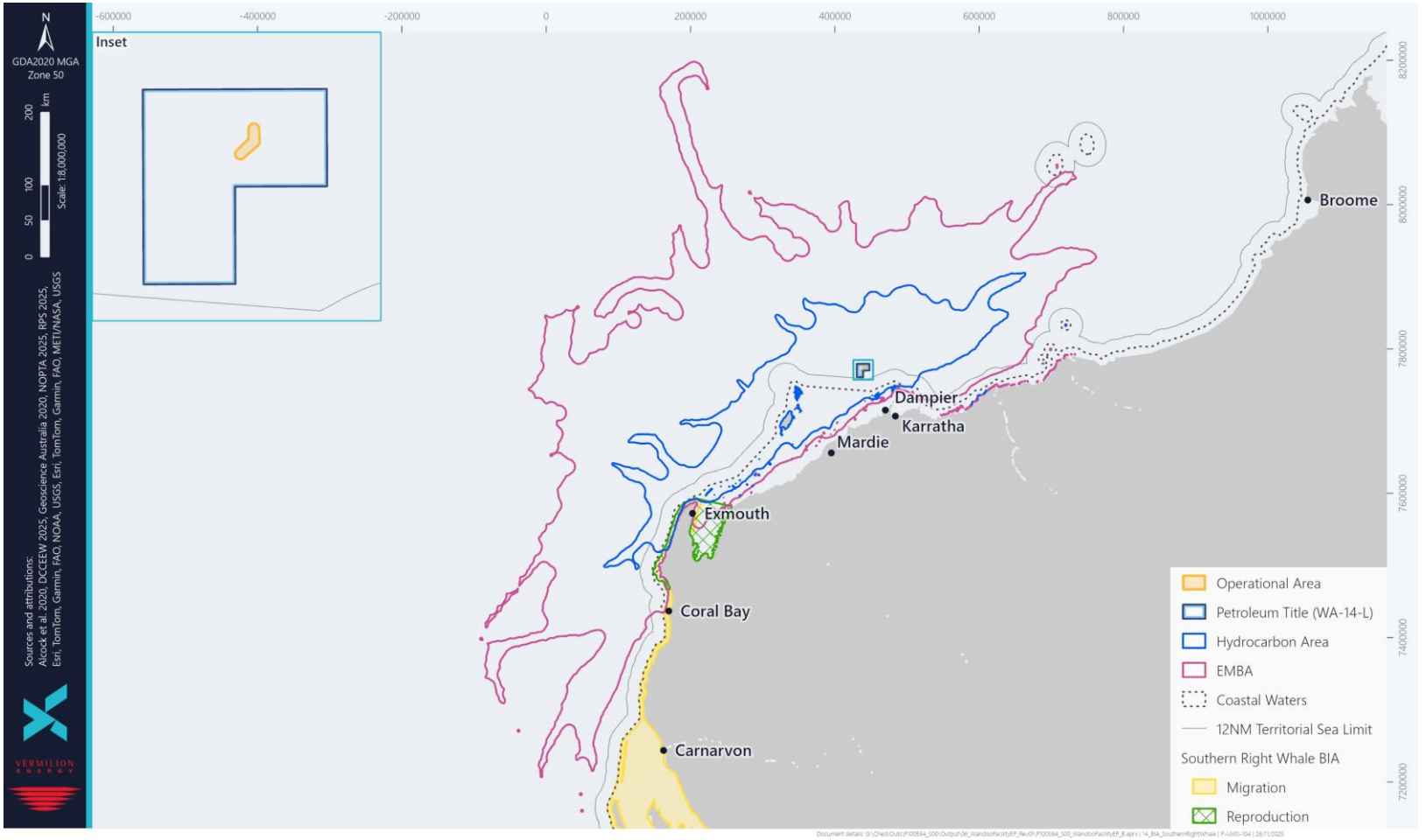
Southern Right Whale

The southern right whale (*Eubalaena australis*) has a migratory and breeding BIA that intersect the Hydrocarbon Area and EMBA (Figure 3-20). Listing advice confirms that the southern right whale remains listed as Endangered under the EPBC Act and is also recognised as a Migratory species (DoE, 2026f).

Breeding and calving for this species occur in near shore water during the austral winter and spring, between June and October (Bannister, 1979–2005; Burnell, 1999). The major reproduction area occurs in Doubtful Island Bay (WA), with smaller aggregations being recorded at Twilight Cove, Flinders Bay, and the Albany/Cape Riche area (Burnell & McKenna, 1996; Kemper et al., 1994). These areas provide shallow, sheltered conditions suitable for breeding and nursing, and females exhibit strong site fidelity to these habitats (Pirzl, 2008).

Southern right whales migrate seasonally between mid-latitude breeding grounds and higher-latitude feeding areas. They are regularly present along the southern coast of Western Australia from mid-May to mid-November, with movements within coastal habitat often exceeding 200 km in a single season (Burnell, 2001).

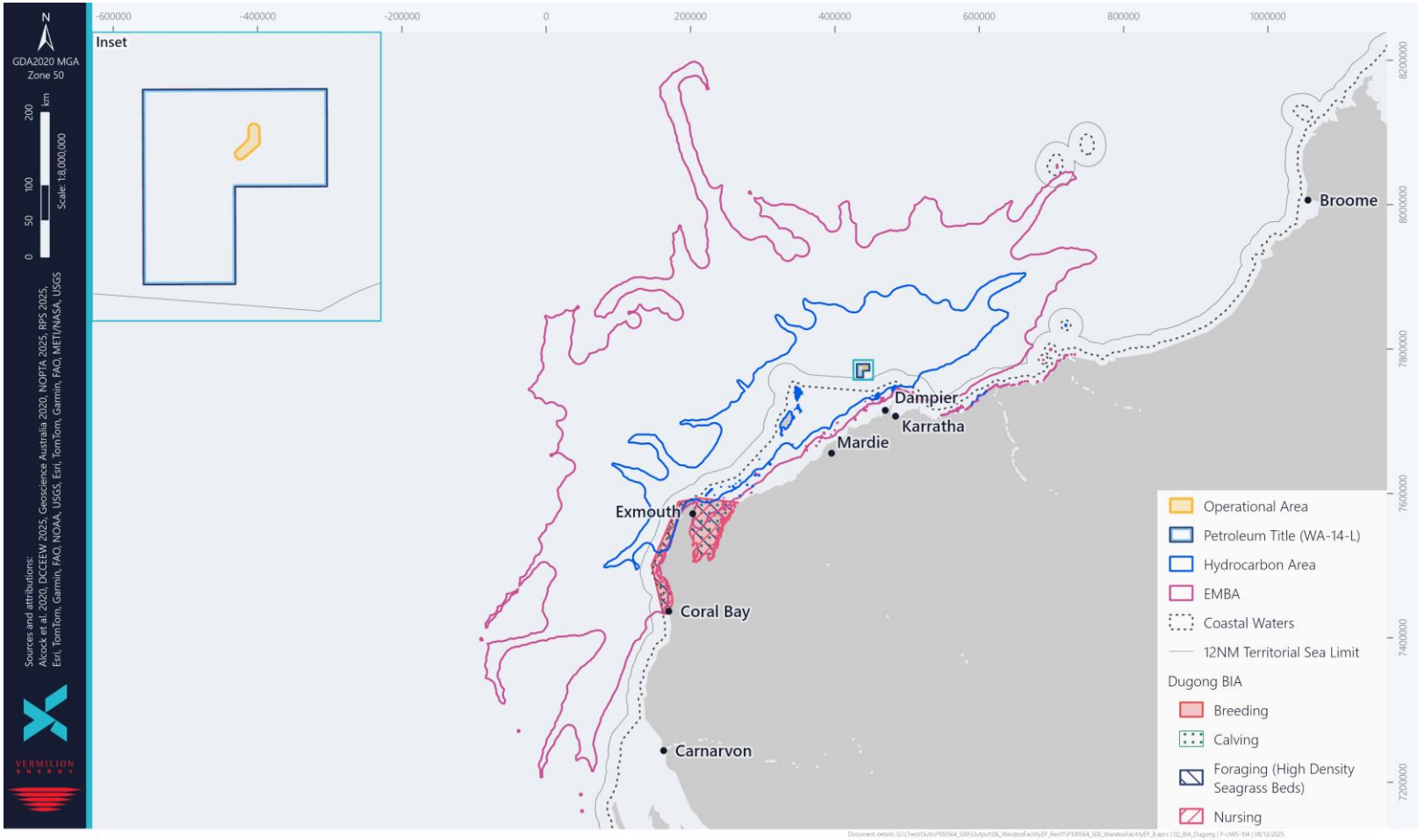
Figure 3-20: BIA for the southern right whale



Dugong

The dugong (*Dugong dugon*) has breeding, calving, foraging and nursing BIAs that intersect the Hydrocarbon Area and EMBA (Figure 3-21). A significant proportion of the world's dugong (*Dugong dugon*) population occurs in coastal waters from Shark Bay (WA) to Moreton Bay (Queensland) (DoE, 2026g). Shark Bay occurs outside of the EMBA and supports a significant population of dugongs, with an estimated 10,000 individuals (DoE, 2026g). Dugongs are also known to feed and migrate through the NWS Province, including regions within the Exmouth Gulf, around North-West Cape and offshore on the NWS (DoE, 2026g). The Exmouth Gulf dugong population is considered stable and the only one not in decline. Exmouth Gulf is important to this species, as it has been recorded as providing significant breeding and feeding habitat (Jenner and Jenner, 2005). Seagrass meadows are the preferred habitat and food for dugongs; however, they are also known to graze on algae and macroinvertebrates (DoE, 2026g).

Figure 3-21: BIA for the dugong



3.4.3.6 Marine Reptiles

Marine reptile species presence within the Project Areas is shown in Table 3-5. Table 3-7 identified BIAs for four species that overlap the Hydrocarbon Area and EMBA, one of those species (flatback turtle), has an internesting buffer BIA within the Operational Area. These species are discussed further below.

Table 3-5: Marine reptile species or species habitat that may occur within the Project Areas

Scientific name	Common name	EPBC Act Status			Project Areas		
		Threatened Species	Migratory Species	Listed Marine Species	Operational Area	Hydrocarbon Area	EMBA
Marine turtles							
Caretta caretta	Loggerhead Turtle	E	✓(M)	✓	KO	BKO	BKO
Chelonia mydas	Green Turtle	V	✓(M)	✓	KO	BKO	BKO
Dermochelys coriacea	Leatherback Turtle	E	✓(M)	✓	LO	KO	FKO
Eretmochelys imbricata	Hawksbill Turtle	V	✓(M)	✓	KO	BKO	BKO
Natator depressus	Flatback Turtle	V	✓(M)	✓	CKO	BKO	BKO
Sea snakes							
Aipysurus apraefrontalis	Short-nosed Sea Snake	CE	-	✓	-	KO	KO
Aipysurus duboisii	Dubois' Sea Snake	-	-	✓	MO	MO	MO
Aipysurus foliosquama	Leaf-scaled Sea Snake	CE	-	✓	-	KO	KO
Aipysurus laevis	Olive Sea Snake	-	-	✓	MO	MO	MO
Aipysurus mosaicus	Mosaic Sea Snake	-	-	✓	MO	MO	MO
Aipysurus tenuis	Brown-lined Sea Snake	-	-	✓	MO	MO	MO
Emydocephalus annulatus	Eastern Turtle-headed Sea Snake	-	-	✓	-	MO	MO
Ephalophis greyae	Mangrove Sea Snake	-	-	✓	MO	MO	MO
Hydrelaps darwiniensis	Port Darwin Sea Snake	-	-	✓	MO	MO	MO
Hydrophis czeblukovi	Fine-spined Sea Snake	-	-	✓	MO	MO	MO
Hydrophis elegans	Elegant Sea Snake	-	-	✓	MO	MO	MO
Hydrophis kingii	Spectacled Sea Snake	-	-	✓	MO	MO	MO
Hydrophis macdowelli	MacDowell's Sea Snake	-	-	✓	MO	MO	MO
Hydrophis major	Olive-headed Sea Snake	-	-	✓	MO	MO	MO
Hydrophis ornatus	Spotted Sea Snake	-	-	✓	MO	MO	MO
Hydrophis peronii	Horned Sea Snake	-	-	✓	MO	MO	MO
Hydrophis platura	Yellow-bellied Sea Snake	-	-	✓	MO	MO	MO

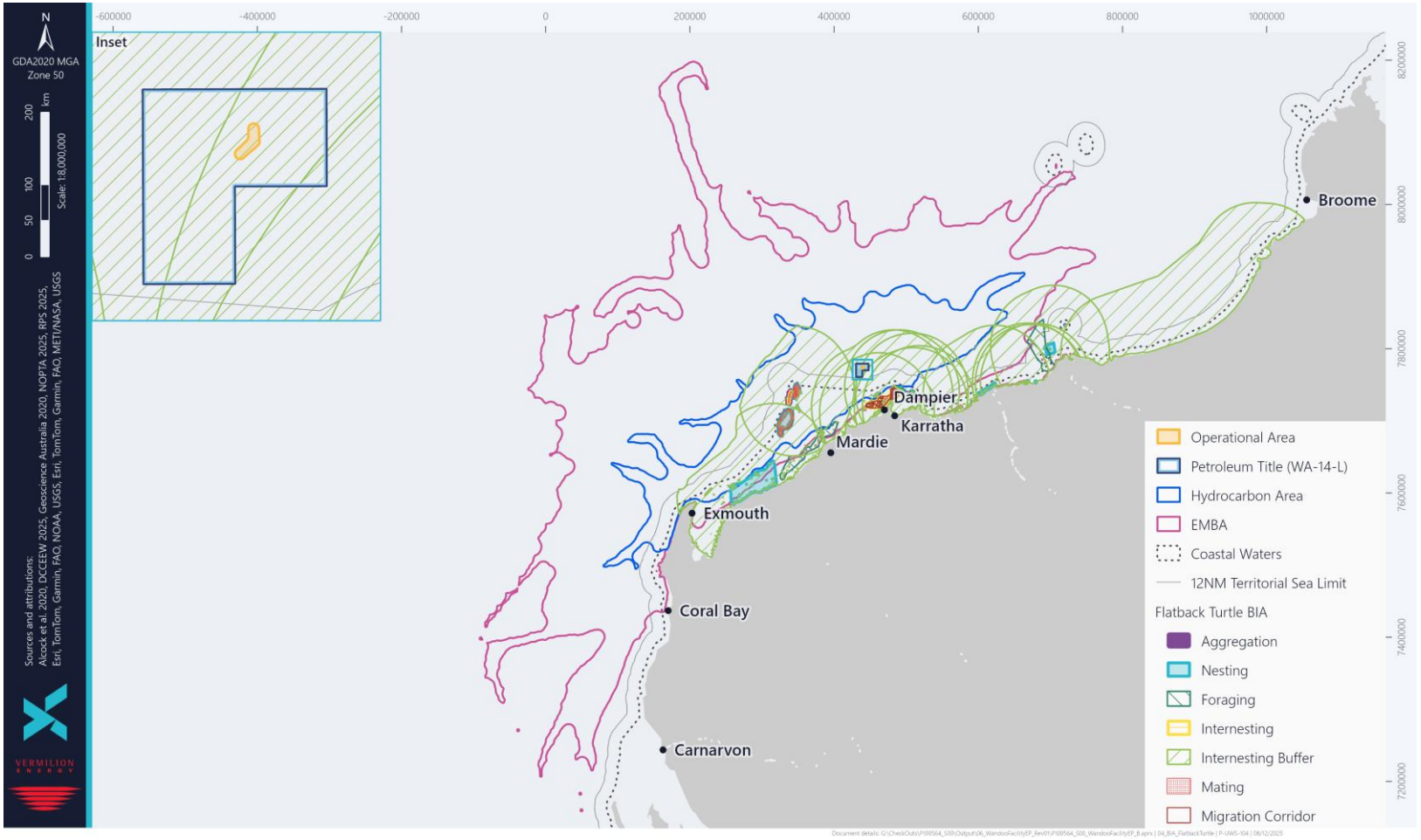
Scientific name	Common name	EPBC Act Status			Project Areas		
		Threatened Species	Migratory Species	Listed Marine Species	Operational Area	Hydrocarbon Area	EMBA
Hydrophis stokesii	Stokes' Sea Snake	-	-	✓	MO	MO	MO
Crocodile							
Crocodylus porosus	Salt-water Crocodile	-	✓(M)		MO	MO	MO
Threatened species: V Vulnerable E Endangered CE Critically Endangered Migratory species: M Marine W Wetland T Terrestrial	Type of presence: MO Species of species habitat may occur within area LO Species or species habitat likely to occur within area KO Species or species habitat known to occur within area FMO Foraging, feeding or related behaviour may occur within area FLO Foraging, feeding or related behaviour likely to occur within area FKO Foraging, feeding or related behaviour known to occur within area BLO Breeding likely to occur within area BKO Breeding known to occur within area RLO Roosting likely to occur within area RKO Roosting known to occur within area CKO Congregation or aggregation known to occur within area						

Flatback Turtle

The flatback turtle (*Natator depressus*) has inter-nesting buffer BIAs that intersect with the Operational Area. Aggregation, foraging, inter-nesting, internesting-buffer, mating, migration, and nesting BIAs intersect the Hydrocarbon Area and EMBA (Figure 3-22). The flatback turtle has an Australasian distribution, with all recorded nesting beaches occurring within tropical to sub-tropical Australian waters. One third of the total breeding for the species occurs in WA (Limpus, 2007). The Pilbara stock nests throughout the NWS and is characterised by summer nesting (October to March) (Commonwealth of Australia, 2017). On the NWS, significant rookeries are centred on Barrow Island especially the east coast beaches (DSEWPC, 2012a). Montebello Islands, Thevenard Island, Varanus Island, the Lowendal Islands, King Sound and Dampier Archipelago are also significant rookeries (Pendoley, 2005; Limpus, 2007; Pendoley Environmental, 2011).

Delambre Island is an important turtle rookery for flatback turtles with an estimated population size of approximately 2,700–3,900 nesting females per season and nesting from late October to mid-February (Thums et al., 2020). There have also been occasional records of nesting by flatback turtles on the Jurabi Coast and Muiron Islands (CALM, 2005). During turtle surveys for Santos, WA flatback turtle nesting was recorded on Bessieres Islands (Astron, 2014), Serrurier, Flat and Table Island in previous surveys (Pendoley Environmental, 2009). Previously, the status of the flatback population(s) was undetermined and although not well quantified, it was estimated to be many thousands of females (Limpus, 2007). However, Pendoley et al. (2014) reported both Barrow Island and Mundabullangana flatback turtles as substantial reproductive populations with estimates of 1,512 and 1,461 nesting females annually respectively.

Figure 3-22: BIAs for the flatback turtle



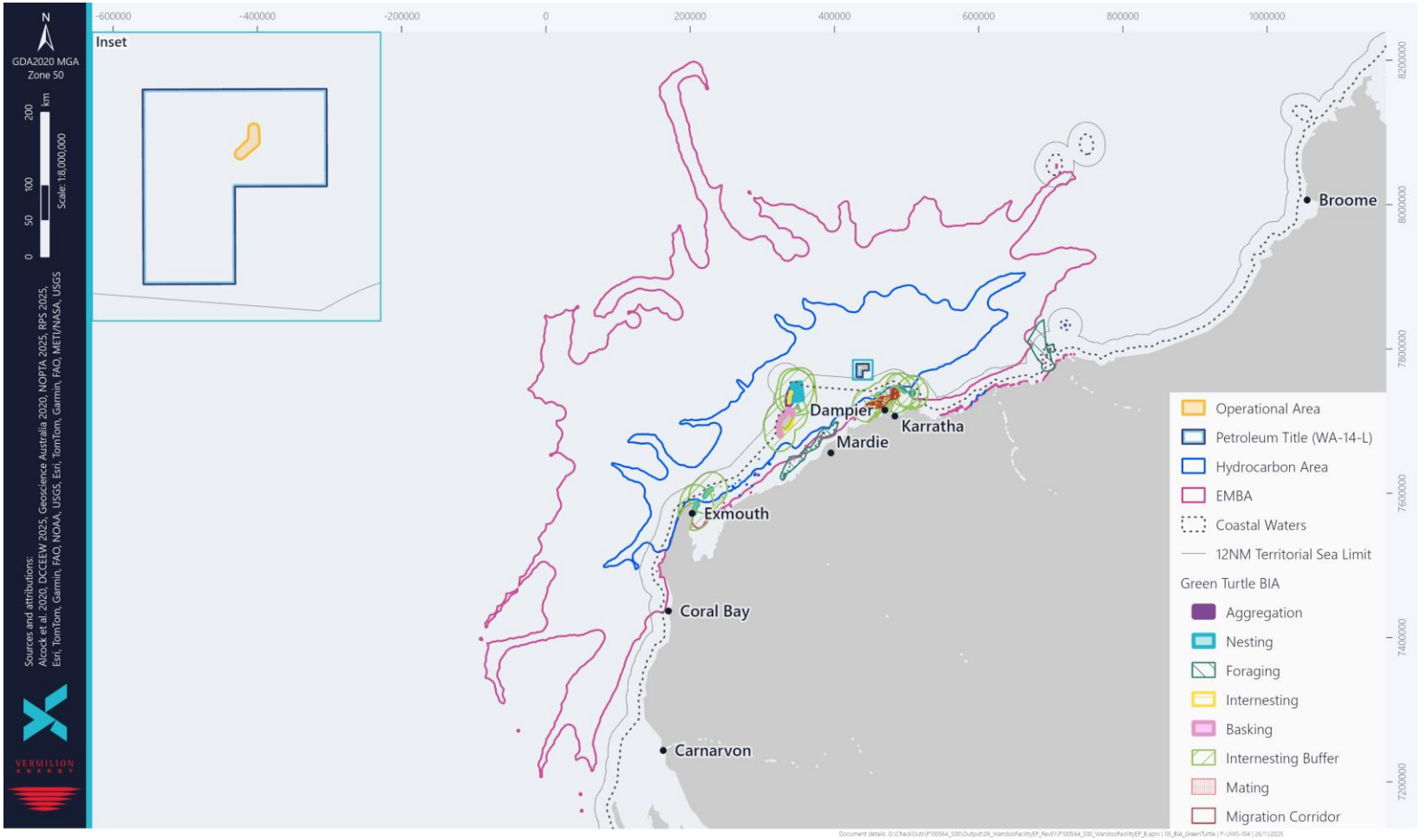
Green Turtle

The green turtle (*Chelonia mydas*) has an aggregation, basking, foraging, internesting, internesting buffer, mating, migration, and nesting BIAs that intersect with the Hydrocarbon Area and aggregation, basking, resting, foraging, internesting, internesting buffer, mating, migration, and nesting BIAs that intersect the EMBA (Figure 3-23). No green turtle BIAs intersect the Operational Area.

The NWS population of green turtles is one of the largest in the world and the most significant rookery is the western side of Barrow Island (Prince, 1994; Limpus, 2008a). Other principal rookeries include the Lacepede Islands, Montebello Islands, Dampier Archipelago, Browse Island and North-West Cape (Prince, 1994; Limpus, 2008a; DSEWPC, 2012b).

Surveys by Waayers (2010) within the Ningaloo Marine Park and Muiron Islands Marine Management Area estimated up to 7,500 female green turtles used these areas. In 2014, Santos commissioned a survey of the islands in the Exmouth Region which found that North and South Muiron Islands were significant nesting sites for green turtles with over 100 green turtles nesting overnight on one beach at North Muiron Island (Astron, 2014). The green turtle is also known to breed in large numbers in the dunes above the extensive beaches found on Serrurier Island, with counts indicating the island supports the second largest rookery in the Pilbara (Oliver, 1990).

Figure 3-23: BIAs for the green turtle



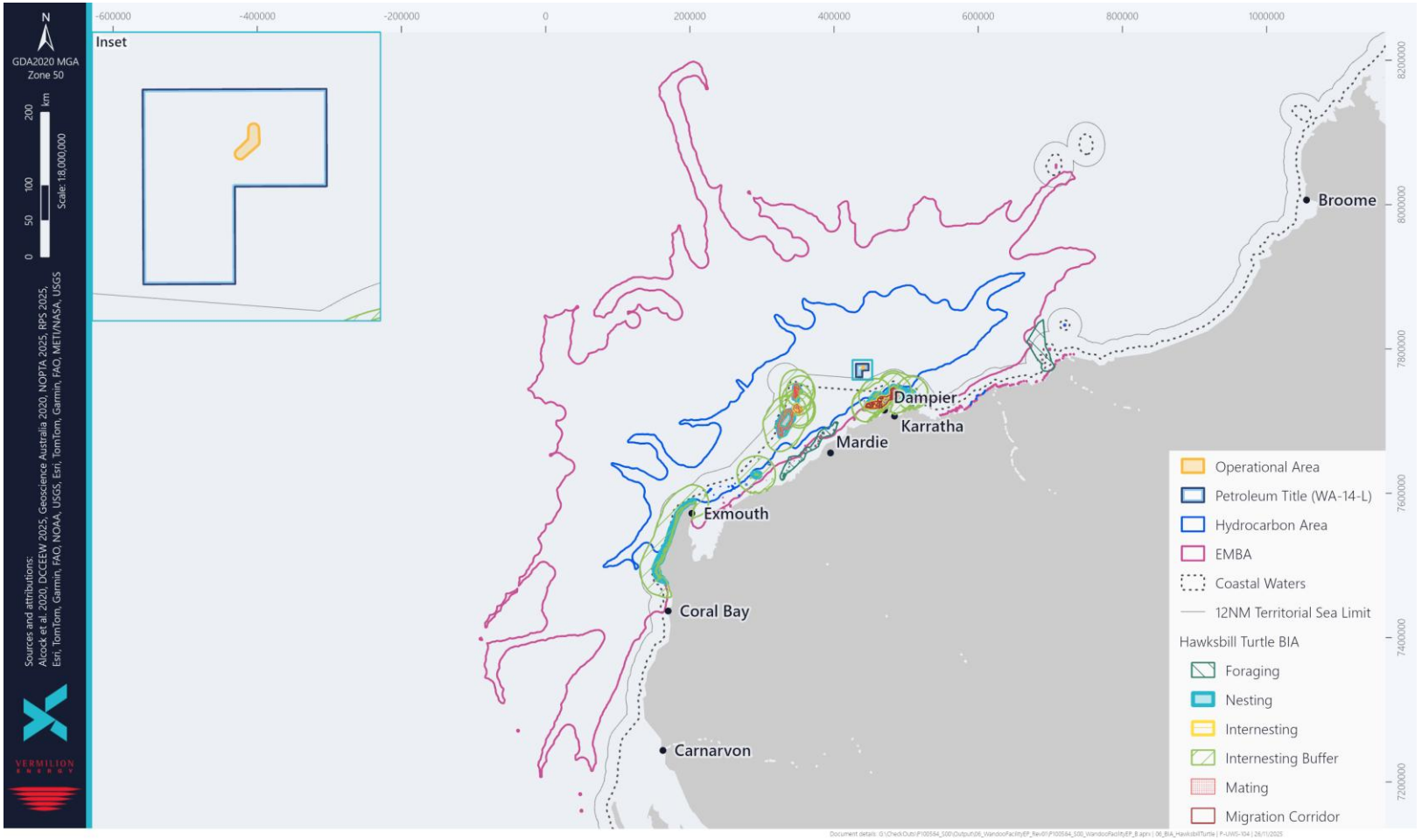
Hawksbill Turtle

The hawksbill turtle (*Eretmochelys imbricate*) has a foraging, internesting, internesting buffer, mating, migration, and nesting BIAs that intersect with the Hydrocarbon Area and EMBA (Figure 3-24).

Hawksbill turtles have a global distribution throughout tropical and sub-tropical marine waters. The Western Australian stock is concentrated on the NWS (Dampier Archipelago) (Limpus, 2009) and is considered to be one of the largest hawksbill populations remaining in the world. In WA, their nesting range is relatively small and extends from the Muiron Islands to the Dampier Archipelago, a distance of approximately 400 km. The most significant breeding areas, that support hundreds of nesting females annually, are around sandy beaches within the Dampier Archipelago, Montebello Islands, Lowendal Islands and Barrow Island (Pendoley, 2005; Limpus, 2009).

The largest known nesting area for the NWS population is the sandy shoreline of Rosemary Island, within the EMBA, particularly on the northwestern side of the Island. The Rosemary Island rookery may support up to 1,000 nesting females annually (Limpus, 2009). Low density nesting is also known from Barrow Island, Airlie Island, Muiron Islands and North-West Cape/ Ningaloo coast (Cape Range) (Limpus, 2009). Hawksbill turtles have been observed breeding on the NWS between July and March with peak nesting activity around the Lowendal Islands between October and December (Limpus, 2009).

Figure 3-24: BIAs for the hawksbill turtle



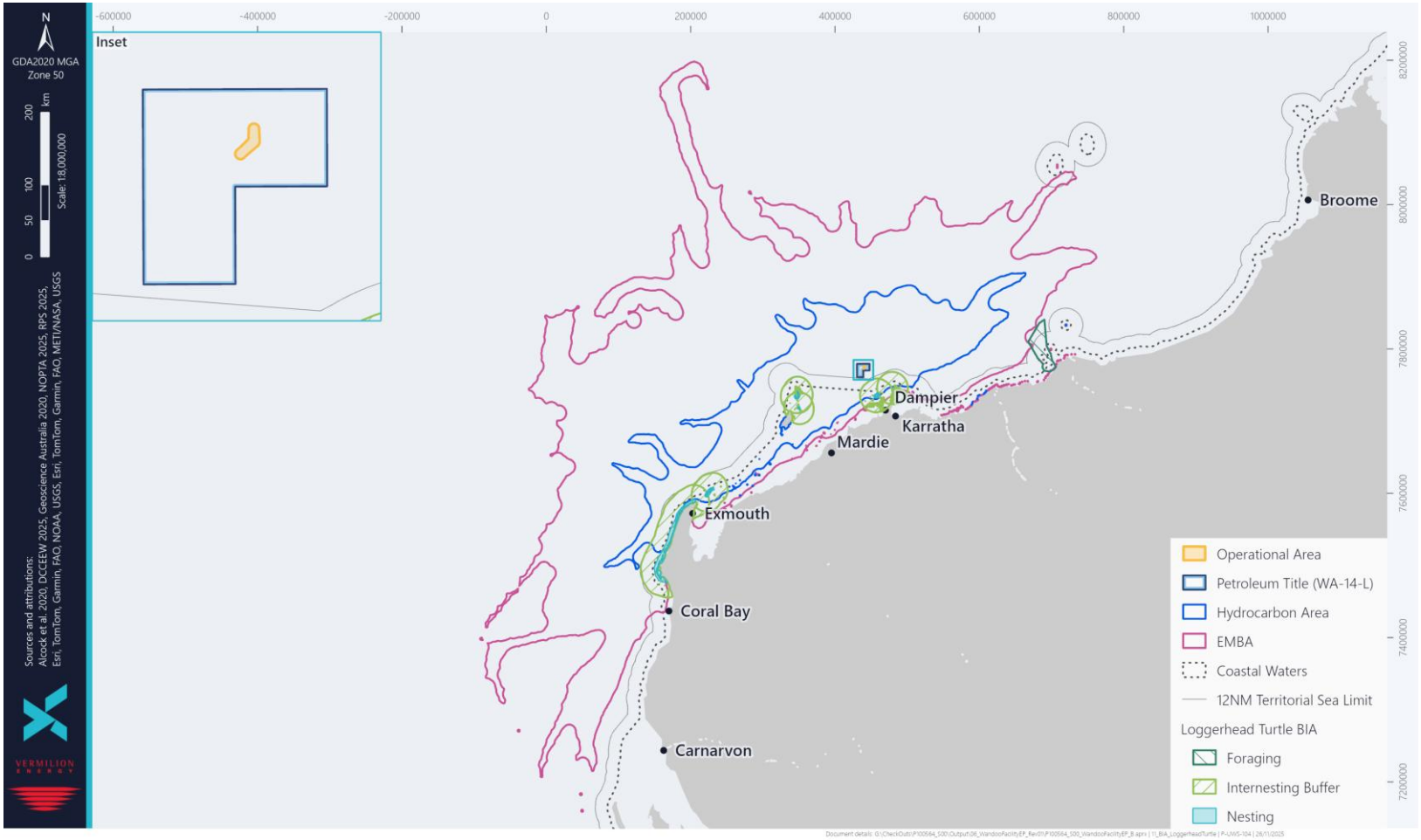
Loggerhead Turtle

The loggerhead turtle (*Caretta caretta*) has an internesting buffer and nesting BIA the intersects the Hydrocarbon Area. A foraging, internesting, internesting buffer, and nesting BIA intersects the EMBA (Figure 3-25).

The Recovery Plan for Marine Turtles in Australia (CoA, 2017) identifies the Muiron Islands (as a principal rookery), and all waters within a 20 km radius as habitat critical to the survival of loggerhead turtles (Commonwealth of Australia, 2017). The Muiron Islands, within the EMBA, is one of the major nesting locations (Limpus, 2008a).

Estimates of up to 5,000 female loggerhead turtles have been predicted within the Ningaloo Marine Park and Muiron Islands Marine Management Area (Waayers, 2010). Loggerhead nesting and breeding occurs from November to March, with a peak in late December/early January (Limpus, 2008b).

Figure 3-25: BIAs for the loggerhead turtle



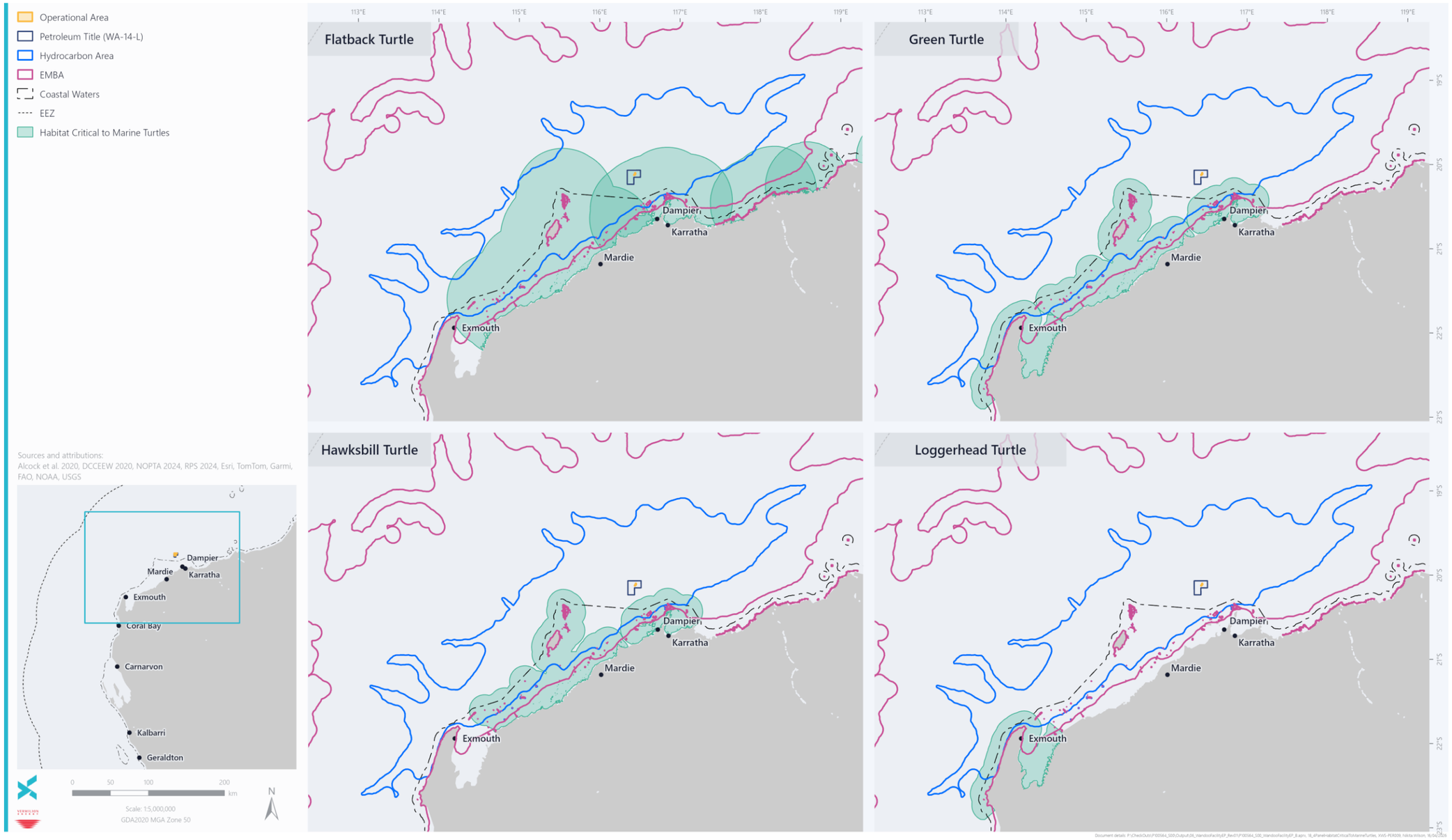
Habitat Critical for the Survival of Sea Turtles

Habitat critical to the survival of the green turtle, loggerhead turtle, leatherback turtle and hawksbill turtle located within the Operational Area and Hydrocarbon Area are described in Table 3 6 and Figure 3-26.

Table 3-6: Habitat critical to the survival of marine turtles occurring within the Operational Area, Hydrocarbon Area and EMBA

Species	Genetic stock	Nesting locations	Approximate distance and direction of habitat critical buffer from Operational Area (km)	Inter-nesting buffer	Nesting period	Hatching period
Flatback Turtle	Pilbara	Barrow Island, Montebello Islands, coastal islands from Cape Preston to Locker Island	22.4 km SW	60 km	Oct–Mar (peak: Nov–Jan)	Feb–Mar
		Cemetary Beach, Port Hedland.	175 km east			
		Dampier Archipelago, including Delambre Island and Hauy Island	Overlap			
		Eighty mile beach - coastal beach.	292 km east			
		Mundabullangana Beach	103 km east			
Green Turtle	NWS	Barrow Island, Montebello Islands, Serrier Island and Thevenard Island	62.2 km SW	20 km	Nov–Mar (peak: Dec–Feb)	Jan–May (peak: Feb–Mar)
		Dampier Archipelago	19.2 km SE			
		Exmouth Gulf and Ningaloo coast	269.3 km SW			
Hawksbill Turtle	WA	Cape Preston to mouth of Exmouth Gulf including Montebello Islands and Lowendal Islands	62.2 km SW	20 km	All year (peak: Oct–Jan)	All year (peak: Dec–Feb)
		Dampier Archipelago, including Delambre Island and Rosemary Island	19.2 km SE			
Loggerhead Turtle	WA	Exmouth Gulf and Ningaloo coast	269.3 km SW	20 km	Nov–Mar (peak: Jan)	Jan–May

Figure 3-26: Habitat critical to the survival of marine turtles



3.4.4 Biologically Important Areas

Table 3-7 summarises BIAs that intersect with the Operational Area, Hydrocarbon Area and EMBA.

Table 3-7: BIAs within the Operational Area, Hydrocarbon Area and EMBA

Species	BIA presence			Summary description
	Operational Area	Hydrocarbon Area	EMBA	
Seabirds and shorebirds				
Brown Booby (*Sula leucogaster*)	-	br	br	Breeding grounds and buffer area around offshore islands in Pilbara and Kimberley (including Bedout Island). Breeding presence may occur February to October.
Fairy Tern (*Sterna nereis*)	-	br	br	Breeding grounds and buffer area around offshore islands in Gascoyne and Pilbara. Breeding may occur late-July to September.
Lesser Crested Tern (*Thalasseus bengalensis*)	-	br	br	Breeding grounds and buffer area around offshore islands in Gascoyne, Pilbara and Kimberley (including Lowendal Islands and Bedout Island). Breeding may occur March to June.
Lesser Frigatebird (*Fregata ariel*)	-	br	br	Breeding grounds and buffer area around coasts and islands in Kimberley and Pilbara.
Little Tern (*Sternula albifrons sinensis*)	-	-	r	Breeding grounds and buffer area and resting areas, around offshore islands in Pilbara and Kimberley. Breeding has been recorded June to October.
Roseate Tern (*Sterna dougallii*)	-	br	br	Breeding grounds and buffer area around offshore islands in Gascoyne, Pilbara and Kimberly. Breeding presence may occur mid-March to July.
Wedge-tailed Shearwater (*Ardenna pacifica*)	br	br	br	Breeding grounds and buffer area around offshore islands including Bedout Island, Dampier Archipelago, Forestier Islands, Montebello and Lowendal Islands. Breeding presence may occur between mid-August to April (Pilbara) or to mid-May (Shark Bay).
White-tailed Tropicbird *(Phaethon lepturus)*	-	-	br	Breeding grounds and buffer area around offshore islands in the Pilbara and Kimberley (including Rowley Shoals). Breeding recorded between May and October.
Fish, sharks and rays				
Whale Shark (*Rhincodon typus*)	f	f	f	Aggregation occurs in Ningaloo due to seasonal concentrations (March to July) of krill and other zooplankton which whale sharks forage upon.

Species	BIA presence			Summary description
	Operational Area	Hydrocarbon Area	EMBA	
Marine mammals				
Humpback Whale (*Megaptera novaeangliae*)	m	m	m, r	Migration corridor extends out to ~50–100 km from the coast. Migration along the WA coast occurs between May and late November. Winter resting areas identified within Exmouth Gulf and Shark Bay. Calving ground extending from Camden Sound to North-West Cape.
Pygmy Blue Whale (*Balaenoptera musculus*)	-	f, m	f, m	Foraging along outer continental shelf from Cape Naturaliste to south of Jurien Bay (November to June, with peak in March to May). Offshore migration corridor, typically along shelf-edge at depths 500–1,000 m, occurring close to the coast around Exmouth. Presence may occur during northern migration past Exmouth area during April to August (whereas January to May past Perth Canyon area). Southern migration presence may occur October to late-December.
Southern Right Whale (*Eubalaena australis*)	-	br, m	br, m	Breeding grounds and buffer area around Ningaloo to Exmouth. Breeding occurs between May and September. The coastal region near Carnarvon, Western Australia, forms part of the migration corridor, used approximately between April and October.
Dugong (*Dugong dugon*)	-	br, c, f, n	br, c, f, n	Breeding, calving, nursing and foraging grounds within the Exmouth Gulf and North-West Cape regions. High foraging occurs in high density seagrass beds in the Exmouth Gulf. Presence may occur throughout the year.
Marine reptiles				
Flatback Turtle (*Natator depressus*)	ib	a, f, i, ib, ma, m, n	a, f, i, ib, ma, m, n	Nesting and inter-nesting areas around rookeries, including Barrow and Montebello Islands, Thevenard (and other Pilbara inshore islands) and Dampier Archipelago with the potential for presence during summer. Oceanic foraging area around the inshore islands between Cape Preston and Onslow; and De Grey River and Bedout island.
Green Turtle (*Chelonia mydas*)	-	a, b, f, i, ib, ma, m, n	a, b, f, i, ib, ma, m, n	Nesting and inter-nesting areas and rookeries including Barrow and Montebello Islands, North-West Cape and Dampier Archipelago. Oceanic foraging grounds around the inshore islands between Cape Preston and Onslow; and De Grey River and Bedout Island.

Species	BIA presence			Summary description
	Operational Area	Hydrocarbon Area	EMBA	
Hawksbill Turtle (*Eretmochelys imbricate*)	-	f, i, ib, ma, m, n	f, i, ib, ma, m, n	Nesting and inter-nesting areas around rookeries, including Montebello and Lowendal Islands, Ningaloo Coast, Thevenard, Barrow and Dampier Archipelago. Oceanic foraging area around the inshore islands between Cape Preston and Onslow; and De Grey River and Bedout Island
Loggerhead Turtle (*Caretta caretta*)	-	ib, n	f, ib, n	Nesting and internesting areas around rookeries, including Lowendal and Montebello islands, Ningaloo Coast, Muiron and Dampier Archipelago. Oceanic foraging area between De Grey River and Bedout Island may be used throughout the year by multiple turtle species.

BIAs					
a	Aggregation	ib	Inter-nesting Buffer	c	Calving and/or Nursing
b	Basking	m	Migration	d	Distribution
f	Foraging	ma	Mating	r	Resting
i	Inter-nesting	n	Nesting	n	Nursing
		br	Breeding	p	Pupping and/or Juvenile

3.5 Social and Economic Environment

Table 3-1 identifies the social and economic receptors within the Operational Area, Hydrocarbon Area and EMBA that may be relevant to aspects of the Petroleum Activity. The descriptions below provide sufficient details to assess all impacts and risks to the social and economic environment.

3.5.1 Fisheries and Aquaculture

Table 3-8 identifies the Commonwealth and State managed fisheries that have a defined management area or historical catch data overlapping the Operational Area, Hydrocarbon Area and the EMBA. The description below provides sufficient details to assess all impacts and risks to Commonwealth and State managed fisheries.

Commonwealth fisheries are those managed by the AFMA and typically extend from 3 nm to 200 nm, which is the extent of the Australian Fishing Zone (AFZ). Commonwealth-managed fisheries data includes fishing intensity from 2010 to 2022 provided by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) (Summerson, 2024).

There are three Commonwealth managed commercial fisheries that have a defined management area overlapping the Operational Area. Of these, zero have historical fishing intensity intersecting the Operational Area, Hydrocarbon Area or EMBA.

Western Australian fisheries are managed by the WA Department of Primary Industries and Regional Development (DPIRD). Data on state-managed fisheries in WA includes maximum vessel

count over 5 years (2018 to 2023) within 10 nm and 60 nm CAES blocks provided by FishCube Data (DPIRD, 2023a).

The FishCube database indicates there are 9 state managed commercial fisheries that have a defined management area overlapping the Operational Area.

There are a total of 10 WA-managed commercial fisheries that have historical fishing effort overlapping the Operational Area. These fisheries are listed in Table 3-8.

WA fisheries with active fishing effort recorded within the past 5-year period (2018 to 2023) are displayed in figures from Figure 3-28 to Figure 3-47.

Table 3-8: Commonwealth and WA managed fisheries with management areas overlapping the Operational Area, Hydrocarbon Area and EMBA

Commercial fishery	Operational Area	Hydrocarbon Area	EMBA	Fishing Effort	Figure
Commonwealth managed fisheries					
North-West Slope Trawl Fishery	X	✓	✓(a)	The management area intersects the Hydrocarbon Area and EMBA. Low to medium fishing effort (<0.25 – 0.5 hours/km^2) recorded in reporting grids 1 and 2 within the EMBA, during the 2019-2020 season.	Figure 3-27
Southern Bluefin Tuna Fishery	✓	✓	✓	The management area intersects the Operational Area, Hydrocarbon Area and EMBA. No fishing effort recorded within the Operational Area, Hydrocarbon Area and EMBA.	-
Southern Tuna and Billfish Fishery	X	X	✓	The management area intersects the EMBA. No fishing effort recorded within the Operational Area, Hydrocarbon Area and EMBA.	-
Western Deepwater Trawl Fishery	X	✓	✓	The management area intersects the Hydrocarbon Area and EMBA. No fishing effort recorded within the Operational Area, Hydrocarbon Area and EMBA.	-
Western Skipjack Tuna Fishery	✓	✓	✓	The management area intersects the Operational Area, Hydrocarbon Area and EMBA. No fishing effort recorded within the Operational Area, Hydrocarbon Area and EMBA.	-
Western Tuna and Billfish Fishery	✓	✓	✓	The management area intersects the Operational Area, Hydrocarbon Area and EMBA. No fishing effort recorded within the Operational Area, Hydrocarbon Area and EMBA.	-

Commercial fishery	Operational Area	Hydrocarbon Area	EMBA	Fishing Effort	Figure
WA State managed fisheries					
Abalone Managed Fishery	✓	✓	✓	The management area intersects the Operational Area, Hydrocarbon Area and EMBA. No fishing effort recorded within the Operational Area, Hydrocarbon Area and EMBA within the 2018-2023 seasons.	-
Exmouth Gulf Prawn Managed Fishery	X	✓ (a)	✓ (a)	The management area intersects the Hydrocarbon Area and EMBA. Up to 6 vessels were active between the 2018 and 2023 season within the 10 nm CAES blocks that intersect the Hydrocarbon Area, and up to 7 vessels in the EMBA. Fishing intensity within the 10 nm blocks only occurs within the Hydrocarbon Area and EMBA. VOGA considers there is potential for interaction with the fishery within the Hydrocarbon Area and EMBA.	Figure 3-27
Exmouth Gulf Beach Seine and Mesh Net Managed Fishery*	X	X	X (a)	There is no defined management area for this fishery. There has been no fishing effort recorded within the Operational Area and Hydrocarbon Area. Less than three vessels were active between 2018 and 2023 within the 60 nm CAES blocks that intersect the EMBA. VOGA considers there is potential for interaction with the fishery only within the EMBA.	Figure 3-29
FBL Condition 74 Fish Trapping*	X	X	X (a)	There is no defined management area for this fishery. There has been no fishing effort recorded within the Operational Area and Hydrocarbon Area within the 2018-2023 seasons. Less than three vessels active between the 2018-2023 season within the 60 nm CAES blocks that intersect the EMBA. Last active in 2018 to 2019. VOGA considers there is potential for interaction with the fishery only within the EMBA.	Figure 3-30
Gascoyne Demersal Scalefish	X	X	✓ (a)	The management area intersects the EMBA. There has been no fishing effort recorded within the 2018-2023 season within the Operational Area and Hydrocarbon Area.	Figure 3-31

Commercial fishery	Operational Area	Hydrocarbon Area	EMBA	Fishing Effort	Figure
Managed Fishery				Up to seven vessels active between 2018 and 2023 within the 10 nm CAES blocks that intersect the EMBA, andup to 10 vessels active between within the 60 nm CAES blocks that intersect the EMBA. VOGA considers there is potential for interaction with the fishery only within the EMBA.	
Hermit Crab Fishery*	X	X	X (a)	There is no defined management area for this fishery. There has been no fishing effort recorded within the 2018-2023 seasons within the Operational Area or Hydrocarbon Area. Up to three vessels active between 2018 - 2023 season within the 60 nm CAES blocks that intersect the EMBA. VOGA considers there is potential for interaction with the fishery only within the EMBA.	-
Mackerel Managed Fishery	✓ (a)	✓ (a)	✓ (a)	The management area intersects the Operational Area, Hydrocarbon Area and EMBA. Up to 5 vessels were active between the 2018 and 2023 season within the 60 nm CAES blocks that intersect the Operational Area. However, there is no fishing intensity overlap of the 10 nm blocks in the Operational Area during the same period. Fishing intensity within the 10 nm blocks only occurs within the Hydrocarbon Area and EMBA, with up to 3 licences reported between the 2018-2023 seasons in the Hydrocarbon Area, and up to 3 vessels in the EMBA. There is potential for interaction with the fishery within the Operational Area, Hydrocarbon Area and EMBA.	Figure 3-32
Marine Aquarium Fish Managed Fishery	✓ (a)	✓(a)	✓(a)	The management area intersects the Operational Area, Hydrocarbon Area and EMBA. Up to seven vessels were active between the 2018 and 2023 season within the 60 nm CAES blocks that intersect the Operational Area. However, there is no fishing intensity overlap of the 10 nm blocks in the Operational Area during the same period. Fishing intensity within the 10 nm blocks only occurs within the Hydrocarbon Area and EMBA, with up to 5 licences reported between the 2018-2023 seasons in the Hydrocarbon Area, and up to 7 vessels in the EMBA. VOGA	Figure 3-33

Commercial fishery	Operational Area	Hydrocarbon Area	EMBA	Fishing Effort	Figure
				considers there is potential for interaction with the fishery within the Operational Area, Hydrocarbon Area and EMBA.	
Nickol Bay Prawn Fishery	X (a)	✓ (a)	✓ (a)	The management area intersects the Hydrocarbon Area and EMBA. Up to 8 vessels were active between the 2018 and 2023 season within the 60 nm CAES blocks that intersect the Operational Area. However, there is no fishing intensity overlap of the 10 nm blocks in the Operational Area during the same period. Fishing intensity within the 10 nm blocks only occurs within the Hydrocarbon Area and EMBA, with up to 3 licences reported between the 2018-2023 seasons in the Hydrocarbon Area, and up to 8 vessels in the EMBA. VOGA considers there is potential for interaction with the fishery within the Operational Area, Hydrocarbon Area and EMBA.	Figure 3-34
Onslow Prawn Limited Entry Fishery	✓ (a)	✓ (a)	✓ (a)	The management area intersects the Operational Area, Hydrocarbon Area and EMBA. Less than 3 vessels were active between the 2018 and 2023 season within the 60 nm CAES blocks that intersect the Operational Area. However, there is no fishing intensity overlap of the 10 nm blocks in the Operational Area during the same period. Fishing intensity within the 10 nm blocks only occurs within the Hydrocarbon Area and EMBA, with <3 licences reported between the 2018-2023 seasons in the Hydrocarbon Area, and <3 vessels in the EMBA. VOGA considers there is potential for interaction with the fishery within the Operational Area, Hydrocarbon Area and EMBA.	Figure 3-35
Open Access Open Access (North Coast, Gascoyne Coast and West Coast Bioregions)*	X	X	X (a)	There is no defined management area for this fishery. There has been no fishing effort recorded in the 2018-2023 seasons within the Operational Area and Hydrocarbon Area. Less than three active vessels. between 2018 and 2023 within the 60 nm CAES blocks that intersect the EMBA. Last active between 2018 to 2019. VOGA considers there is potential for interaction with the fishery within the EMBA.	Figure 3-36

Commercial fishery	Operational Area	Hydrocarbon Area	EMBA	Fishing Effort	Figure
Pilbara Crab Managed Fishery	✓ (a)	✓ (a)	✓ (a)	The management area intersects the Operational Area, Hydrocarbon Area and EMBA. Less than 3 vessels were active between the 2018 and 2023 season within the 60 nm CAES blocks that intersect the Operational Area. However, there is no fishing intensity overlap of the 10 nm blocks in the Operational Area during the same period. Only fishing intensity within the 60 nm CAES blocks occurs within the Hydrocarbon Area and EMBA, with <3 licences reported between the 2018-2023 seasons in the Hydrocarbon Area and EMBA. VOGA considers there is potential for interaction with the fishery within the Hydrocarbon Area and EMBA.	Figure 3-37
Pilbara Fish Trawl Interim Managed Fishery	✓ (a)	✓ (a)	✓ (a)	The management area intersects the Operational Area, Hydrocarbon Area and EMBA. Up to 4 vessels were active between the 2018 and 2023 season within the 10 nm CAES blocks that intersect the Operational Area. Fishing intensity within the 10 nm blocks only occurs within the Hydrocarbon Area and EMBA, with up to 4 licences reported between the 2018-2023 seasons in the Hydrocarbon Area, and up to 4 vessels in the EMBA. VOGA considers there is potential for interaction with the fishery within the Operational Area, Hydrocarbon Area and EMBA.	Figure 3-38
Pilbara Line Fishery (Condition)*	X (a)	X (a)	X (a)	There is no defined management area for this fishery. Less than 3 vessels were active between the 2018 and 2023 season within the 60 nm CAES blocks that intersect the Operational Area. However, there is no fishing intensity overlap of the 10 nm blocks in the Operational Area during the same period. Fishing intensity only occurs within the 60 nm blocks within the Hydrocarbon Area and EMBA, with up to 5 licences reported between the 2018-2023 seasons in the Hydrocarbon Area and EMBA. VOGA considers there is potential for interaction with the fishery within the Operational Area, Hydrocarbon Area and EMBA.	Figure 3-39

Commercial fishery	Operational Area	Hydrocarbon Area	EMBA	Fishing Effort	Figure
Pilbara Trap Managed Fishery	✓ (a)	✓ (a)	✓ (a)	The management area intersects the Operational Area, Hydrocarbon Area and EMBA. Up to 3 vessels were active between the 2018 and 2023 season within the 60 nm CAES blocks that intersect the Operational Area. However, there is no fishing intensity overlap of the 10 nm blocks in the Operational Area during the same period. Fishing intensity only occurs within the 60 nm blocks within the Hydrocarbon Area and EMBA, with up to 3 licences reported between the 2018-2023 seasons in the Hydrocarbon Area and EMBA. VOGA considers there is potential for interaction with the fishery within the Operational Area, Hydrocarbon Area and EMBA.	Figure 3-40
Shark Bay Crab Managed Fishery	X	X	✓ (a)	The management area intersects the EMBA. There has been no fishing effort recorded in the 2018-2023 seasons within the Operational Area and Hydrocarbon Area. Up to twenty active vessels were recorded between 2018 and 2023 within the 60 nm CAES blocks that intersect the EMBA. VOGA considers there is potential for interaction with the fishery only within the EMBA.	Figure 3-41
Shark Bay Prawn Managed Fishery	X	X	✓ (a)	The management area intersects the EMBA. There has been no fishing effort recorded in the 2018-2023 seasons within the Operational Area and Hydrocarbon Area. Up to 18 active vessels were recorded between 2018 and 2023 within the 60 nm CAES blocks that intersect the EMBA. VOGA considers there is potential for interaction with the fishery only within the EMBA.	Figure 3-42
Shark Bay Scallop Managed Fishery	X	X	✓ (a)	The management area intersects the EMBA. There has been no fishing effort recorded in 2018-2023 seasons within the Operational Area and Hydrocarbon Area. Up to 3 active vessels were recorded between 2018 and 2023 within the 60 nm CAES blocks that intersect the EMBA. VOGA	Figure 3-43

Commercial fishery	Operational Area	Hydrocarbon Area	EMBA	Fishing Effort	Figure
				considers there is potential for interaction with the fishery only within the EMBA.	
South-west Coast Salmon Fishery	X	X		The management area intersects the EMBA. No fishing effort recorded within the Operational Area, Hydrocarbon Area and EMBA.	-
Specimen Shell Managed Fishery	✓ (a)	✓ (a)	✓ (a)	The management area intersects the Operational Area, Hydrocarbon Area and EMBA. Less than 3 vessels were active between the 2018 and 2023 season within the 60 nm CAES blocks that intersect the Operational Area. However, there is no fishing intensity overlap of the 10 nm blocks in the Operational Area during the same period. Fishing intensity within the 10 nm blocks only occurs within the Hydrocarbon Area and EMBA, with <3 licences reported between the 2018-2023 seasons in the Hydrocarbon Area, and up to 3 licences within the EMBA. VOGA considers there is potential for interaction with the fishery within the Operational Area, Hydrocarbon Area and EMBA.	Figure 3-44
Tour Operator*	(a)	(a)	(a)	There is no defined management area for this fishery. Less than three licences active in the Operational Area between 2018 and 2023 season within in the 10 nm CAES block. Up to 5 licences active between 2018 and 2023 within the 60 nm CAES blocks that intersect the Operational Area. Up to 16 licences were recorded within the 10 nm CAES block that intersects the Hydrocarbon Area and EMBA. VOGA considers there is potential for interaction with the fishery within the Operational Area, Hydrocarbon Area and EMBA.	Figure 3-45
West Coast Deep Sea Crustacean Managed Fishery	✓	✓ (a)	✓ (a)	The management area intersects the Operational Area, Hydrocarbon Area and EMBA. Fishing intensity within the 10 nm blocks only occurs within the Hydrocarbon Area and EMBA, with <3 licences reported between the 2018-2023 seasons in the Hydrocarbon Area and <3 licences in the EMBA. VOGA considers	Figure 3-46

Commercial fishery	Operational Area	Hydrocarbon Area	EMBA	Fishing Effort	Figure
				there is potential for interaction with the fishery within the Hydrocarbon Area and EMBA.	
West Coast Rock Lobster Managed Fishery	X	X	✓(a)	The management area intersects the EMBA. There has been no fishing effort recorded in the 10-year period 2018-2023 within the Operational Area and Hydrocarbon Area. Less than three active vessels between 2018 and 2023 within the 60 nm CAES blocks that intersect the EMBA. VOGA considers there is potential for interaction with the fishery within the EMBA.	Figure 3-47
Western Australian Sea Cucumber Fishery*	X	X (a)	X (a)	There is no defined management area for this fishery. Less than 3 vessels were active between the 2018 and 2023 season within the 60 nm CAES blocks that intersect the Operational Area. However, there is no fishing intensity overlap of the 10 nm blocks in the Operational Area during the same period. Fishing intensity within the 10 nm blocks only occurs within the Hydrocarbon Area and EMBA, with <3 licences reported between the 2018-2023 seasons in the Hydrocarbon Area, and <3 licences in the EMBA. VOGA considers there is potential for interaction with the fishery within the Hydrocarbon Area and EMBA.	Figure 3-48
✓= Management area present within area; X = management area not present within area (a) = Active fishing intensity recorded between 2018 to 2023 * Does not have a defined management area					

Figure 3-27: North-West Slope Trawl Fishery activity within the EMBA



Figure 3-28: Exmouth Gulf Prawn Managed Fishery activity within the EMBA



Figure 3-29: Exmouth Gulf Beach Seine and Mesh Net Managed Fishery activity within the EMBA

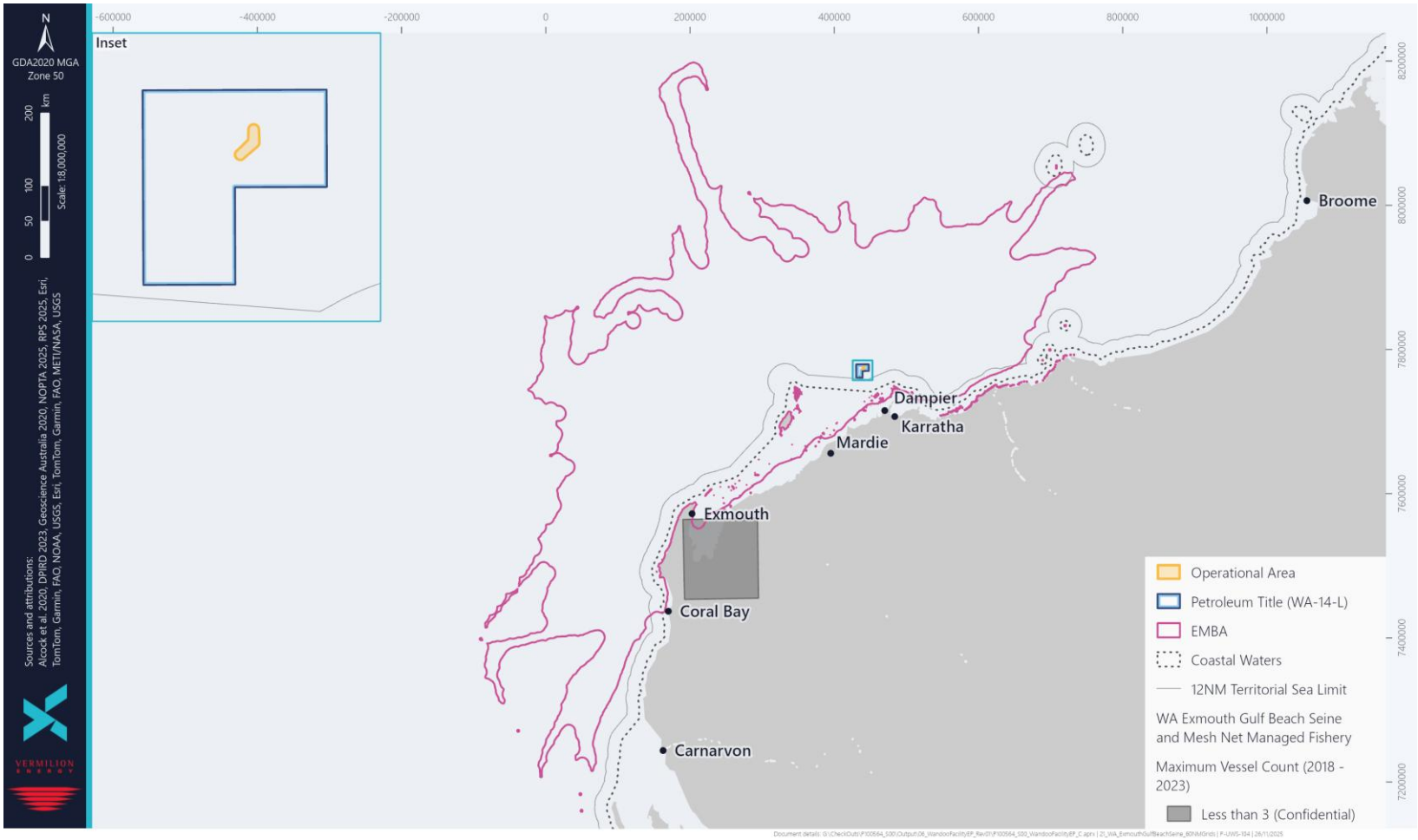


Figure 3-30: FBL Condition 74 Fish Trapping activity within the EMBA

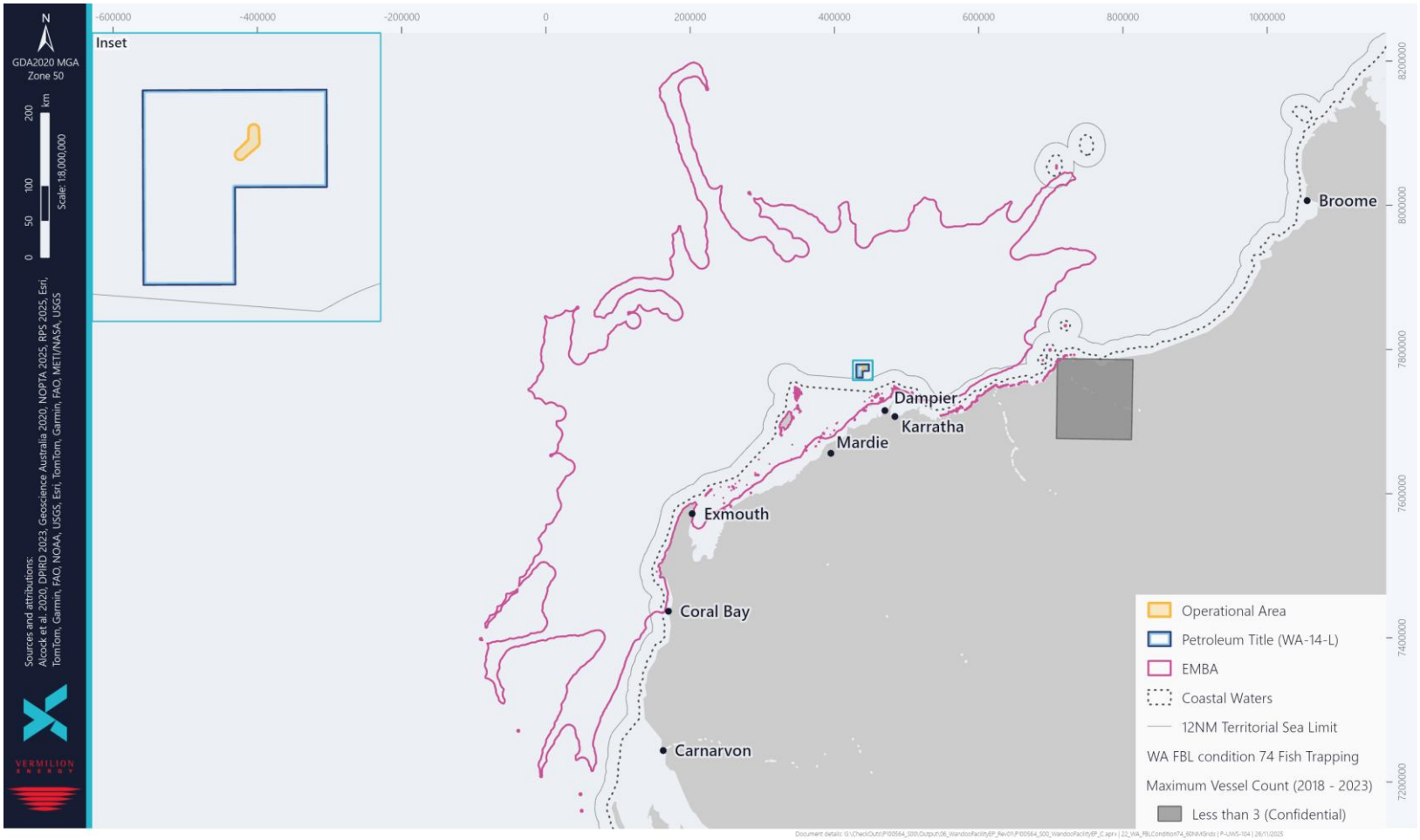


Figure 3-31: Gascoyne Demersal Scalefish Managed Fishery activity within the EMBA

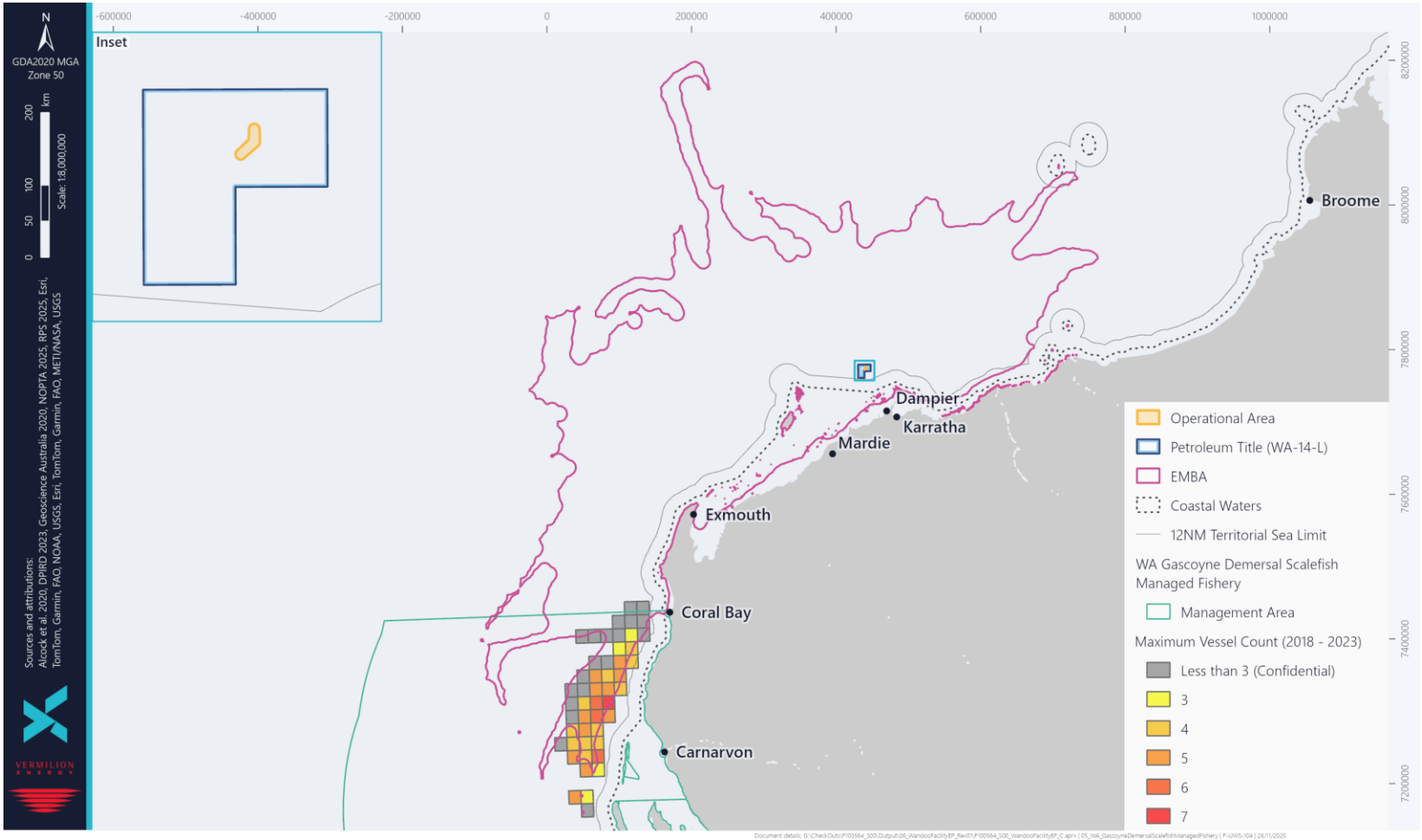


Figure 3-32: Mackerel Managed Fishery activity within the EMBA

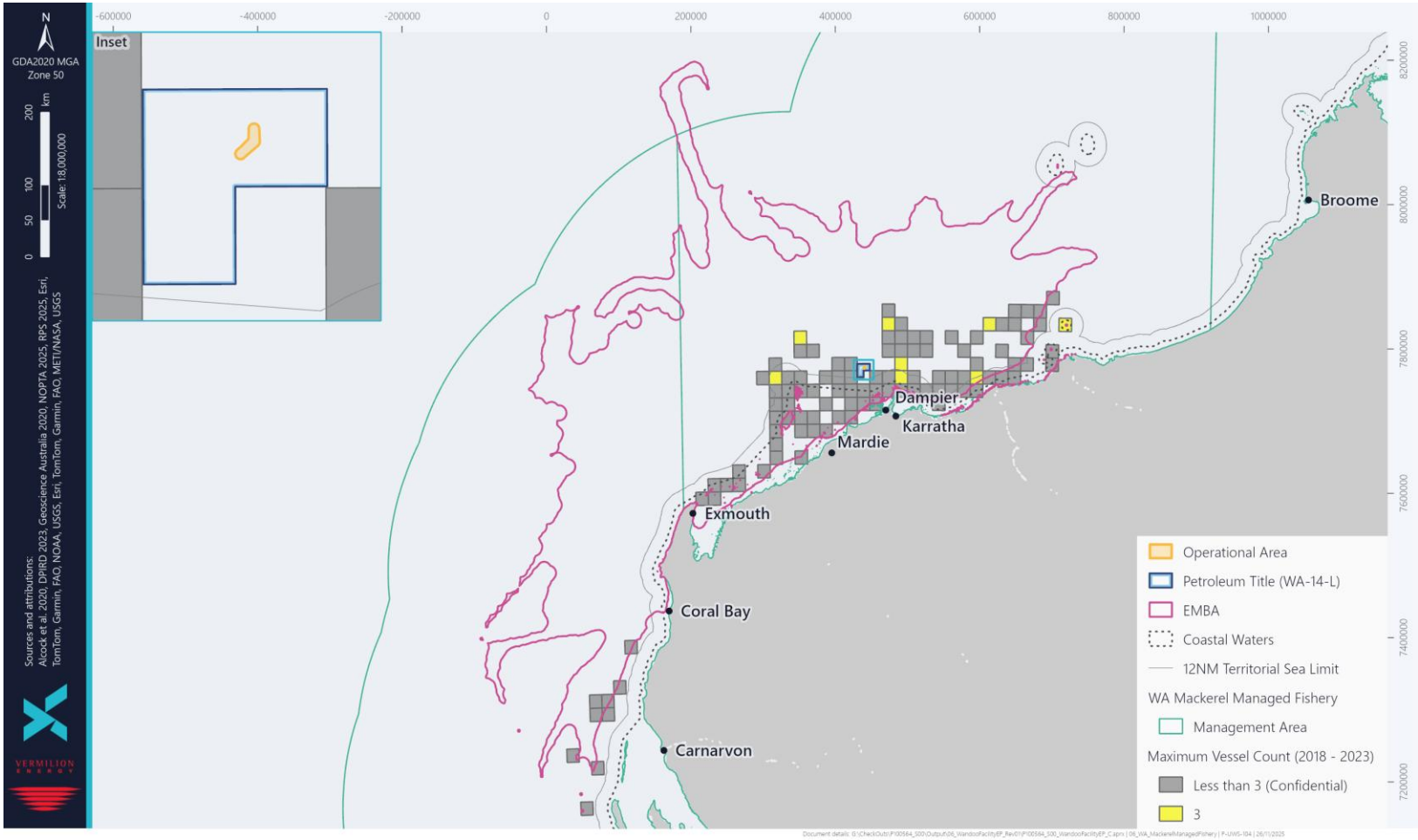


Figure 3-33: Marine Aquarium Fish Managed Fishery activity within the EMBA

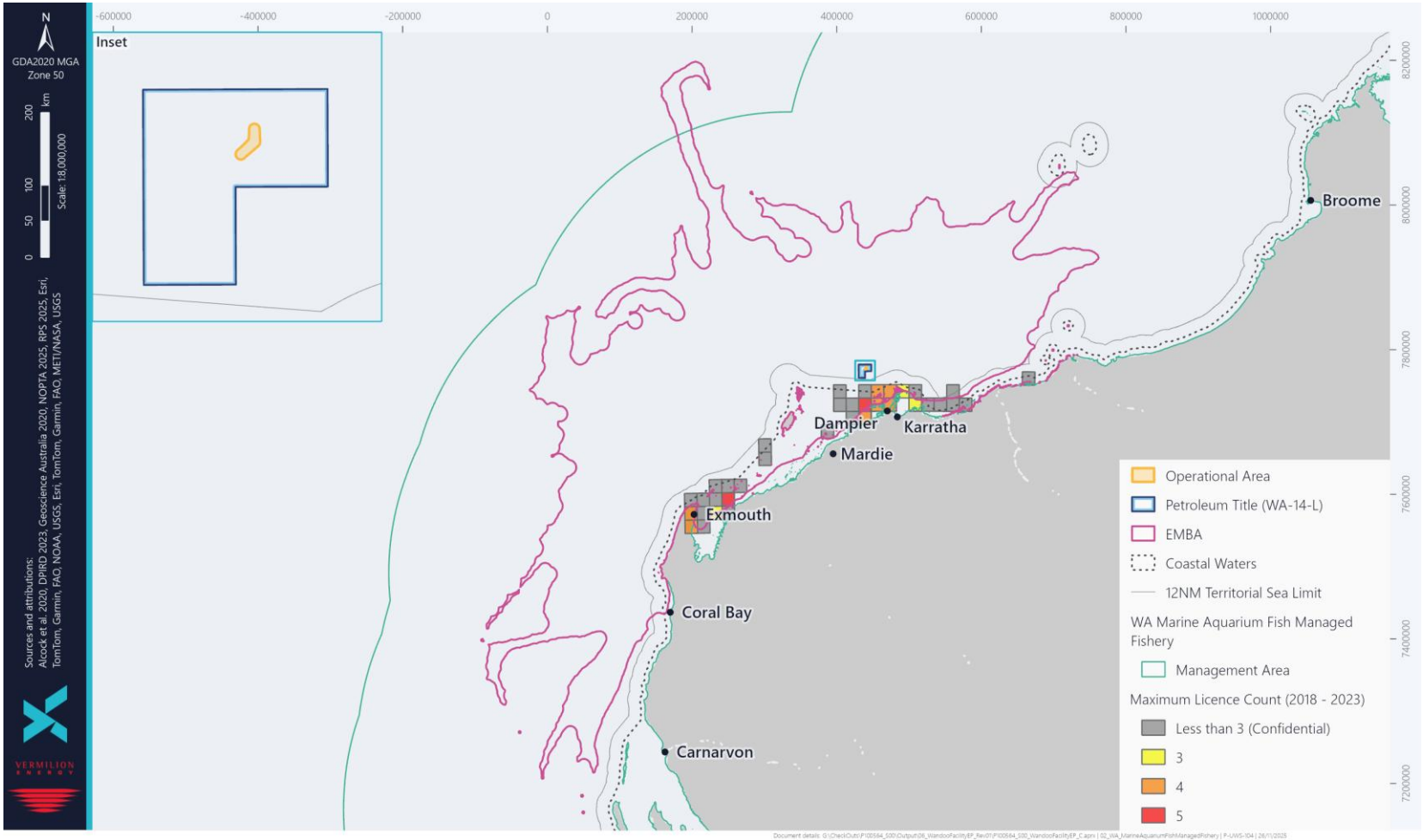


Figure 3-34: Nickol Bay Prawn Fishery activity within the EMBA



Figure 3-35: Onslow Prawn Limited Entry Fishery activity within the EMBA

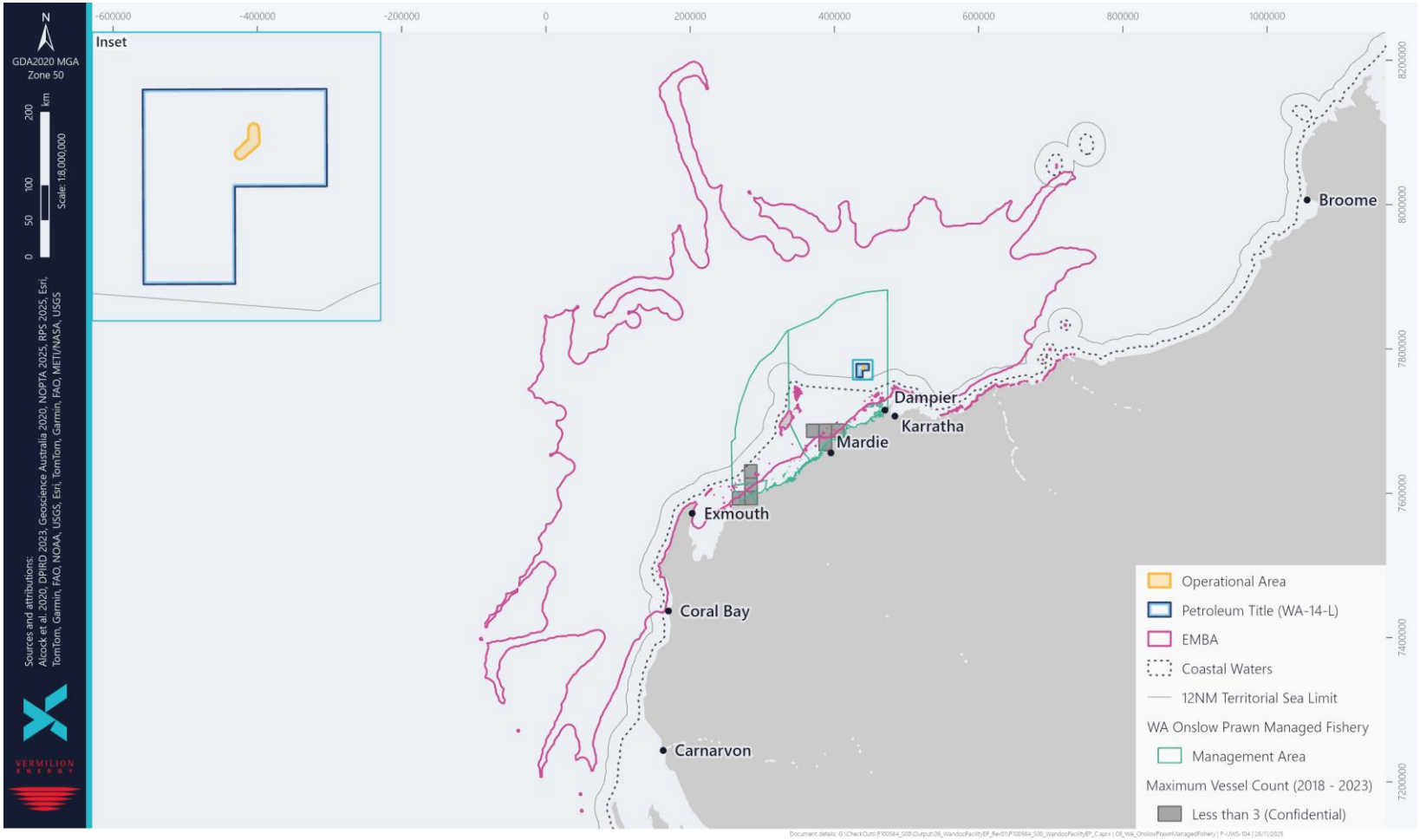


Figure 3-36: Open Access (North Coast, Gascoyne Coast and West Coast Bioregions) activity within the EMBA

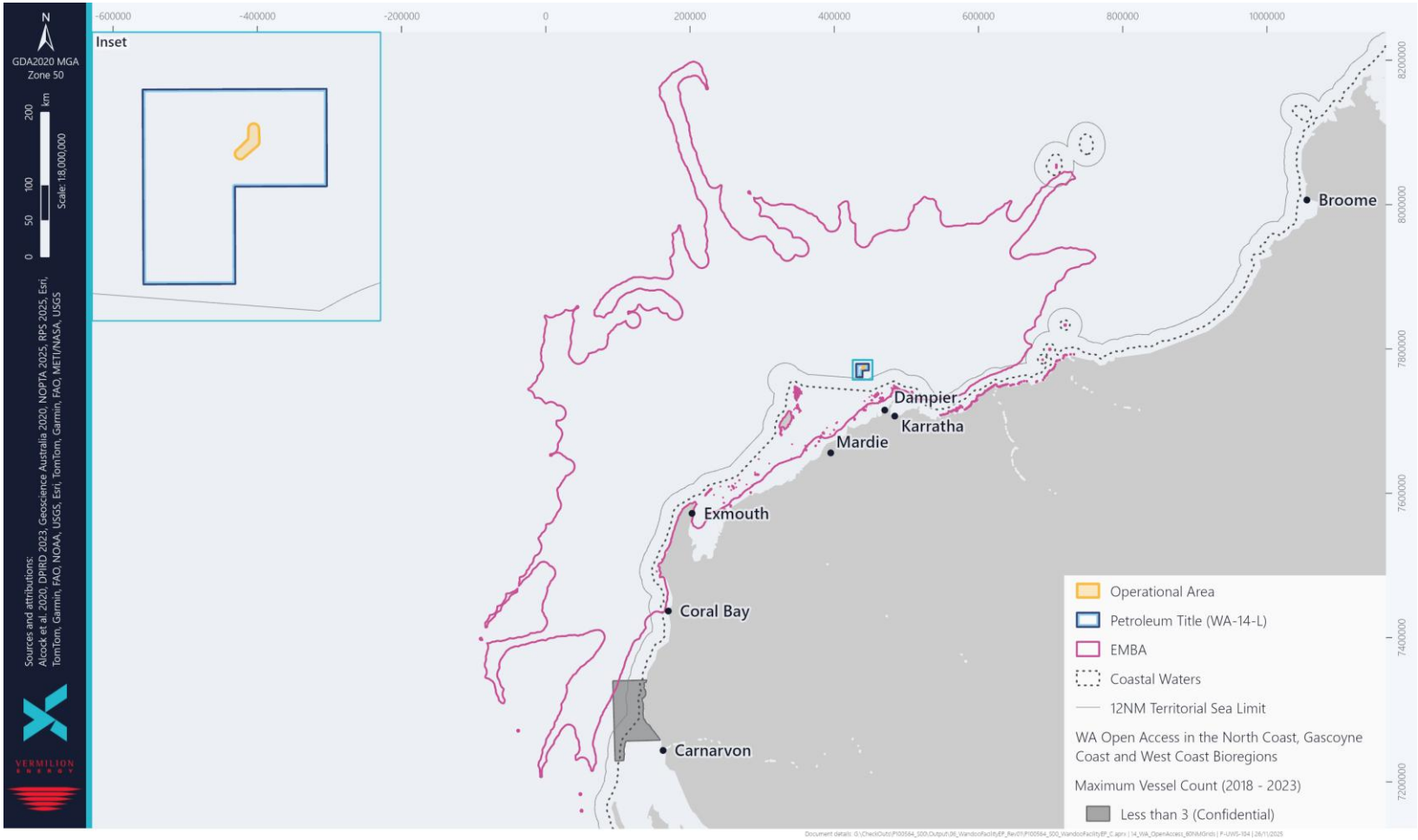


Figure 3-37: Pilbara Crab Managed Fishery activity within the EMBA

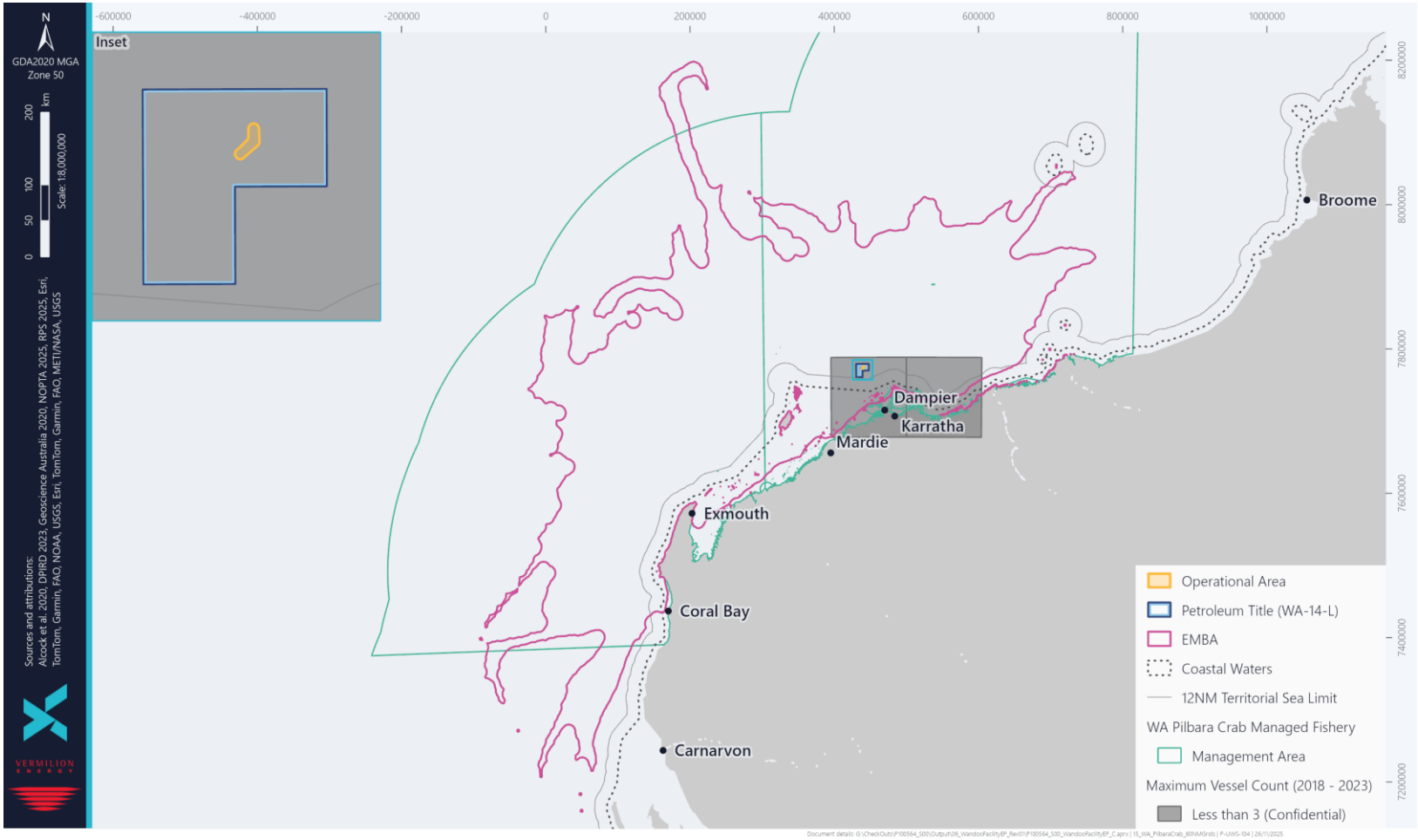


Figure 3-38: Pilbara Fish Trawl Interim Managed Fishery activity within the EMBA

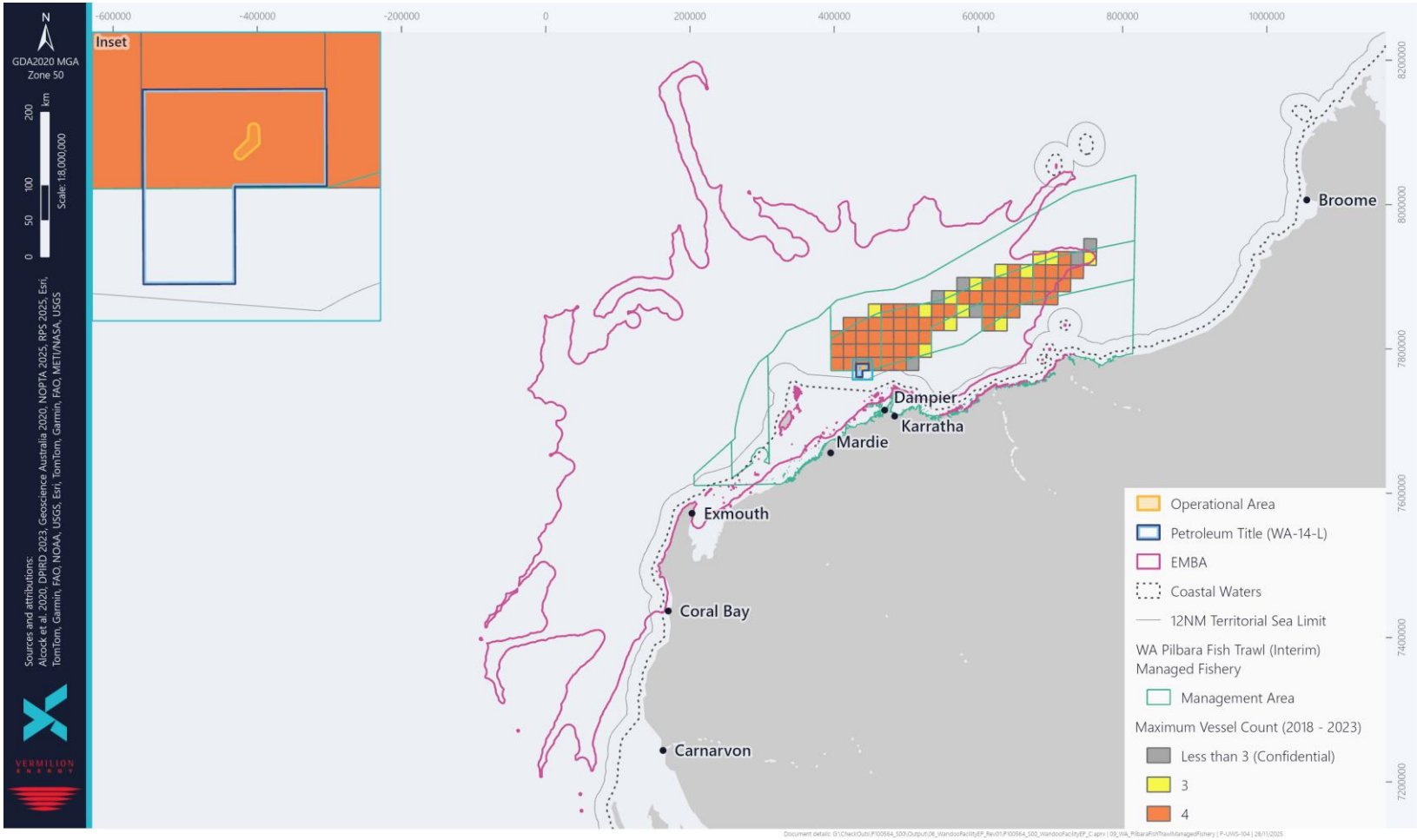


Figure 3-39: Pilbara Line Fishery activity within the EMBA

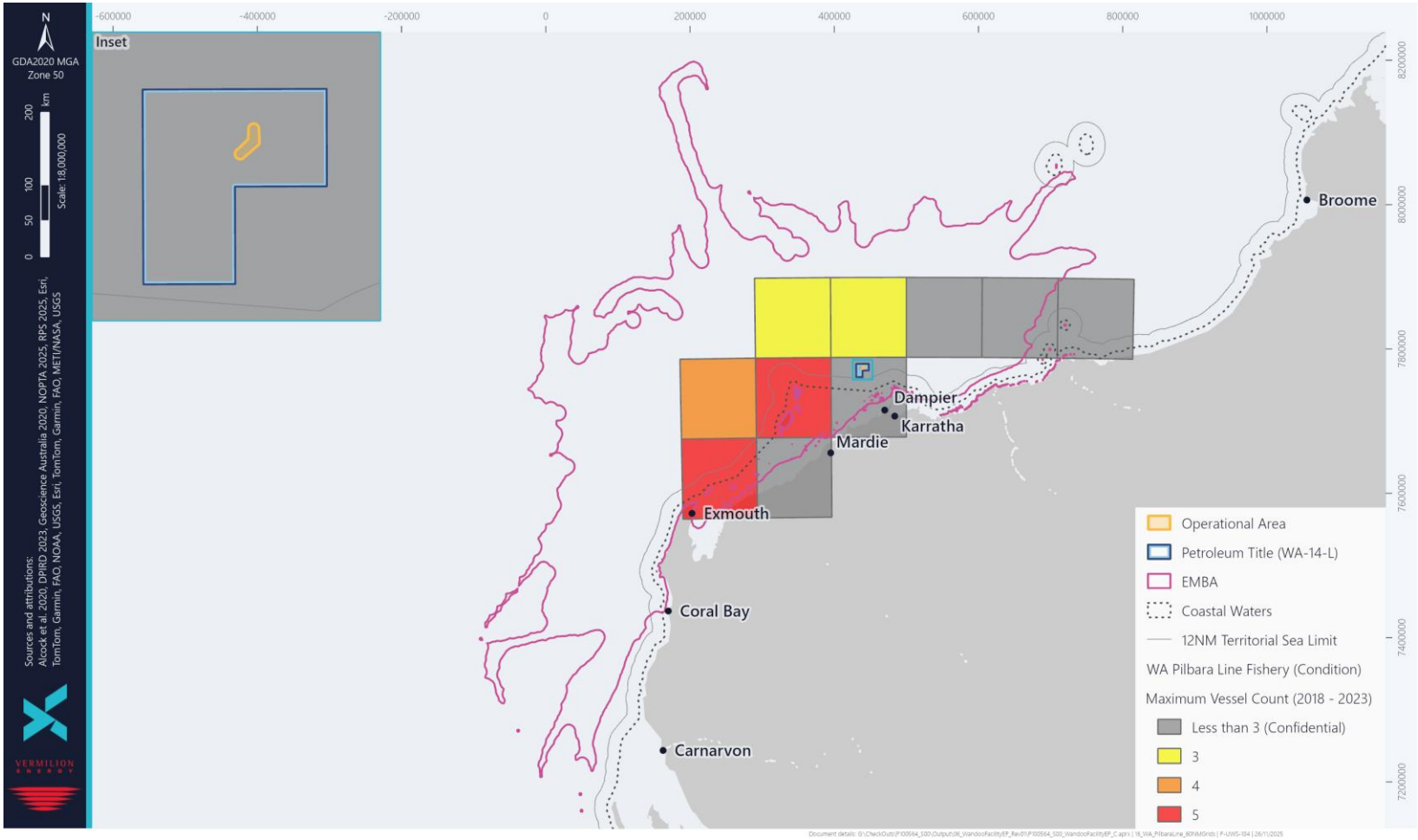


Figure 3-40: Pilbara Trap Managed Fishery activity within the EMBA

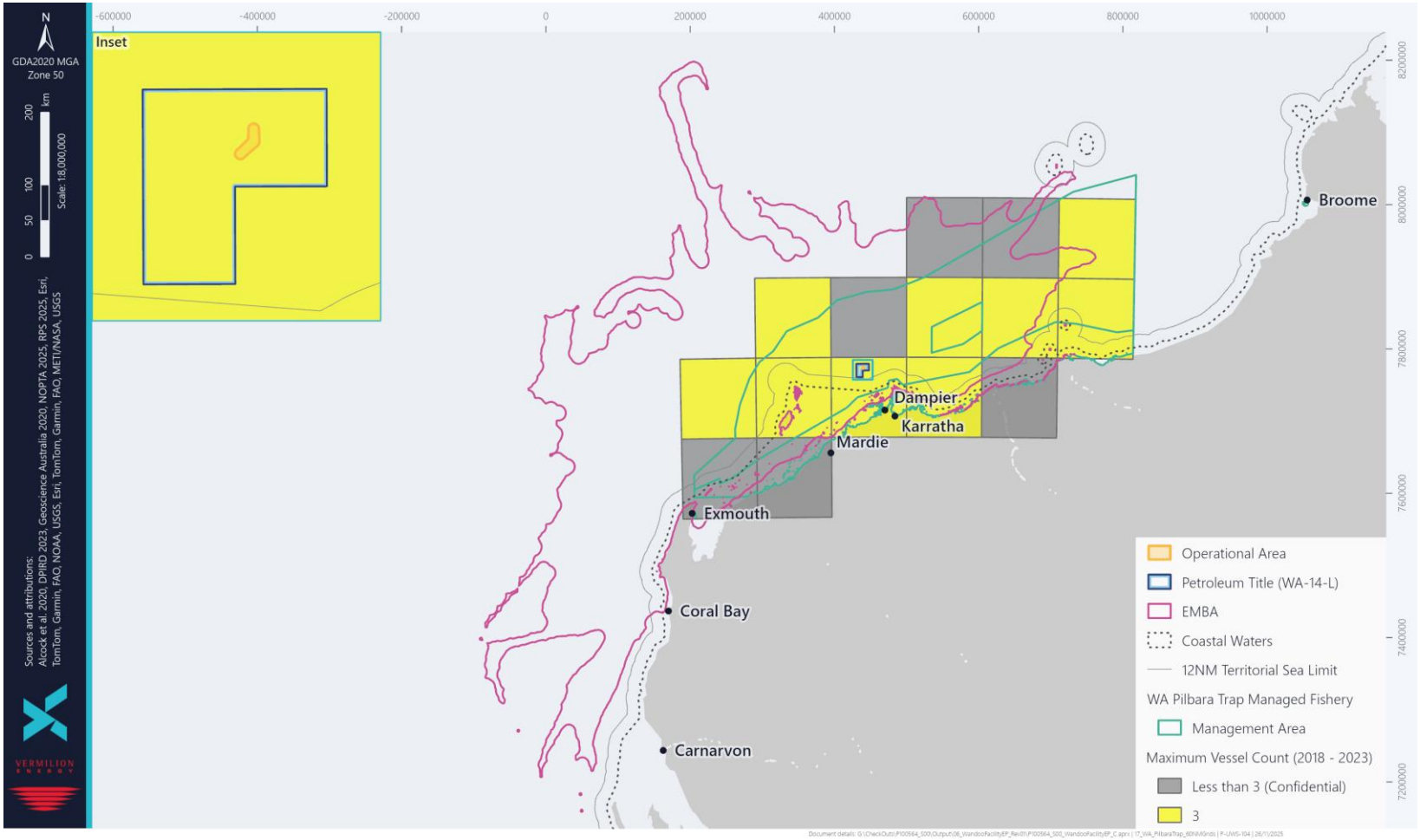


Figure 3-41: Shark Bay Crab Managed Fishery activity within the EMBA

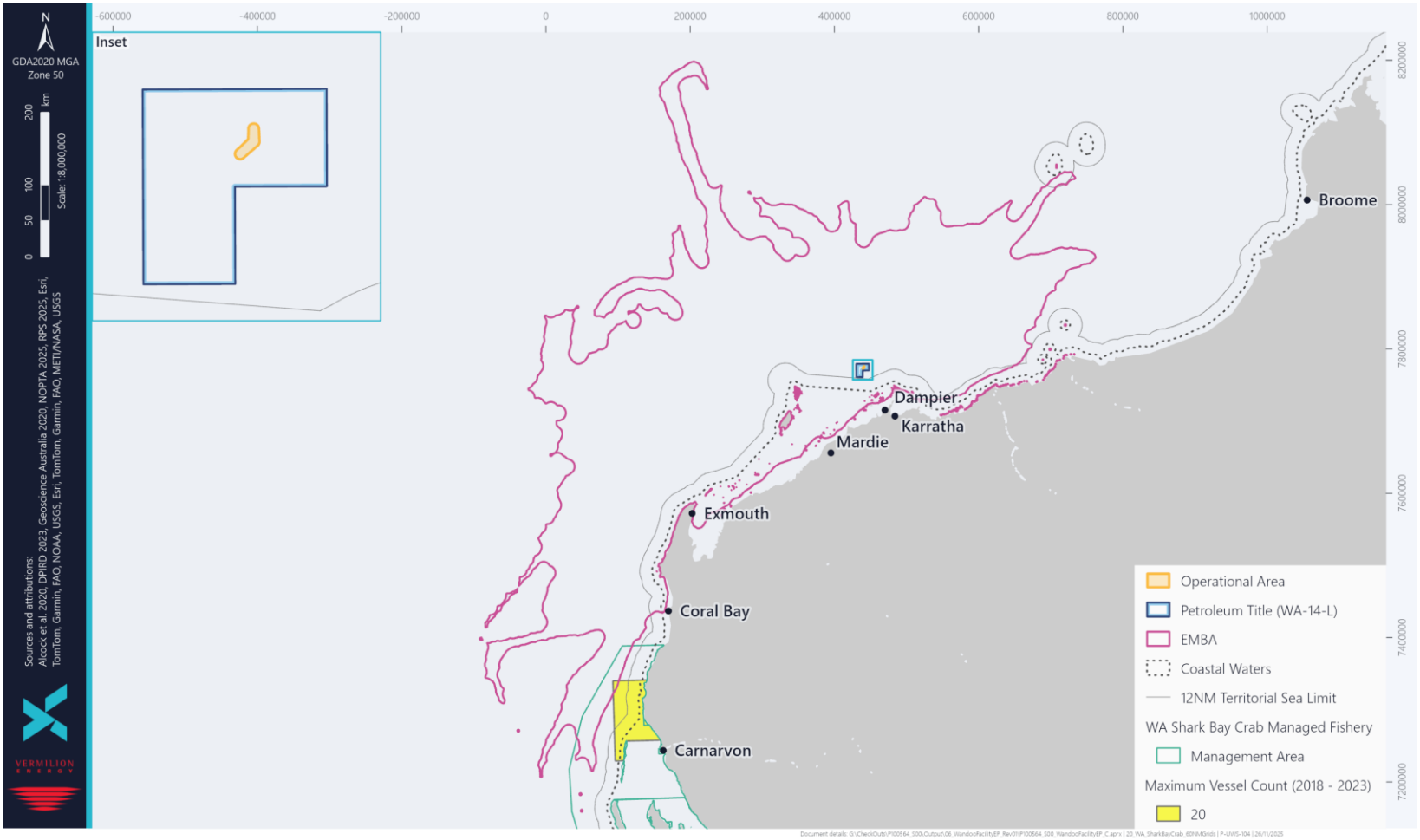


Figure 3-42: Shark Bay Prawn Managed Fishery activity within the EMBA

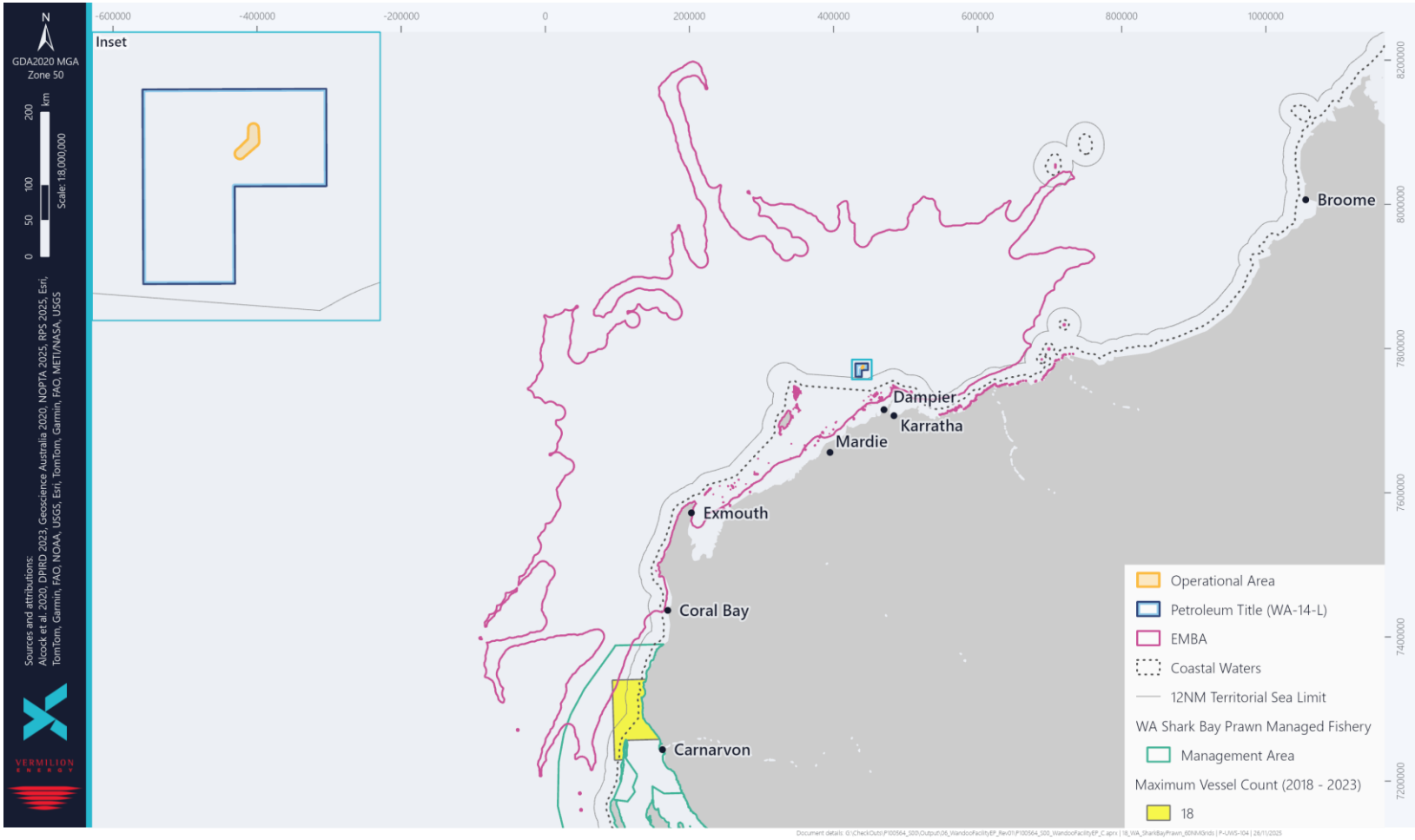


Figure 3-43: Shark Bay Scallop Managed Fisher activity within the EMBA

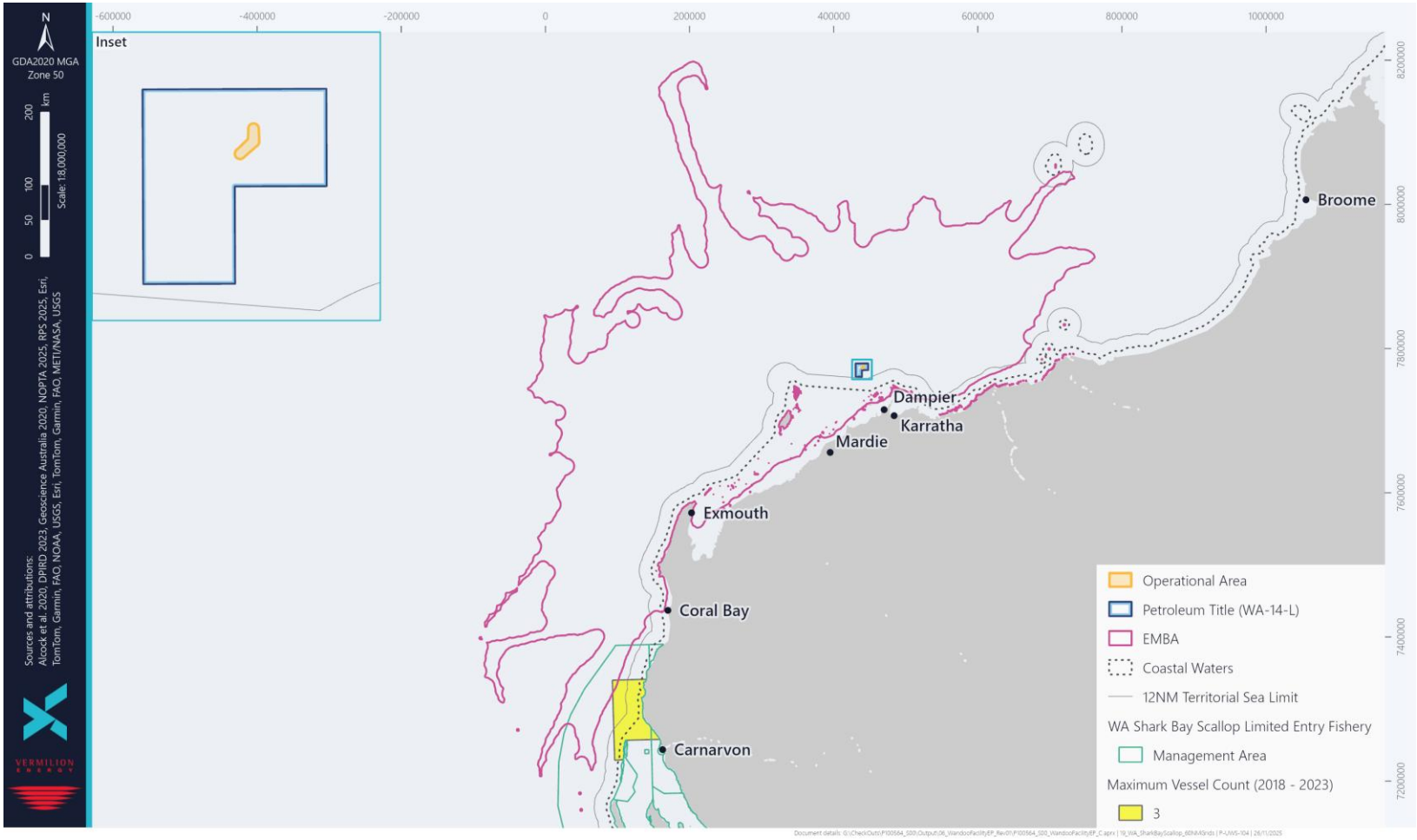


Figure 3-44: Specimen Shell Managed Fishery activity within the EMBA



Figure 3-45: Tour Operator activity within the EMBA

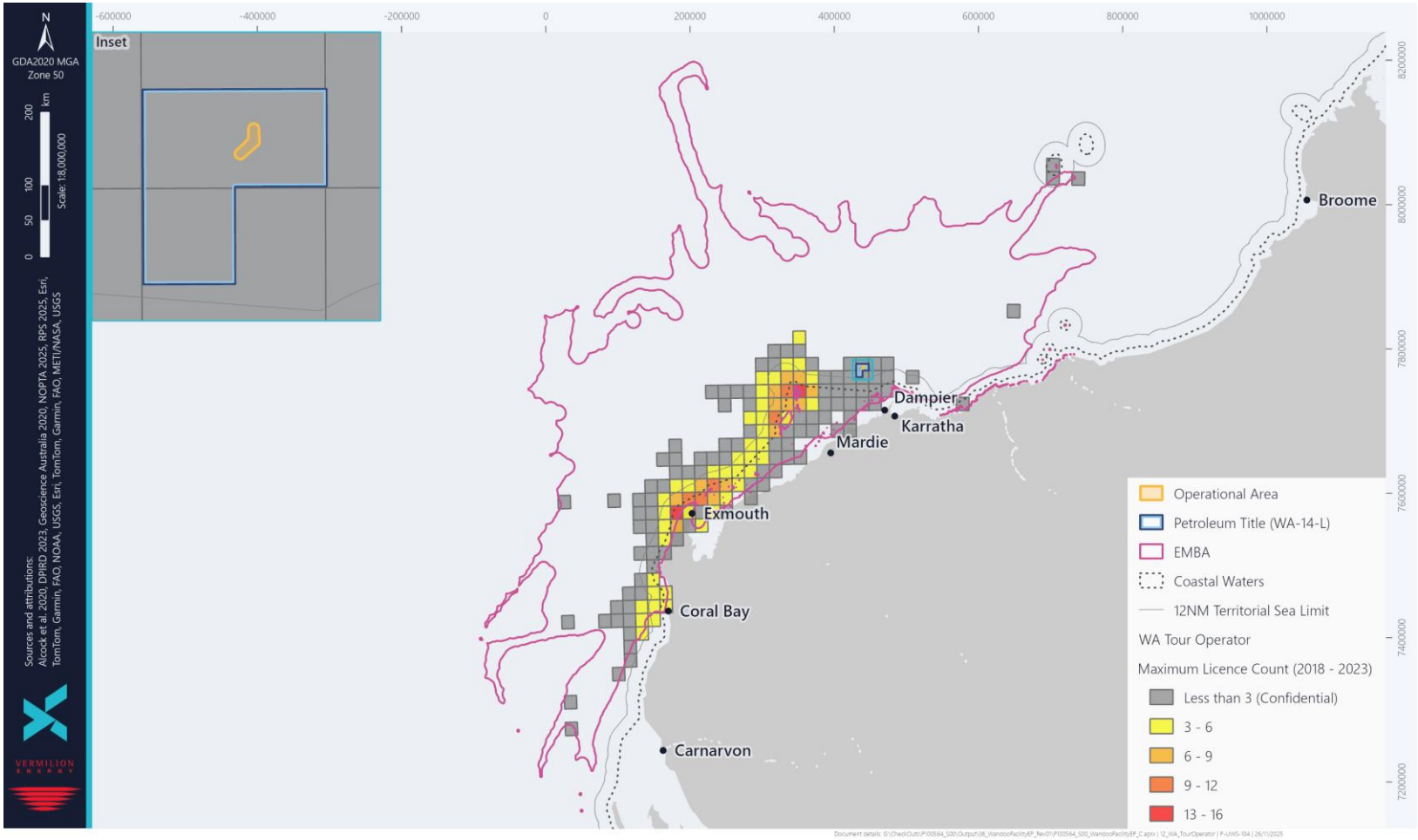


Figure 3-46: West Coast Deep Sea Crustacean Managed Fishery activity within the EMBA

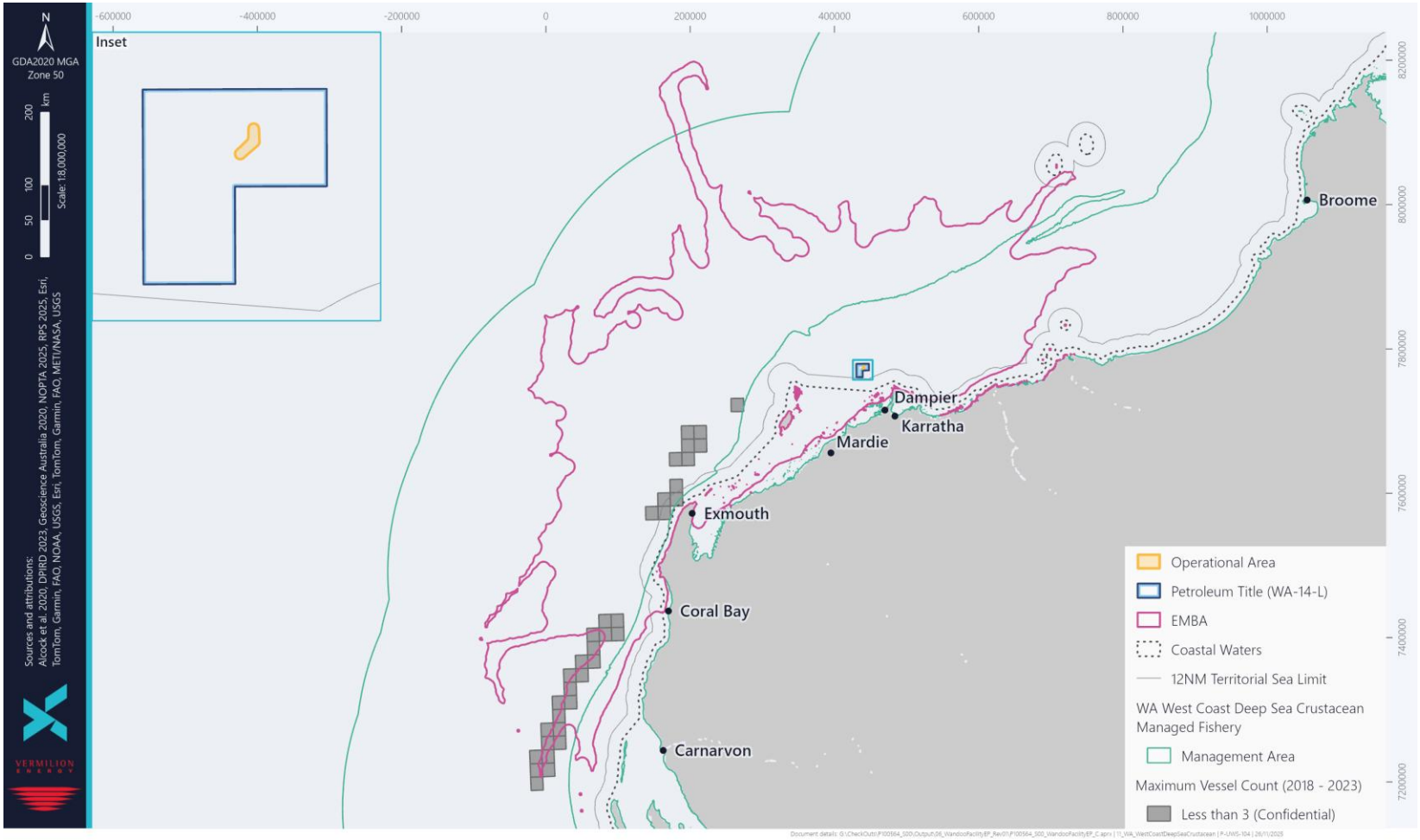


Figure 3-47: West Coast Rock Lobster Managed Fishery activity within the EMBA

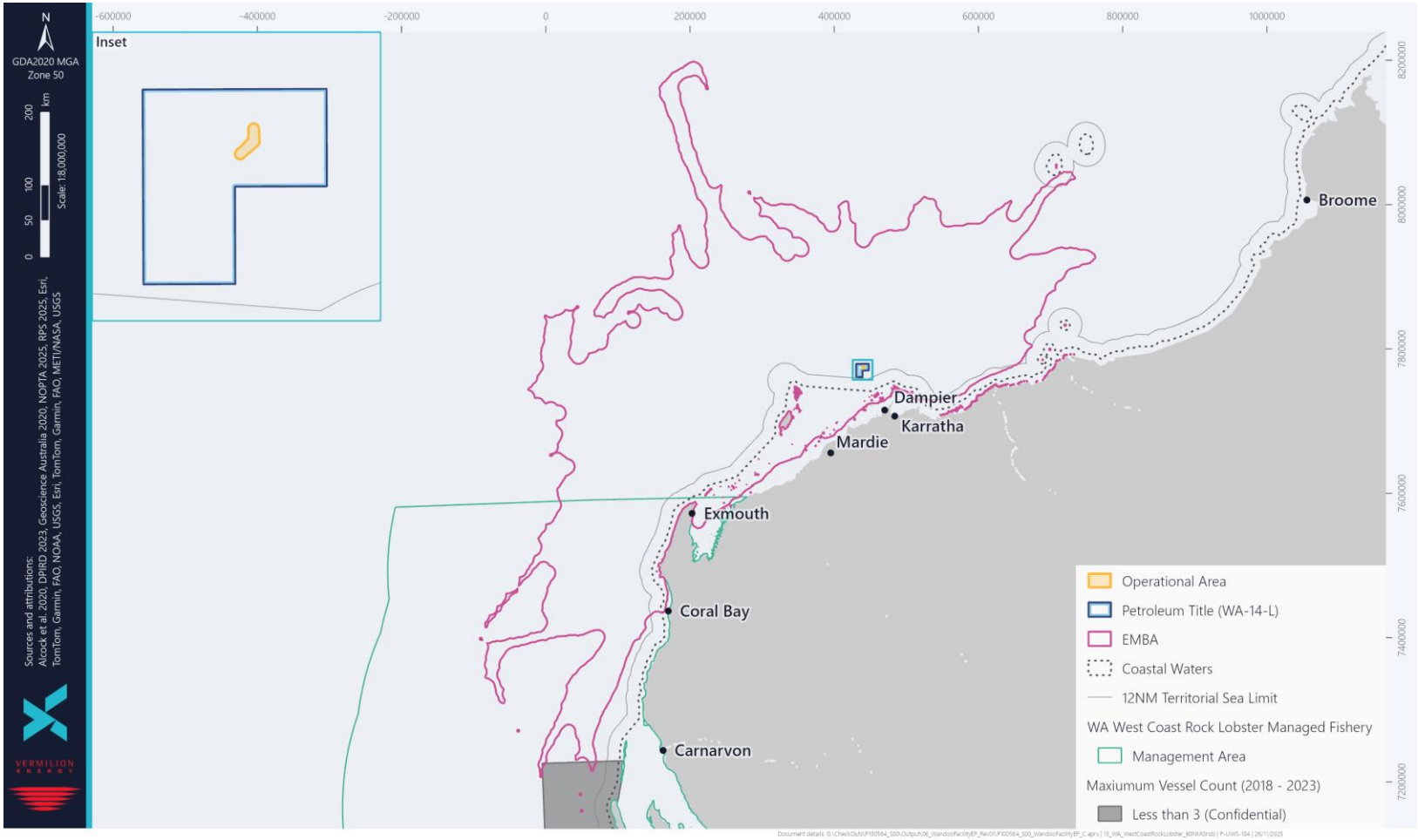
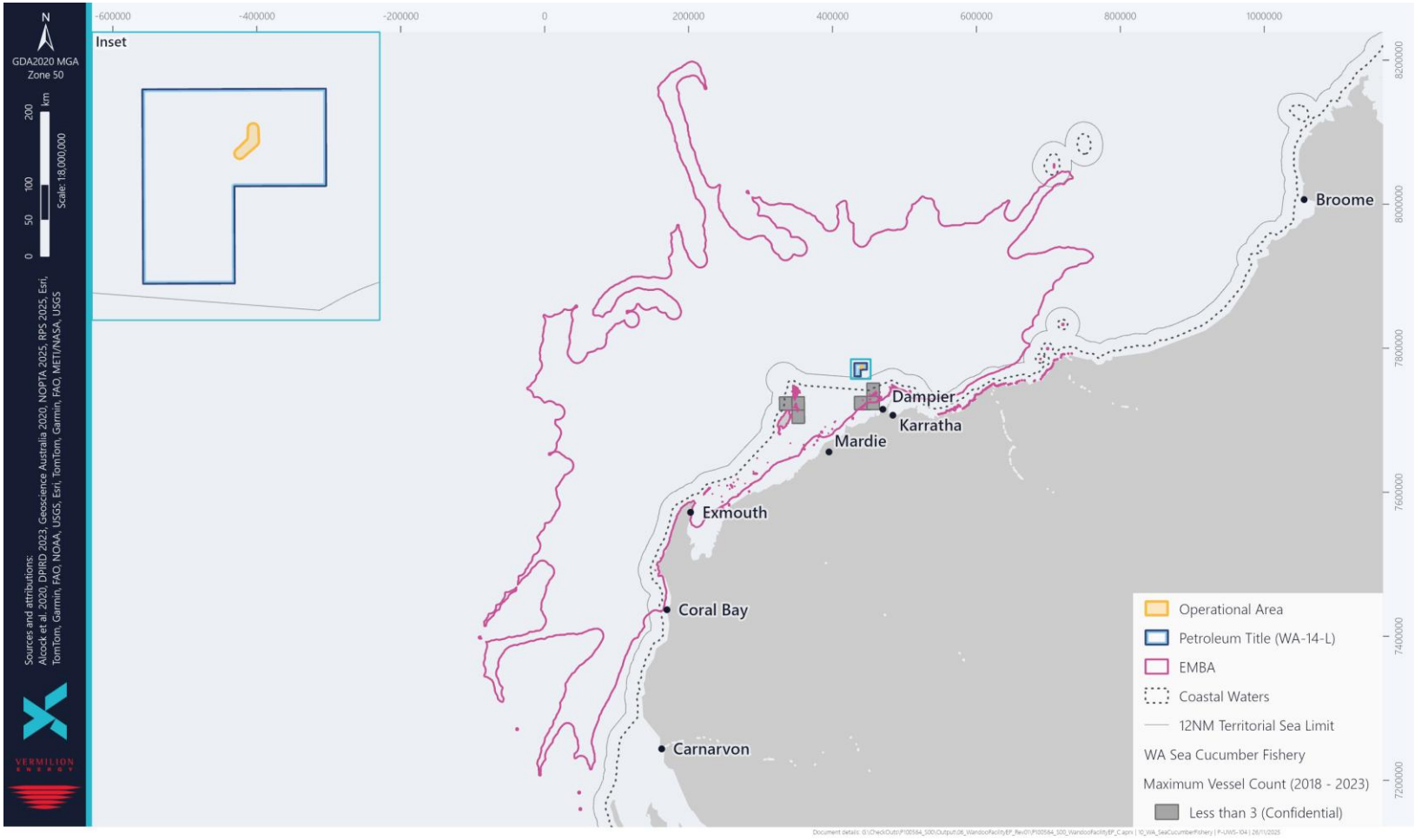


Figure 3-48: Western Australian Sea Cucumber Fishery activity within the EMBA



3.5.2 Commercial Shipping

Significant commercial shipping activity occurs within the EMBA, the majority of which is associated with the WA oil and gas and mining industries.

AMSA has established a network of shipping fairways for the NWS with the aim to reduce the risk of collision between transiting vessels and offshore infrastructure (AMSA, 2012a). The fairways are intended to direct large vessels such as bulk carriers and LNG ships trading to the major ports into pre-defined routes to keep them clear of existing and planned offshore infrastructure.

The closest AMSA shipping fairway is ~9 km south of the Operational Area (Figure 3-49).

3.5.3 Defence

There are no defence related uses within the Operational Area (Figure 3-50). The EMBA encompasses military installations near Exmouth, including a naval communication station. The Department of Defence has several offshore training areas, including the North-West Cape which is around 57 km north of the Operational Area at its closest point. The EMBA also overlaps the North-West Exercise Area (NWXA) defence area, and Learmonth Air Weapons Range practice and training areas. These areas are used for Defence Force training exercises, including live firing.

There are five UXO sites that overlap the EMBA. These include:

- The Exmouth Gulf, which RAN, prior to WWII, bombarded both land and sea targets on and in close proximity to the peninsula.
- Potential depth charges northwest of the Bessieres Island and East of the Montebello Islands are areas, where depth charges were used in WWII and where some failed to function.
- Sea dumping in Ningaloo and Anchor Island are areas where dumping at sea of ordnance and other items occurred.

No Unexploded Ordnance (UXO) potential has been identified within the Operational Area.

Figure 3-49: Vessel traffic within the EMBA

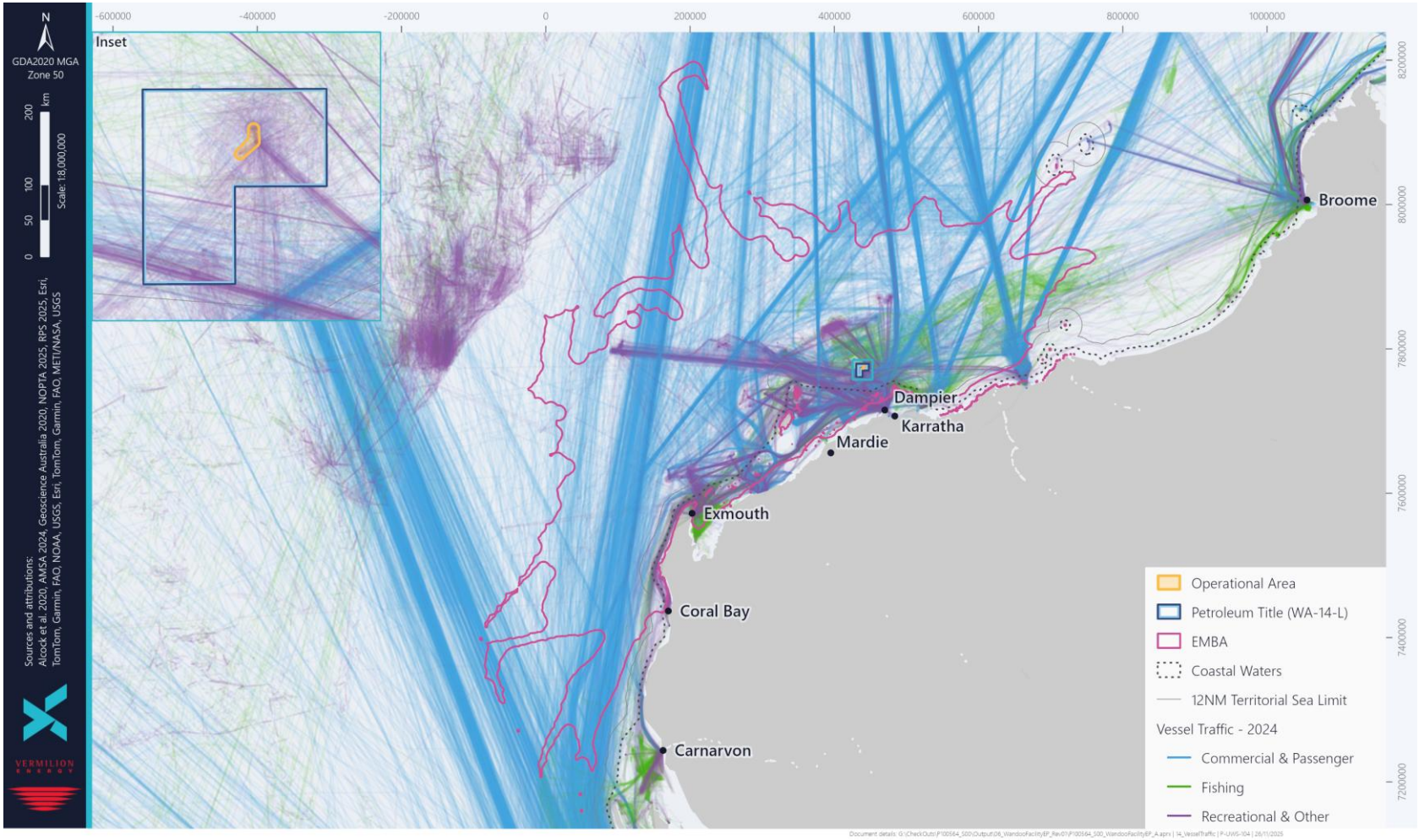
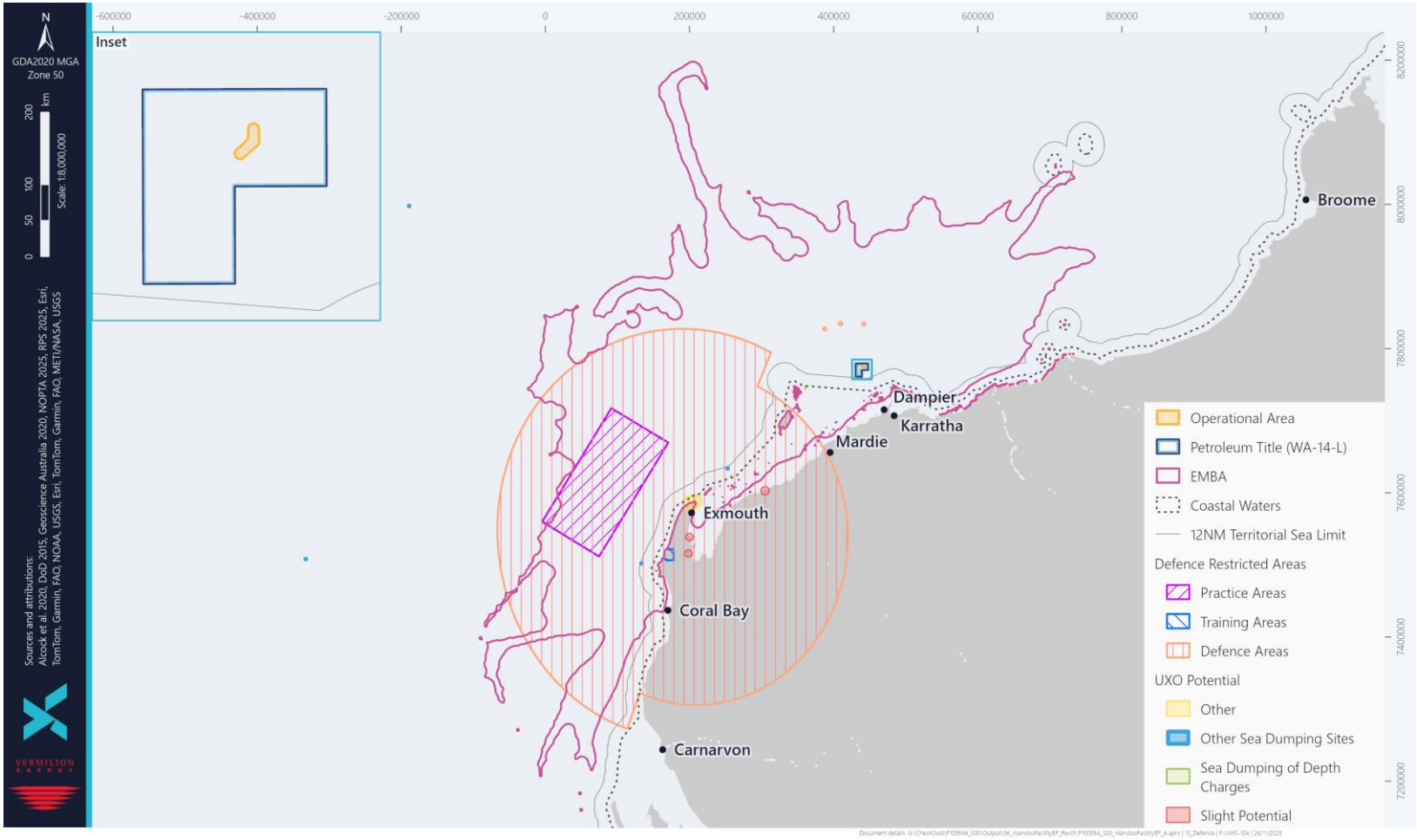


Figure 3-50: Defence Areas within the EMBA



3.5.4 Other Users

3.5.4.1 Tourism and Recreation

Tourism plays a significant role in the NWS region. Popular water-based tourism activities include:

- Whale watching
- Recreational boating and fishing
- Charter fishing
- Snorkelling/diving
- Surfing.

Popular land-based activities include bushwalking, camping, bird watching and four-wheel driving.

Recreational fishing is an integral part of the Pilbara lifestyle. The region's unique coastline includes some of Australia's prime fishing locations and an array of offshore islands, coral reef systems and offshore habitats. These experiences make recreational fishing a key driver of visitation to the region, attracting visitors from around the state and country. Recreational fishing has increased offshore in recent years, as the area is accessed for deepwater fishing by the charter sector and fishers in larger boats. The DPIRD recreational fishing location guide (DPIRD, 2023b) names the Wandoo Production Facility as a fishing location. However, no unauthorised vessels are permitted within the 500 m PSZ.

The Ningaloo Coast tourism precinct occurs within the EMBA. In 2018–19, the Ningaloo region (Ningaloo Reef and the surrounding coastal region Exmouth Gulf, communities of Exmouth and Coral Bay, and adjacent proposed southern coastal reserves and pastoral leases) contributed an estimated $110 million in value added to the WA economy (DBCA, 2020b). Ningaloo's economic contribution to WA is attributed to four key types of economic activity, tourism expenditure by international, interstate and WA visitors to the Ningaloo region, commercial fishing in the Exmouth Gulf, recreation activity involving the Reef by residents of the Ningaloo region and management and research relating to the Reef (DBCA, 2020b). More than 90% of this value added is attributed to the domestic and international tourists who visit Ningaloo each year (DBCA, 2020b).

3.5.5 Oil and Gas Industry

The petroleum exploration and production industry is a significant stakeholder in the region. Petroleum companies have been undertaking exploration and production activities on the NWS for decades.

Petroleum infrastructure within the Operational Area includes the WNA (not normally staffed) monopod and WNB platform (normally staffed facility), operated by Vermillion Energy. Petroleum infrastructure within the vicinity of the Operational Area includes the Reindeer platform (~16 km northwest), the Dampier Spirit (~20 km southwest), and Stag A (~22 km southwest).

There are also several submerged pipelines associated with petroleum fields and facilities with onshore processing hubs. Nearby pipelines include the TL1 and TL2 export pipelines from the

North Rankin Complex to the Karratha Gas Plant (~4.6 km from the Operational Area) and the Devil Creek Pipeline (~10 km from the Operational Area).

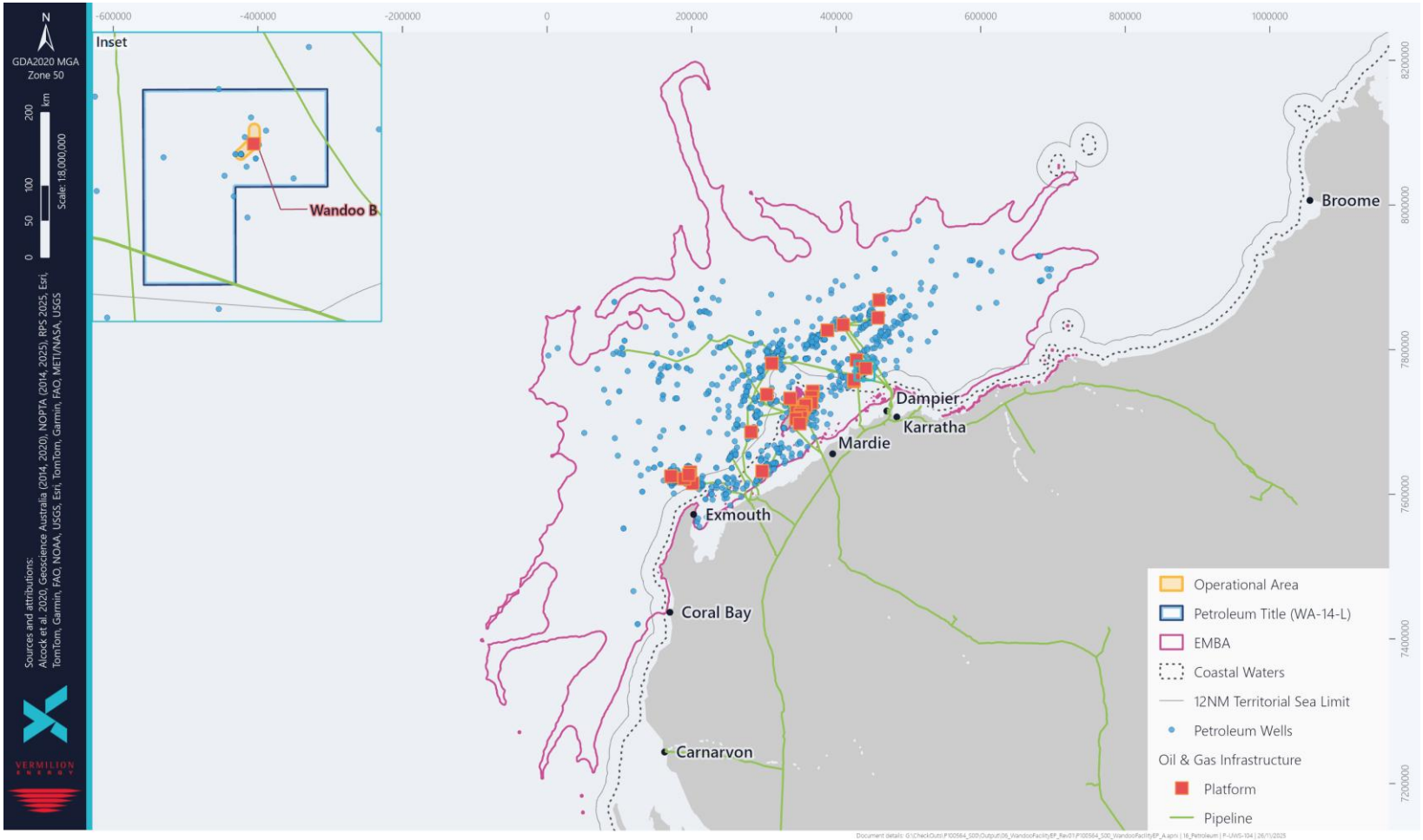
Figure 3-51 shows the proximity of oil and gas infrastructure to the Operational Area. Table 3-9 identifies other oil and gas facilities that overlap with the Hydrocarbon Area and the EMBA.

Table 3-9: Offshore oil and gas facilities overlapping the Operational Area, Hydrocarbon Area and EMBA

Offshore oil and gas facilities	Project Areas			Distance from the Operational Area (km)
	Operational Area	Hydrocarbon Area	EMBA	
Agincourt (Santos)	-	✓	✓	109 km southwest
Angel (Woodside Energy Ltd)	-	✓	✓	69 km northeast
Barrow Island Marine Export Terminal (Chevron)	-	✓	✓	115 km southwest
Double Island (Santos)	-	✓	✓	118 km southwest
Four Rainbow (AFPSOM)	-	✓	✓	176 southwest
Gibson (Santos)	-	✓	✓	109 km southwest
Goodwyn Alpha (Woodside Energy Ltd)	-	✓	✓	73 km northwest
Gorgon (Chevron)	-	✓	✓	155 km southwest
Harriet A (Santos)	-	✓	✓	99 km southwest
Harriet B (Santos)	-	✓	✓	95 km southwest
Harriet C (Santos)	-	✓	✓	97 km southwest
John Brookes (Santos)	-	✓	✓	143 km southwest
Linda (Santos)	-	✓	✓	88 km southwest
Ngujima-Yin (Woodside Energy Ltd)	-	✓	✓	285 km southwest
Ningaloo Vision (Santos)	-	✓	✓	280 km southwest
North Rankin Complex (Woodside Energy Ltd)	-	✓	✓	66 km northwest
Okha (Woodside Energy Ltd)	-	✓	✓	55 km north
Pyrenees Venture (Woodside Energy Ltd)	-	✓	✓	286 km southwest
Reindeer (Santos)	-	✓	✓	16 km northwest
Simpson A (Santos)	-	✓	✓	105 km southwest
Simpson B (Santos)	-	✓	✓	105 km southwest
Stag A (Jadestone Energy)	-	✓	✓	22 km southwest
Thevenard Island Marine Export Terminal (Chevron)	-	-	✓	198 km southwest

Offshore oil and gas facilities	Project Areas			Distance from the Operational Area (km)
	Operational Area	Hydrocarbon Area	EMBA	
Twickenham (Santos)	-	✓	✓	115 km southwest
Varanus Island Marine Export Terminal (Santos)	-	✓	✓	101 km southwest
Victoria (Santos)	-	✓	✓	111 km southwest
Wheatstone (Chevron)	-	-	✓	95 km west
Wonnich (Santos)	-	✓	✓	111 km southwest

Figure 3-51: Oil and gas infrastructure within the EMBA



3.6 Protected and Significant Areas

Table 3-1 identifies that values and sensitives may be a relevant receptor to aspects of the activity occurring within the Operational Area, Hydrocarbon Area or EMBA during the Petroleum Activity. The description below provides sufficient details to assess all impacts and risks to values and sensitivities.

3.6.1 World Heritage Areas

World Heritage status is awarded by the UNESCO World Heritage Committee to sites that are deemed to possess 'Outstanding Universal Value' cultural and/or natural significance.

There are two World Heritage Properties located within the EMBA and the Hydrocarbon Area (Figure 3-52), as discussed in Table 3-10. No World Heritage Properties overlap the Operational Area.

Table 3-10: World Heritage Properties that overlap the Project EMBA

World Heritage Places	Heritage class	Project Areas		
		Operational Area	Hydrocarbon Area	EMBA
Murujuga Cultural Landscape[1]	Criteria (i) (iii) (v)	-	✓	✓
Murujuga Cultural Landscape was inscribed to the World Heritage List in 2025. It is a landscape of ancient rocks encompassing the Burrup Peninsula, Dampier archipelago's 42 islands, and nearby marine areas. The site is shaped by First Nations Lore, rules and narratives that were put in place to create Country, and the enduring presence of the Ngarda-Ngarli people who are the Traditional Owners and custodians of the site. This property holds profound cultural and spiritual significance which reflects over 50,000 years of continuous care and use by Traditional Custodians. The site is renowned for its dense concentration of petroglyphs, which provide a record of traditional use by First Nations people over thousands of years. The engravings depict human figures, bird, marine and animal life, including some extinct species. The area also features middens, fish traps, rock shelters, ceremonial places, spiritual and sacred sites, and stone arrangements (UNESCO, 2025a).				
Ningaloo Coast	Natural Criterion vii and Criterion x	-	✓	✓
The Ningaloo Coast World Heritage Property has been included in the World Heritage list since 2011. spans over 705,015 hectares of marine and terrestrial areas on the western coast of Australia. The marine area features the Ningaloo Reef, one of the longest fringing reefs in the world. An estimated 300 to 500 whale sharks (Rhincodon typus) aggregate annually on the reef coinciding with mass coral spawning events. The marine area has a high diversity of habitats which include lagoon, reef, open ocean, and the continental slope and continental shelf. Intertidal systems include rocky shores, sandy beaches, estuaries, and mangroves. The most dominant marine habitat is the Ningaloo Reef. The reef supports both tropical and temperate marine fauna and features annual gatherings of whale sharks and sea turtles. The terrestrial area of this site features an extensive karst system with substantial cave networks, and groundwater streams. Universal values of this site include high terrestrial species endemism and high marine diversity and abundance.				

[1] The Murujuga World Heritage listed area is yet to be listed in Australian Government spatial defining software. The spatial location has been digitised according to the nominated listing for the Murujuga Cultural landscape Nominated World Heritage Property listing (CoA, 2023).

World Heritage Places	Heritage class	Project Areas		
		Operational Area	Hydrocarbon Area	EMBA
Criterion (vii): The landscapes and seascapes of the Ningaloo Coast are mostly intact, large-scale marine, coastal and terrestrial environments. The property supports rare and large aggregations of whale sharks and other fish species, marine mammals and reptiles. The aggregations in Ningaloo follow the mass seasonal coral spawning and nutrient upwelling which leads to increased productivity and the largest gathering of whale sharks in the world. Criterion (x): The Ningaloo reef is home to a high diversity of coral, fish, mollusc, crustacean, algae, sponge, and echinoderm species. Many species that occur in the region are rare or threatened. It is estimated that 10,000 nests of marine turtles occur annually along the coastline. There are rare aquatic species found in the flooded caves on land which are rare, taxonomically diverse and not found anywhere else in the southern hemisphere. The subterranean fauna and flora of the Ningaloo peninsula is highly diverse (IUCN, 2011).				

3.6.2 Commonwealth Heritage Places

The Commonwealth Heritage list comprises natural, indigenous and historic heritage places which are either entirely within a Commonwealth area, or outside the Australian jurisdiction and owned or leased by the Commonwealth or a Commonwealth Authority. A Commonwealth Heritage Place might also be on the National Heritage List or the World Heritage List.

There are two Commonwealth Heritage places within the EMBA and one overlapping the Hydrocarbon Area, as discussed in Table 3-11 and shown in Figure 3-52. No Commonwealth Heritage Places overlap the Operational Area.

Table 3-11: Commonwealth Heritage Places within the EMBA

Commonwealth Heritage Places	Heritage class	Project Areas		
		Operational Area	Hydrocarbon Area	EMBA
Ningaloo Marine Area - Commonwealth Waters	Natural	-	✓	✓
Description Ningaloo Marine Park stretches for 260 km along Western Australia's Cape Range Peninsula, encompassing both State and Commonwealth waters. Its diverse habitats support rich marine life, including whale sharks, turtles, pelagic fish, and marine mammals, influenced by the Leeuwin and Ningaloo currents that sustain high productivity in this low-nutrient system (DCCEEW, 2025c) **Values** The Ningaloo Marine Area is an ecologically significant region that supports key marine processes and species. It is one of the few places in the world where whale sharks aggregate in large numbers and forms part of the annual migration route for humpback whales, tuna, and many migratory seabirds protected under international treaties. The area provides important feeding and breeding grounds for manta rays, billfish, and marine turtles, and supports numerous threatened and migratory species listed under the EPBC Act. It also offers exceptional opportunities for scientific research into marine ecology and oceanography. The Ningaloo Marine Area Commonwealth heritage listing criteria a, b, and c (DCCEEW, 2025c).				

Commonwealth Heritage Places	Heritage class	Project Areas		
		Operational Area	Hydrocarbon Area	EMBA
Learmonth Air Weapons Range Facility	Natural	-	-	✓

Description

Learmonth Air Weapons Range lies within Cape Range and adjacent coastal plains, a nationally listed heritage area near Ningaloo Reef. The site features coastal sand plains, limestone terraces, and unique subterranean ecosystems such as Bundera Sinkhole, which hosts ancient stygofauna with origins dating back to the Tethys Sea. Several reptile species with highly restricted distributions also occur in this region (DCCEEW, 2025b).

Values

The Cape Range and Learmonth Range Facility are ecologically and geologically significant areas that support rare subterranean ecosystems and highly endemic species. Bundera Sinkhole, located within the facility, is the only deep continental anchialine system in the southern hemisphere and hosts ancient stygofauna with origins tracing back to the Tethys Sea, including endangered crustaceans and the nationally vulnerable Blind Gudgeon (*Milyeringa veritas*). The region's geomorphology, featuring emergent reef terraces, provides critical evidence of sea-level and landform changes since the late Cenozoic. It also supports numerous endemic flora and reptile species with restricted distributions and offers exceptional opportunities for scientific research into evolutionary history, climate change, and biogeography. The Cape Range and Learmonth Range Facility Commonwealth heritage listing criteria a, b, and c (DCCEEW, 2025b).

3.6.3 National Heritage Properties

The National Heritage List is Australia's list of natural, historic and Indigenous places of outstanding significance to Australia.

There are two National Heritage places within the EMBA and Hydrocarbon Area, as discussed in Table 3-12 and shown in Figure 3-52. No National Heritage Places overlap the Operational Area.

Table 3-12: National Heritage Places within the EMBA

National Heritage Places	Heritage class	Project Areas		
		Operational Area	Hydrocarbon Area	EMBA
Dampier Archipelago (including Burrup Peninsula)	Indigenous	-	✓	✓

Description

The Dampier Archipelago is located 1,550 km north of Perth and was listed for inscription in 2007. This site is home to one of the most remarkable collections of rock art in Australia. The archipelago was formed 6,000-8,000 years ago and is made up of islands, reefs, shoals, channels, and straits and spans over approximately 400 km^2. Many significant species of flora and fauna are found in the area.

Values

The Dampier Archipelago is a culturally significant area which has been home to the Ngarda-Ngarlie people for tens of thousands of years. There is great richness and diversity of rock art in the area and culturally significant site types ranging from quarries, middens, fish traps, rock shelters, ceremonial sites, artefact scatters, and stone arrangements. Engravings are the most numerous site types with sites ranging in the potential millions. The Dampier Archipelago (including Burrup Peninsula) national heritage listing criteria a, b, c, d, and f (CoA, 2007).

National Heritage Places	Heritage class	Project Areas		
		Operational Area	Hydrocarbon Area	EMBA
Ningaloo Coast	Natural	-	✓	✓

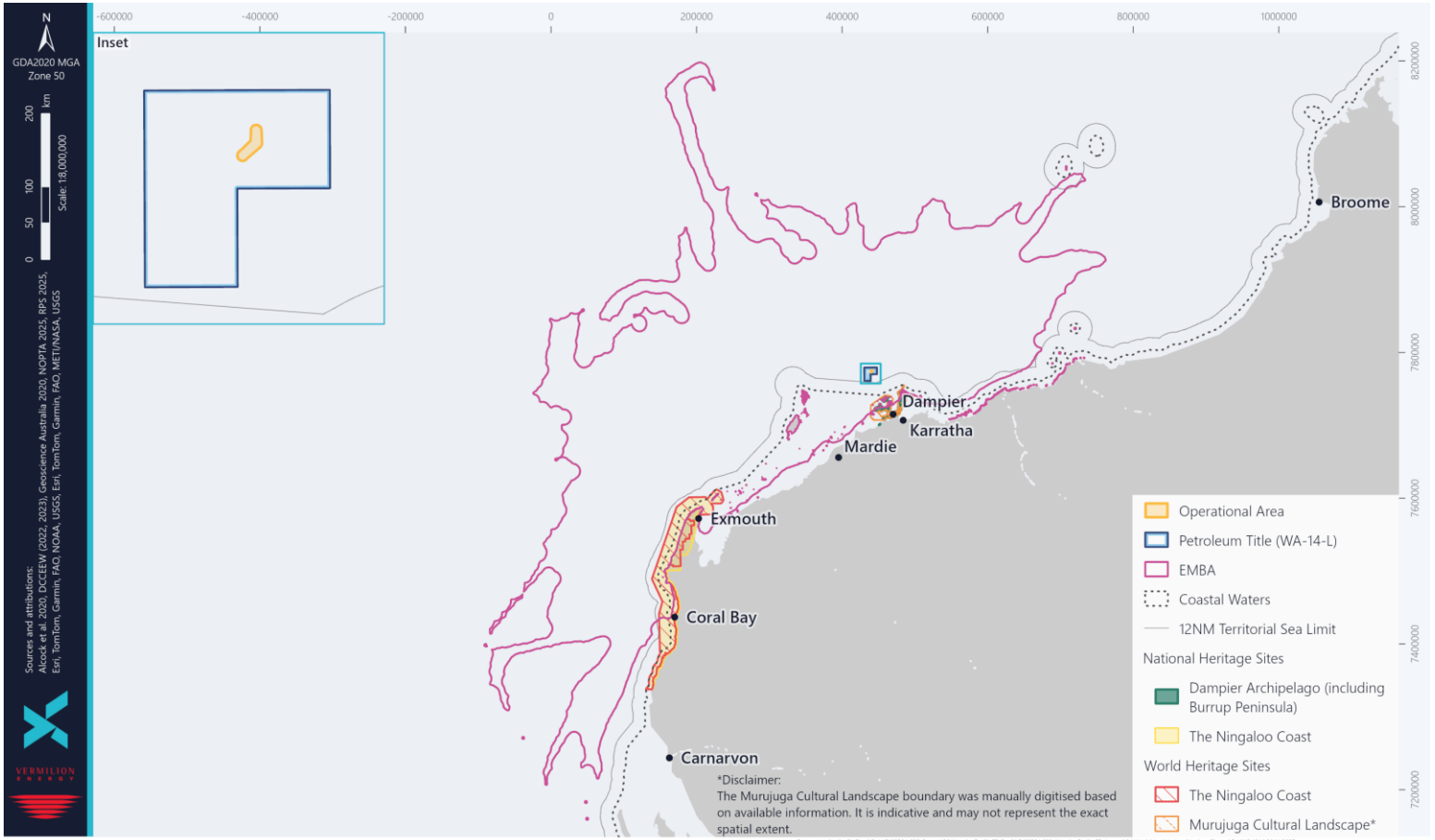
Description

The Ningaloo Coast National Heritage Place consists of the same area included in the Ningaloo Coast World Heritage Property (refer Section 3.6.1) and was established on the National Heritage List in 2010 (DCCEEW, 2025c).

Values

The Ningaloo Coast contains one of the best developed near-shore reefs in the world, being home to rugged limestone peninsulas, spectacular coral and sponge gardens and the whale shark (*Rhincodon typus*) (DCCEEW, 2025c). The Ningaloo Coast meets the national heritage listing criteria a, b, c, d, and f.

Figure 3-52: World Heritage Properties, Commonwealth Heritage, and National Heritage Places within the EMBA[2]



[2] The Murujuga World Heritage listed area is yet to be listed in Australian Government spatial defining software. The spatial location has been digitised according to the nominated listing for the Murujuga Cultural landscape Nominated World Heritage Property listing (CoA, 2023).

3.6.4 Underwater Cultural Heritage

Australia's underwater cultural heritage is protected under the *Underwater Cultural Heritage Act 2018* (Cth). This legislation protects shipwrecks, sunken aircraft and other types of underwater heritage, including Aboriginal underwater cultural heritage (Section 3.7.5 for Aboriginal cultural heritage) in Australian waters, including state and Commonwealth waters.

The remains of vessels and aircrafts located in Commonwealth waters, along with certain associated articles, are automatically protected under the *Underwater Heritage Act 2018* after 75 years. This is applicable whether the existence or location of the article is known or unknown. Remains and relics of any ship that is lost, wrecked, or abandoned in WA waters before 1900 are protected by the *Maritime Archaeology Act 1973* (WA).

Known historical shipwreck sites in WA waters are listed in the WA Maritime Museum Shipwreck Database. Known historical shipwreck sites listed under the *Underwater Heritage Act 2018* in Australian waters are listed in the Australasian Underwater Cultural Heritage Database. These databases only cover known historical sites.

There are 65 shipwrecks and shipwreck artefacts identified within the EMBA. There are no shipwrecks or artefacts located within the Operational Area. The closest shipwreck is located 46 km southwest of the Operational Area (*The Dampier*) (Table 3-13).

Table 3-13: Known shipwrecks and artefacts located within the Project Areas

Shipwrecks or artefacts	Year wrecked	Project Areas			Distance from Operational Area (km)
		Operational Ara	Hydrocarbon Area	EMBA	
Agnes	1893	-	✓	✓	300.2
Beatrice	1899	-	✓	✓	301.6
Bell	1893	-	✓	✓	301.3
Benan	1888	-	-	✓	404.9
Bertha	1874	-	-	✓	403.7
Chofuku Maru	1931	-	-	✓	388.7
Cock of the North	1879	-	-	✓	403.7
Correio da Azia	1816	-	-	✓	409.5
Crown of England	1912	-	-	✓	145.3
Curlew	1911	-	-	✓	131.4
Dampier	-	-	✓	✓	46.5
Don Joseph	1899	-	-	✓	400.9
Elizabeth	1893	-	✓	✓	301.3
Ellen	1893	-	✓	✓	301.1
Emlyn Castle	1960	-	-	✓	296.9
Emma	1867	-	-	✓	428.4
Fairy Queen	1875	-	-	✓	297.1

Shipwrecks or artefacts	Year wrecked	Project Areas			Distance from Operational Area (km)
		Operational Ara	Hydrocarbon Area	EMBA	
Fin	1923	-	-	✓	401.1
Florence	1893	-	✓	✓	301.3
G.G.S.	1883	-	-	✓	403.7
Gem	1893	-	✓	✓	301.6
Haw Kiet	2003	-	-	✓	202.3
Hawk	-	-	-	✓	333.01
Iona	1923	-	-	✓	412.5
Kapala	1964	-	✓	✓	301.3
Lady Ann	1982	-	✓	✓	269.9
Lamareaux	1893	-	✓	✓	301.3
Leave	1893	-	✓	✓	301.3
Lily of the Lake	1875	-	✓	✓	301.3
Mabel	1893	-	✓	✓	301.3
Marietta	1905	-	-	✓	132.0
McCormack	1989	-	✓	✓	48.7
McDermott Derrick Barge No 20	1989	-	✓	✓	48.6
Mildura	1907	-	-	✓	296.6
Min Pin Liu No. 25 (Also Ming Pin Liu)	1999	-	-	✓	201.8
Nellie	1893	-	✓	✓	301.3
Norwegian Bay Unidentified Barge		-	-	✓	393.7
Occator	1856	-	-	✓	379.7
Olive	1893	-	✓	✓	301.3
Parks Lugger	Abandoned beginning of World War I	-	✓	✓	100.2
Pearl	1896	-	✓	✓	301.3
Perth	1887	-	-	✓	403.5
Plym HMS	1952	-	✓	✓	93.8
Point Cloates Unidentified		-	-	✓	409.1
Queen	1891	-	-	✓	403.7
Rapid	1811	-	-	✓	403.4
Rose	1908	-	-	✓	651.0

Shipwrecks or artefacts	Year wrecked	Project Areas			Distance from Operational Area (km)
		Operational Ara	Hydrocarbon Area	EMBA	
Ruby	1893	-	✓	✓	301.3
S.S.S.	1901	-	-	✓	404.6
Sea Queen	1893	-	✓	✓	301.3
Shunsei Maru	1931	-	-	✓	379.7
Smuggler	1893	-	✓	✓	301.3
Stefano	1875	-	-	✓	408.3
Strathmore	1870	-	-	✓	403.7
Tanami	1935	-	✓	✓	111.0
Trial	1622	-	✓	✓	110.3
Tropic Queen	1975	-	✓	✓	101.2
Unidentified Lugger	1893	-	✓	✓	301.3
Veronica	1928	-	✓	✓	272.1
Vianen	1628	-	-	✓	132.0
Wild Wave	1875	-	-	✓	301.3
Wild Wave (China)	1873	-	✓	✓	132.0
Wyndham	1910	-	-	✓	403.7
Zelma	1990	-	-	✓	53.1
Zvir	1902	-	-	✓	398.4

3.6.5 Australian Marine Parks

AMPs, proclaimed under the EPBC Act in 2007 and 2013, are located in Commonwealth Waters that start on the outer edge of State and Territory waters, generally 3 nm from shore, and extend to the outer boundary of Australia's EEZ, 200 nm from the shore. There are 7 AMPs within the EMBA, 4 of which also overlap the Hydrocarbon Area. There are no AMPs within the Operational Area. AMPs are described in Table 3-14, and displayed in Figure 3-53.

Table 3-14: AMPs within the Project Areas (DNP, 2018)

AMP	Area type	Project Areas			Distance and direction from Operational Area
		Operational Area	Hydrocarbon Area	EMBA	
Argo-Rowley Terrace	Multiple Use Zone (IUCN VI)	-	-	✓	260 km north
Description The Argo–Rowley Terrace Marine Park is located approx. 270km north-west of Broome. The Marine Park is adjacent to the Mermaid Reef Marine Park and the State Rowley Shoals Marine Park. The Marine Park covers an area of 146,003km2 and water depths of 220–6,000 m. The Marine Park includes three zones: National Park Zone (II), Multiple Use Zone (VI) and Special Purpose Zone (Trawl) (VI).					

AMP	Area type	Project Areas			Distance and direction from Operational Area
		Operational Area	Hydrocarbon Area	EMBA	
The Argo–Rowley Marine Park is significant because it contains habitats, species and ecological communities associated with the Northwest Transition and Timor Province, and includes two KEFs. The Marine Park is the largest in the North-west Network. It includes the deeper waters of the region and a range of seafloor features (e.g. canyons on the slope between the Argo Abyssal Plain, Rowley Terrace and Scott Plateau). These are believed to be up to 50 million years old and are associated with small, periodic upwellings that results in localised higher levels of biological productivity. **Natural values** The Marine Park includes examples of ecosystems representative of: • Northwest Transition: an area encompassing the shelf break, continental slope and much of the Argo Abyssal Plain. Together with Clerke Reef and Imperieuse Reef, Mermaid Reef forms a biodiversity hotspot and is a key topographic feature of the Argo Abyssal Plain • Timor Province: dominated by warm, nutrient-poor waters, with canyons that are generally associated with high productivity and aggregations of marine life. The Marine Park contains two key ecological features: canyons linking the Argo Abyssal Plain with the Scott Plateau, and Mermaid Reef and Commonwealth waters surrounding the Rowley Shoals. It supports a range of species, including those listed as threatened, migratory, marine or cetacean under the EPBC Act. Biologically important areas within the Marine Park include resting and breeding habitat for seabirds and a migratory pathway for the pygmy blue whale. **Cultural values** Sea country is valued for Indigenous cultural identity, health and wellbeing. However, to date there is limited information about the cultural significance of this Marine Park. **Heritage values** No international, Commonwealth or national heritage listings apply to the Marine Park. The Marine Park contains two known historic shipwrecks: Alfred (1908) and Pelsart (1908). **Social and economic values** Commercial fishing and mining are important activities in the Marine Park.					
Carnarvon Canyon	Habitat Protection Zone (IUCN IV)	-	-	✓	627 km SW
Description The Carnarvon Canyon Marine Park is located approximately 300 km north-west of Carnarvon. It covers an area of 6,177 km^2 and occurs over a water depth range of 1,500–6,000 m. The Marine Park includes one IUCN zone: Habitat Protection Zone (IUCN IV). The Carnarvon Canyon Marine Park is significant because it contains habitats, species and ecological communities associated with the Central Western Transition, including deep-water ecosystems associated with the Carnarvon Canyon. The Marine Park lies within a transition zone between tropical and temperate species and is an area of high biotic productivity. **Natural values** The Marine Park includes examples of ecosystems representative of the Central Western Transition, a bioregion characterised by extensive continental slope habitats, diverse topographic features such as terraces, rises and canyons, and seasonal upwelling that supports benthic slope communities of tropical and temperate species. A key feature is the Carnarvon Canyon, a single-channel canyon spanning the full depth range of the park. Ecosystems are influenced by tropical and temperate currents, deep-water environments and proximity to the continental slope and shelf. Soft-bottom					

AMP	Area type	Project Areas			Distance and direction from Operational Area
		Operational Area	Hydrocarbon Area	EMBA	
habitats at the canyon base are likely to support species typical of the deep seafloor, including holothurians, polychaetes and sea pens. The Marine Park provides habitat for a range of species, including those listed as threatened, migratory, marine or cetacean under the EPBC Act. **Cultural values** Sea country is valued for Indigenous cultural identity, health and wellbeing. However, to date there is limited information about the cultural significance of this Marine Park. **Heritage values** No international, Commonwealth or national heritage listings apply to the Marine Park. **Social and economic values** Commercial fishing is an important activity in the Marine Park.					
Dampier	Habitat Protection Zone (IUCN IV) Multiple Use Zone (IUCN VI) National Park Zone (IUCN II)	-	✓	✓	45 km SE
Description The Dampier Marine Park is located approximately 10 km northeast of Cape Lambert and 40 km from Dampier, extending from the WA state water boundary. The Marine Park covers an area of 1,252 km² and a water depth range between less than 15 m and 70 m. **Natural values** The Marine Park includes ecosystems representative of the NWS Province – a dynamic environment influenced by strong tides, cyclonic storms, long-period swells and internal tides. The bioregion includes diverse benthic and pelagic fish communities, and ancient coastline thought to be an important seafloor feature and migratory pathway for humpback whales. The Marine Park supports a range of species listed under the EPBC Act. BIAs within the Marine Park include breeding and foraging habitat for seabirds, inter-nesting habitat for marine turtles and a migratory pathway for humpback whales. **Cultural values** Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Ngarluma, Yindjibarndi, Yaburara, and Mardudhunera people have responsibilities for sea country in the Marine Park. The Native Title holders for these people are represented by the Ngarluma Aboriginal Corporation and Yindjibarndi Aboriginal Corporation. These Prescribed Body Corporates represent Traditional Owners with Native Title over coastal area adjacent to the Marine Park. The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Pilbara and Yamatji regions. **Social and economic values** Port activities, commercial fishing and recreation, including fishing, are important activities in the Marine Park (DNP, 2018).					

AMP	Area type	Project Areas			Distance and direction from Operational Area
		Operational Area	Hydrocarbon Area	EMBA	
Gascoyne	Habitat Protection Zone (IUCN IV) Multiple Use Zone (IUCN VI)	-	✓	✓	285 km SW

Description

The Gascoyne Marine Park is located approximately 20 km off the west coast of the Cape Range Peninsula, adjacent to the Ningaloo Reef Marine Park and the WA Ningaloo Marine Park and extends to the limit of Australia's exclusive economic zone. The Marine Park covers an area of 81,766 km² and water depths between 15 m and 6,000 m.

Natural values

Ecosystems represented in the Marine Park are influenced by the interaction of the Leeuwin Current, Leeuwin Undercurrent and the Ningaloo Current. The Marine Park supports a range of species listed under the EPBC Act. BIAs within the Marine Park include breeding habitat for seabirds, inter-nesting habitat for marine turtles, a migratory pathway for humpback whales, and foraging habitat and migratory pathway for pygmy blue whales.

Cultural values

Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Gnulli people have responsibilities for sea country in the Marine Park. The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Yamatji region.

Heritage values

- The Ningaloo Coast was listed as an area of outstanding universal value under the World Heritage Convention in 2011, meeting world heritage listing criteria vii and x. The Ningaloo Coast World Heritage Property is adjacent to the Marine Park.
- The Ningaloo Marine Area (Commonwealth waters) meets the Commonwealth heritage listing criteria A, B and C. The Ningaloo Marine Area is adjacent to the Marine Park.
- The Ningaloo Coast meets the national heritage listing criteria A, B, C, D, and F and is adjacent to the Marine Park.
- The Marine Park contains more than five known shipwrecks listed under the *Underwater Cultural Heritage Act 2018*.

Social and economic values

Commercial fishing, mining and recreation are important activities in the Marine Park (DNP, 2018).

Montebello	Multiple Use Zone (IUCN VI)	-	✓	✓	44 km W

Description

The Montebello Marine Park is located offshore of Barrow Island and 80 km west of Dampier extending from the WA state water boundary and is adjacent to the Barrow Island and Montebello Islands Marine Parks. The Marine Park covers an area of 3,413 km² and water depths from less than 15 m to 150 m.

Natural values

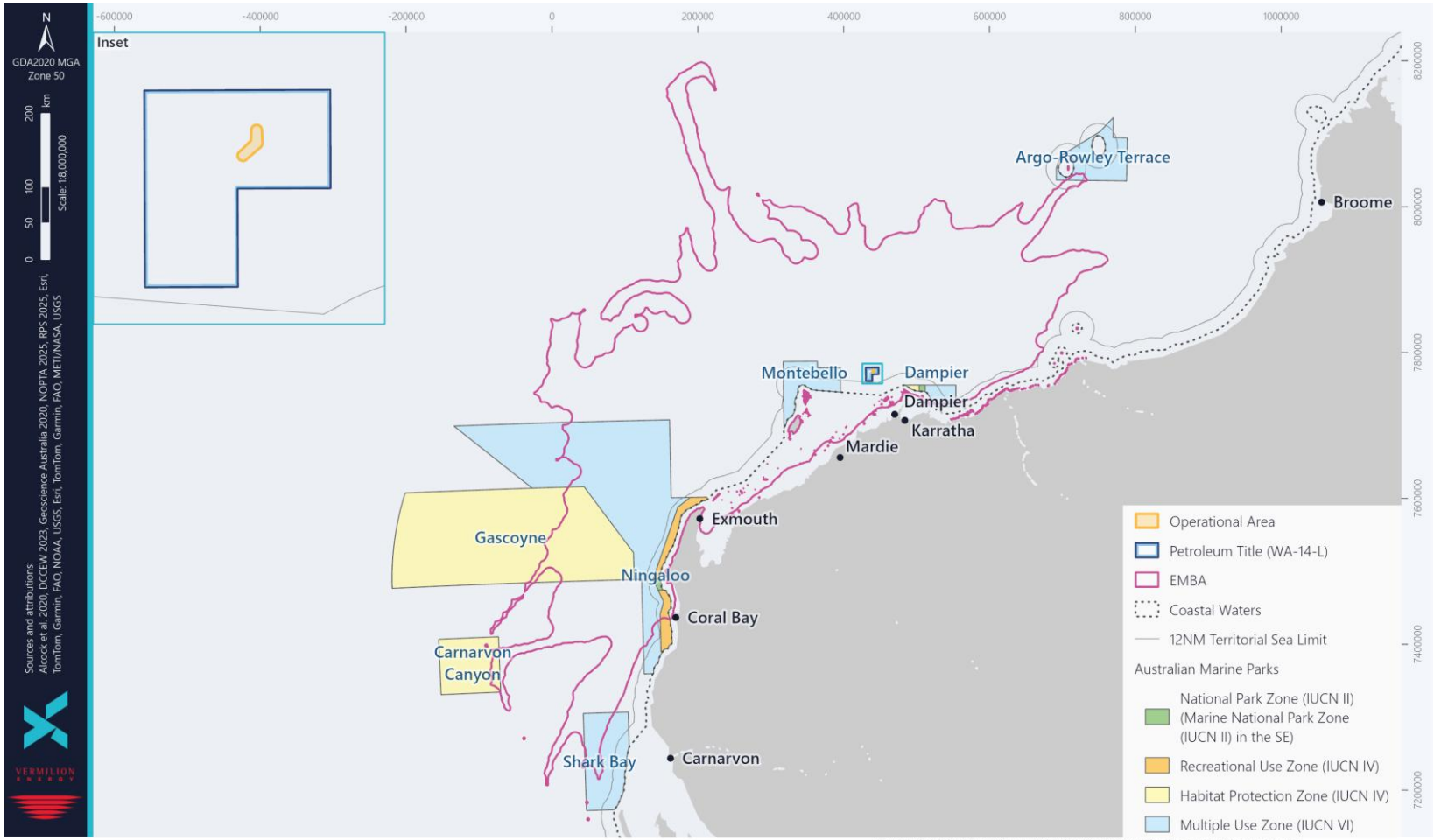
The Marine Park includes examples of ecosystems representative of the NWS Province – a dynamic environment influenced by strong tides, cyclonic storms, long-period swells and internal tides. The

AMP	Area type	Project Areas			Distance and direction from Operational Area
		Operational Area	Hydrocarbon Area	EMBA	
bioregion includes diverse benthic and pelagic fish communities. A key ecological feature of the Marine Park is the ancient coastline at the 125 m depth contour. The Marine Park supports a range of species listed under the EPBC Act. BIAs within the Marine Park include breeding habitat for seabirds, inter-nesting, foraging, mating, and nesting habitat for marine turtles, a migratory pathway for humpback whales and foraging habitat for whale sharks. **Cultural values** The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Pilbara region. Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. As noted in the 'North-west Marine Park Management Plan', there is limited information about the cultural significance of this Marine Park. **Heritage values** The Marine Park contains two known shipwrecks listed under the *Underwater Cultural Heritage Act 2018*: Trial (wrecked in 1622), the earliest known shipwreck in Australian waters and Tanami (unknown date). **Social and economic values** Tourism, commercial fishing, mining and recreation are important activities in the Marine Park (DNP, 2018).					
Ningaloo	Recreational Use Zone (IUCN IV)	-	✓	✓	285 km SW
Description The Ningaloo Marine Park stretches approximately 300 km along the west coast of the Cape Range Peninsula and is adjacent to the WA Ningaloo Marine Park and Gascoyne Marine Park. The Marine Park covers an area of 2435 km² and a water depth range of 30 m to more than 500 m. The Marine Park provides connectivity between deeper offshore waters of the shelf break and coastal waters of the adjacent WA Ningaloo Marine Park. It includes some of the most diverse continental slope habitats in Australia, including the continental slope area between North-West Cape and the Montebello Trough. Canyons in the Marine Park are important for sustaining the nutrient conditions that support the high diversity of Ningaloo Reef. **Natural values** Ecosystems represented in the Marine Park are influenced by interaction of the Leeuwin Current, Leeuwin Undercurrent and the Ningaloo Current. The Marine Park supports a range of species listed under the EPBC Act. BIAs within the Marine Park include breeding and or foraging habitat for seabirds, inter-nesting habitat for marine turtles, a migratory pathway for humpback whales, foraging habitat and migratory pathway for pygmy blue whales, breeding, calving, foraging and nursing habitat for dugong and foraging habitat for whale sharks. **Cultural values** Sea country is valued for Indigenous cultural identity, health and wellbeing. Across Australia, Indigenous people have been sustainably using and managing their sea country for tens of thousands of years. The Gnulli people have responsibilities for sea country in the Marine Park. The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Yamatji region.					

AMP	Area type	Project Areas			Distance and direction from Operational Area
		Operational Area	Hydrocarbon Area	EMBA	
Heritage values • The Marine Park is within the Ningaloo Coast World Heritage Property, meeting world heritage listing criteria vii and x. The area is valued for high terrestrial species endemism, marine species diversity and abundance, and the interconnectedness of large-scale marine, coastal and terrestrial environments. The area connects the limestone karst system and fossil reefs of the ancient Cape Range to the nearshore reef system of Ningaloo Reef, to the continental slope and shelf in Commonwealth waters. • The Ningaloo Coast overlaps the Marine Park, meeting the national heritage listing criteria A, B, C, D, and F. • The Ningaloo Marine Area (Commonwealth waters) meets Commonwealth heritage listing criteria A, B and C. The Ningaloo Marine Area overlaps the Marine Park. • The Marine Park contains more than 15 known shipwrecks listed under the *Underwater Cultural Heritage Act 2018*. **Social and economic values** Tourism and recreation, including fishing, are important activities in the Marine Park (DNP, 2018).					
Shark Bay	Multiple Use Zone (IUCN VI)	-	-	✓	573 km SW
Description The Shark Bay Marine Park is located approximately 60 km offshore of Carnarvon, adjacent to the Shark Bay world heritage property and national heritage place. The Marine Park covers an area of 7,443 km², extending from the WA state water boundary, over a water depth range of 15–220 m. The Marine Park includes one IUCN zone: Multiple Use Zone (IUCN VI). The Shark Bay Marine Park is significant because it contains habitats, species and ecological communities associated with the Central Western Shelf Province and Central Western Transition. The Marine Park provides connectivity between deeper Commonwealth waters and the inshore waters of the Shark Bay world heritage property. **Natural values** The Marine Park includes examples of ecosystems representative of: • Central Western Shelf: a predominantly flat, sandy and low-nutrient area in water depths of 50–100 m, forming a transitional zone between tropical and temperate species • Central Western Transition: characterised by extensive continental slope habitats, diverse topographic features such as terraces, rises and canyons, seasonal and sporadic upwelling, and benthic slope communities comprising tropical and temperate species. Ecosystems within the Marine Park are influenced by the Leeuwin, Ningaloo and Capes currents. The Marine Park supports a range of species, including those listed as threatened, migratory, marine or cetacean under the EPBC Act. Biologically important areas include breeding habitat for seabirds, internesting habitat for marine turtles, and a migratory pathway for humpback whales. The Marine Park and adjacent coastal areas are also important for shallow-water snapper. **Cultural values** Sea country is valued for Indigenous cultural identity, health and wellbeing. The Gnulli and Malgana people have responsibilities for Sea Country in the Marine Park. **Heritage values** No international, Commonwealth or national heritage listings apply to the Marine Park.					

AMP	Area type	Project Areas			Distance and direction from Operational Area
		Operational Area	Hydrocarbon Area	EMBA	
The Marine Park is listed to contain approximately 20 known shipwrecks (Section 3.6.4). **Social and economic values** Tourism, commercial fishing, mining and recreation are important activities in the Marine Park.					

Figure 3-53: Australian Marine Parks within the EMBA



3.6.6 State Marine Protected Areas

The EMBA intersects with 7 WA State marine protected Areas. The Hydrocarbon Area intersects with six marine protected areas. There are no protected marine areas that intersect with the Operational Area. The state AMPs are described in Table 3-15.

Table 3-15: State Marine Protected Areas within the Project Areas

Protected Area Name	Area Type	Project Areas			Distance and direction from Operational Area
		Operational Area	Hydrocarbon Area	EMBA	
Montebello Islands and Barrow Islands (Jointly Managed)	Marine Park Marine Management Area Conservation Park	-	✓	✓	84 km SW
Description The Montebello Islands Marine Park and Barrow Islands Marine Park is located off the north-west coast of WA, ~1,600 km north of Perth, and cover areas of ~583 km^2, 42 km^2 and 1,147 km^2, respectively. **Conservation values** The Montebello/Barrow islands marine conservation reserves have very complex seabed and island topography, resulting in a myriad of different habitats subtidal coral reefs, macroalgal and seagrass communities, subtidal soft-bottom communities, rocky shores and intertidal reef platforms, which support a rich diversity of invertebrates and finfish. The reserves are important breeding areas for several species of marine turtles and seabirds, which use the undisturbed sandy beaches for nesting. Humpback whales migrate through the reserves and dugongs occur in the shallow warm waters (DEC, 2007a).					
Pilbara Islands Nature Reserve (Great Sandy Island, Thevenard Island)	Nature Reserve	-	✓	✓	71 km SW
Thevenard Island and Great Sandy Island Nature Reserves were identified to be within the Hydrocarbon Area and EMBA. No Nature Reserves were identified within the Operational Area. **Description** Located between the Ningaloo Coast World Heritage Area and the Dampier Archipelago, the Pilbara Islands Nature Reserve includes 174 small islands with a combined area of over 130 km^2 and a total coastline of over 500 km. Islands within this management area are characterised by foredunes surrounding a central depression and less than 12 m in elevation. **Conservation values** The islands provide a refuge for threatened and migratory species including the critically endangered eastern curlew, great knot, curlew sandpiper. The islands provide nesting beaches for the green, flatback, hawksbill and loggerhead turtles. Mangrove thickens are found on some of the islands which provide essential habitat for coastal species and shorebirds. **Cultural values** The Nganhurra Thanadri Garrbu Aboriginal Corporation and the Wirrawandi Aboriginal Corporation have native title determinations over parts of the planning area. The area holds significant cultural value to First Nations people. Culturally significant sites, places and species are found within the area.					

Protected Area Name	Area Type	Project Areas			Distance and direction from Operational Area
		Operational Area	Hydrocarbon Area	EMBA	
Customary activities including hunting, ceremonies and sharing of traditional knowledge is practiced in the region. Thevenard Island contains one registered site under the *Aboriginal Heritage Act 1972*, which includes a midden scatter with three baler shell containers. Aboriginal artefacts have been found on some of the islands including a burial site, stone and glass flakes, brunt shell and bone and baler shells. Some of the islands were possibly occupied by First Nations people of the region. **Social and economic values** Visitation to the islands is low and only is by private boat and commercial accommodation is only available at Thevenard Island. Recreational fishing is undertaken around the islands. Thevenard Island previously was utilised as a base for an oil and gas facility but is now being decommissioned (DBCA, 2020).					
Ningaloo and Murion Islands Marine Management area (Jointly Managed)	Marine Park Marine Management Area	-	✓	✓	264 km SW
Description The Ningaloo Marine Park and Muiron Islands Marine Management Area are located off the North-west Cape of WA, ~1,200 km north of Perth, and cover areas of ~2,633 km^2 and 286 km^2, respectively. **Ecological values** Ningaloo Reef is the largest fringing coral reef in Australia. Temperate and tropical currents converge in the Ningaloo region resulting in highly diverse marine life including spectacular coral reefs, abundant fishes and species with special conservation significance such as turtles, whale sharks, dugongs, whales and dolphins. The region has diverse marine communities including mangroves, algae and filter-feeding communities and has high water quality. These values contribute to the Ningaloo Marine Park being regarded as the State's premier marine conservation icon. The Muiron Islands Marine Management Area is also important, containing a very diverse marine environment, with coral reefs, filter-feeding communities and macroalgal beds. In addition, the Islands are important seabird and green turtle nesting areas. **Cultural values** The Ningaloo Reef has a long history of occupancy by aboriginal communities and aboriginal heritage sites. The Jinigudira and Baiyungu people have lived on this region for thousands of years and use coastal areas for fishing, camping and hunting of turtles and dugongs. **Social and economic values** The Ningaloo region has a high number of visitors enjoying the area who come to appreciate nature-based tourism which is brings important economic value to the communities of the area (CALM, 2005).					
Rowley Shoals	Marine Park	-	-	✓	
De**scription** The Rowley Shoals comprise of three reef systems, Mermaid Reef, Clerke Reef and Imperieuse Reef, all 30-40 km apart. These reef systems are located ~300 km west north-west of Broome. **Conservation values** The three coral atolls of the Rowley Shoals Marine Park comprise of shallow lagoons inhabited by diverse corals and abundant marine life, each covering around 80 km2 at the edge of Australia's continental shelf.					

Protected Area Name	Area Type	Project Areas			Distance and direction from Operational Area
		Operational Area	Hydrocarbon Area	EMBA	
Further offshore, the seafloor slopes away to the abyssal plain, some 6,000 m below. Undersea canyons slice the slope; these features are commonly associated with diverse communities of deep-water corals and sponges and create localised upwellings that aggregate pelagic species like tunas and billfish. **Social and economic values** Due to its remote location, the Rowley Shoals has low numbers of visitors with most arriving aboard licenced charter boats. Popular activities in the area include scuba diving, recreational fishing, and boating (DEC, 2007b).					

3.6.7 Wetlands of International Importance (Ramsar Wetlands)

There are no Ramsar wetlands of international importance that intersect the EMBA, Hydrocarbon Area or Operational Area.

3.6.8 Nationally Important Wetlands

The EMBA intersects two Nationally Important Wetlands. The Operational Area and Hydrocarbon Area do not intersect any Nationally Important Wetlands. Nationally Important Wetlands described in Table 3-16 and displayed in Figure 3-54.

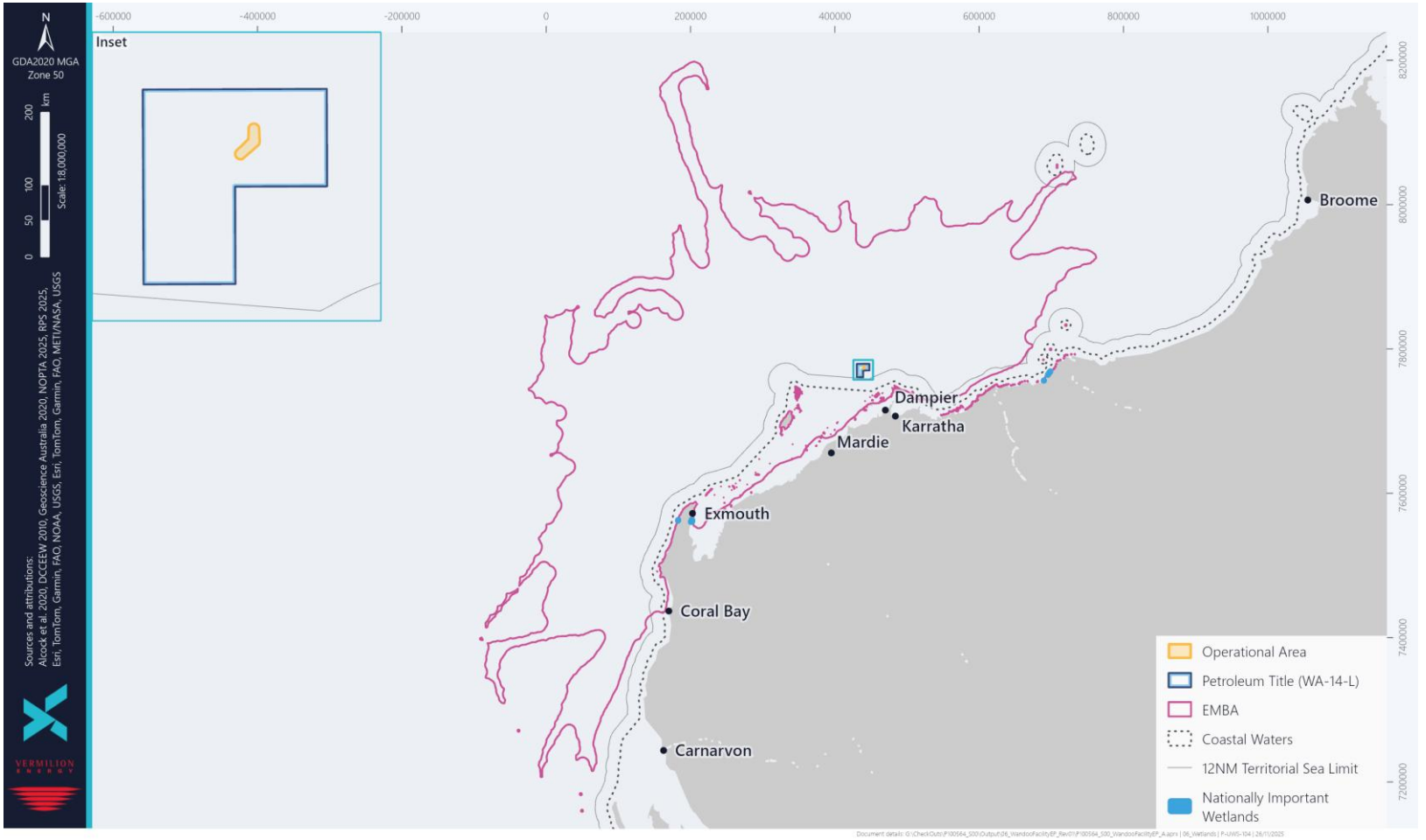
Table 3-16: Nationally Important Wetlands within the Project Areas

Nationally Important Wetland	Project Areas			Distance and direction from Operational Area
	Operational Area	Hydrocarbon Area	EMBA	
Cape Range Subterranean Waterways	-	-	✓	297 km SW
The Cape Range Subterranean Waterways (DCCEEW, 2025d) are located within the Cape Range karst system near Exmouth on the north-west coast of Western Australia. This Ramsar-listed wetland comprises a network of groundwater-fed caves, fissures, and anchialine pools within limestone formations. It is internationally significant for its unique subterranean aquatic ecosystems and high level of endemism among stygofauna (aquatic organisms living in groundwater). Ecosystem components and processes: • **Climate:** Arid tropical climate with hot summers, mild winters, and low annual rainfall. Subject to seasonal monsoonal influence and occasional cyclones. • **Geomorphic setting:** Karstic limestone system formed by uplifted marine sediments. Extensive cave networks and fissures provide habitat for groundwater-dependent ecosystems. • **Hydrology:** Groundwater flows through interconnected subterranean channels and pools. Water levels influenced by recharge from rainfall and surface infiltration. Salinity varies from fresh to brackish in anchialine pools. • **Water quality:** Generally stable temperature and chemistry within caves; low nutrient concentrations. Vulnerable to contamination from surface activities. • **Vegetation:** Limited to cave entrances and sinkholes—includes halophytic shrubs and sparse coastal vegetation. Subterranean habitats lack photosynthetic plants.				

Nationally Important Wetland	Project Areas			Distance and direction from Operational Area
	Operational Area	Hydrocarbon Area	EMBA	
• **Aquatic biota:** High diversity of stygofauna including crustaceans (copepods, amphipods), worms, and other invertebrates. Many species are endemic and adapted to low-light, low-nutrient conditions. • **Fish:** Presence of specialised cave fish species in anchialine pools. • **Other fauna:** Bats roost in caves; terrestrial fauna occasionally use cave entrances. • **Connectivity:** Linked to Exmouth groundwater system, supporting ecological and cultural values. Ecosystem services: • **Provisioning services – Groundwater:** Supports Exmouth town water supply and other uses under strict allocation limits. • **Regulating services – Water quality maintenance:** Subterranean systems contribute to natural filtration and aquifer recharge. • **Supporting services – Biodiversity:** Provides habitat for highly specialised and endemic stygofauna, contributing to global subterranean biodiversity. • **Supporting services – Physical habitat:** Anchialine pools and caves offer unique ecological niches. • **Cultural services – Scientific and educational:** Globally significant for research on karst hydrology, groundwater ecology, and evolutionary biology. • **Cultural services – Heritage and identity:** Caves and pools hold cultural significance for Traditional Owners and are associated with stories and heritage sites. • **Cultural services – Recreation:** Limited but includes cave exploration and eco-tourism under controlled conditions.				
Leslie (Port Hedland) Saltfields System	-	-	✓	240 km E
The Leslie Saltfields System (DCCEEW, 2025e) is located near Port Hedland on the Pilbara coast of Western Australia. It comprises a network of artificial salt evaporation ponds, levees, and adjacent natural tidal flats and mangrove fringes. The system is regionally significant for supporting large numbers of migratory shorebirds and waterbirds, despite being an industrially modified environment. It forms part of the broader Eighty Mile Beach and Port Hedland wetland complex, recognised under international agreements for bird conservation. Ecosystem components and processes: • **Climate**: Arid tropical climate with high temperatures and low annual rainfall. Influenced by monsoonal patterns and occasional tropical cyclones. • **Geomorphic setting**: Coastal supratidal flats and intertidal mudflats modified for salt production. Includes man-made evaporation ponds, levee banks, and intake channels adjacent to natural mangrove-lined creeks. • **Tides and currents**: Macro-tidal environment with tidal ranges exceeding 5 m. Strong tidal flushing in intake zones and mudflats; evaporation ponds are hydrologically controlled. • **Water quality**: Hypersaline conditions in evaporation ponds, with salinity gradients from seawater intake to crystalliser ponds. Natural flats experience seasonal turbidity and nutrient pulses. • **Vegetation:** Sparse halophytic vegetation on levees and supratidal flats; mangrove patches dominated by Avicennia marina along natural creeks. • **Aquatic biota:** Microbial mats and algal communities in hypersaline ponds; benthic invertebrates in mudflats supporting shorebird foraging.				

Nationally Important Wetland	Project Areas			Distance and direction from Operational Area
	Operational Area	Hydrocarbon Area	EMBA	
• **Birds:** Over 50 species of waterbirds and shorebirds recorded, including internationally significant populations of migratory waders (e.g., Eastern Curlew, Great Knot, Broad-billed Sandpiper). Regularly supports >1% of the population for several species under international treaties. • **Fish and invertebrates:** Limited diversity in hypersaline ponds; natural tidal creeks support estuarine fish and crustaceans. • **Other fauna:** Occasional use by marine turtles in adjacent tidal areas; no significant mammal populations. Ecosystem services: • **Provisioning services – Salt production:** Primary economic function of the site through industrial salt harvesting. • **Regulating services – Shoreline stabilisation**: Mangroves and levees reduce erosion and buffer storm surges. • **Supporting services – Habitat for migratory birds:** Critical roosting and feeding habitat for shorebirds listed under international agreements (JAMBA, CAMBA, ROKAMBA). • **Supporting services – Biodiversity:** Maintains ecological functions in a semi-arid coastal zone, supporting specialised halophytic and microbial communities. • **Supporting services – Physical habitat:** Provides extensive roosting areas for large flocks of shorebirds during high tide. • **Cultural services – Scientific and educational:** Important for ornithological research and monitoring of migratory bird populations. • **Cultural services – Conservation significance:** Part of a recognised Key Biodiversity Area and contributes to Australia's obligations under international migratory bird treaties.				

Figure 3-54: Nationally important wetlands within the EMBA



3.6.9 Key Ecological Features

The EMBA intersects 7 Key Ecological Features (KEFs), and the Hydrocarbon Area intersects 6 KEFs. The Operational Area does not intersect any KEFs. KEFS are described in Table 3-17 and displayed in Figure 3-55.

Table 3-17: KEFs within the Project Areas

KEF	Project Areas			Distance and direction from Operational Area
	Operational Area	Hydrocarbon Area	EMBA	
Ancient coastline at 125 m depth contour	-	✓	✓	61 km NW
National and/or regional importance The ancient coastline at 125 m depth contour is defined as a key ecological feature as it is a unique seafloor feature with ecological properties of regional significance. **Location** The shelf of the NWMR contains several terraces and steps which reflect changes in sea level that occurred over the last 100,000 years. The most prominent of these features occurs as an escarpment along the NWS and Sahul Shelf at a depth of 125 m. The spatial boundary of this KEF is defined by depth range 115–135 m in the NWS Province and NWS Transition IMCRA provincial bioregions. **Description and values** The ancient submerged coastline provides areas of hard substrate and therefore may provide sites for higher diversity and enhanced species richness relative to surrounding areas of predominantly soft sediment. Little is known about fauna associated with the hard substrate of the escarpment, but it is likely to include sponges, corals, crinoids, molluscs, echinoderms and other benthic invertebrates representative of hard substrate fauna in the NWS bioregion. The escarpment may also facilitate increased availability of nutrients off the Pilbara by interacting with internal waves and enhancing vertical mixing of water layers. Enhanced productivity associated with the sessile communities and increased nutrient availability may attract larger marine life such as whale sharks (*Rhincodon typus*) and large pelagic fish. Humpback whales (*Megaptera novaeangliae*) appear to migrate along the ancient coastline, using it as a guide to move through the region (DCCEEW, 2024e).				
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	-	✓	✓	239 km SW
National and/or regional importance The Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula are defined as a key ecological feature as they are unique seafloor features with ecological properties of regional significance, which apply to both the benthic and pelagic habitats within the feature. **Location** The largest canyons on the slope linking the Cuvier Abyssal Plain and Cape Range Peninsula are the Cape Range Canyon and Cloates Canyon which are located along the southerly edge of Exmouth Plateau adjacent to Ningaloo Reef. The canyons are unusual because their heads are close to the coast of North-West Cape. **Description and values** The canyons on the slope of the Cuvier Abyssal Plain and Cape Range Peninsula are connected to the Commonwealth waters adjacent to Ningaloo Reef and may also have connections to Exmouth Plateau. The canyons are thought to interact with the Leeuwin Current to produce eddies inside the heads of				

KEF	Project Areas			Distance and direction from Operational Area
	Operational Area	Hydrocarbon Area	EMBA	
the canyons, resulting in waters from the Antarctic intermediate water mass being drawn into shallower depths and onto the shelf; these waters are cooler and richer in nutrients and strong internal tides may also aid upwelling at the canyon heads. The narrow shelf width (approx. 10 km) near the canyons facilitates nutrient upwelling and this nutrient-rich water interacts with the Leeuwin Current at the canyon heads. Aggregations of whale sharks, manta rays, humpback whales, sea snakes, sharks, large predatory fish and seabirds are known to occur in this area and are related to productivity. The canyons, Exmouth Plateau and Commonwealth waters adjacent to Ningaloo Reef operate as a system to create the conditions for enhanced productivity seen in this region (DCCEEW, 2024f).				
Commonwealth waters adjacent to Ningaloo Reef	-	✓	✓	284 km SW
National and/or regional importance The Commonwealth waters adjacent to Ningaloo Reef are defined as a KEF for their high productivity and aggregations of marine life, which apply to both the benthic and pelagic habitats. **Location** Ningaloo Reef extends >260 km along Cape Range Peninsula with a landward lagoon 0.2–6.0 km wide. Seaward of the reef crest, the reef drops gently to depths of 8–10 m; the waters reach 100 m depth, 5–6 km beyond the reef edge. Commonwealth waters over the narrow shelf (10 km at its narrowest) and shelf break are contiguous with Ningaloo Reef and connected via oceanographic and trophic cycling. **Description and values** Ningaloo reef is globally significant as the only extensive coral reef in the world that fringes the west coast of a continent; it is also globally significant as a seasonal aggregation site for whale sharks. The Commonwealth waters adjacent to Ningaloo Reef and associated canyons and plateau are interconnected and support the high productivity and species richness of Ningaloo Reef. The Leeuwin and Ningaloo currents interact on the seaward side of the reef, leading to areas of enhanced productivity which support aggregations and migration pathways of whale sharks (Rhincodon typus), manta rays (*Manta alfredi*), humpback whales (*Megaptera novaeangliae*), sea snakes, sharks, large predatory fish and seabirds. Detrital input from phytoplankton production in surface waters and from higher-trophic consumers cycles back to the deeper waters of the shelf and slope. Deepwater biodiversity includes fish, molluscs, sponges, soft corals and gorgonians. Some of these sponge and filter-feeding communities appear to be significantly different to those of the Dampier Archipelago and Abrolhos Islands, indicating that the Commonwealth waters of Ningaloo Marine Park have some areas of potentially high and unique sponge biodiversity. The outer reef is marked by a well-developed spur and groove system of fingers of coral formations penetrating the ocean with coral sand channels in between. The spurs support coral growth, while the grooves experience strong scouring surges and tidal run-off and have little coral growth (DCCEEW, 2024g).				
Continental Slope Demersal Fish Communities	-	✓	✓	111 km NW
National and/or regional importance This species assemblage is recognised as a KEF because of its biodiversity values, including high levels of endemism. **Location** This KEF is defined as the area of slope found in the North-West Province and Timor Province provincial bioregions, at the depth ranges of 220–500 m and 750–1,000 m.				

KEF	Project Areas			Distance and direction from Operational Area
	Operational Area	Hydrocarbon Area	EMBA	
Description and values The diversity of demersal fish assemblages on the continental slope in the Timor Province, the North-West Transition and the North-West Province is high compared to elsewhere along the Australian continental slope. The continental slope between North-West Cape and the Montebello Trough has >500 fish species, 76 of which are endemic, which makes it the most diverse slope bioregion in Australia. The slope of the Timor Province and the North-West Transition also contains >500 species of demersal fish of which 64 are considered endemic. The Timor Province and North-West Transition bioregions are the second-richest areas for demersal fish across the entire continental slope. The demersal fish species occupy two distinct demersal community types (biomes) associated with the upper slope (water depth of 225–500 m) and the mid-slope (750–1,000 m). Although poorly known, it is suggested that the demersal-slope communities rely on bacteria and detritus-based systems comprised of infauna and epifauna, which in turn become prey for a range of teleost fish, molluscs and crustaceans. Higher-order consumers may include carnivorous fish, deepwater sharks, large squid and toothed whales. Pelagic production is phytoplankton based, with hot spots around oceanic reefs and islands. Bacteria and fauna present on the continental slope are the basis of the food web for demersal fish and higher-order consumers in this system. Loss of benthic habitat along the continental slope at depths known to support demersal fish communities may lead to a decline in species richness, diversity and endemism associated with this feature (DCCEEW, 2024h).				
Exmouth Plateau	-	✓	✓	220 km NW
National and/or regional importance The Exmouth Plateau is defined as KEF as it is a unique seafloor feature with ecological properties of regional significance, which apply to both the benthic and pelagic habitats. **Location** The Exmouth Plateau is located in the North-West Province and covers an area of 49,310 km² in water depths of 800–4,000 m. **Description and values** Although the seascapes of this plateau are not unique, it is believed that the large size of Exmouth Plateau and its expansive surface may modify deep-water flow and be associated with the generation of internal tides; both these features may contribute to the upwelling of deeper, nutrient-rich waters closer to the surface. The topography of the plateau (with valleys and channels), in addition to potentially constituting a range of benthic environments, may provide conduits for the movement of sediment and other material from the plateau surface through the deeper slope to the abyss. The Exmouth Plateau is generally an area of low habitat heterogeneity; however, it is likely to be an important area of biodiversity as it provides an extended area offshore for communities adapted to depths of around 1,000 m. Sediments on the plateau suggest that biological communities include scavengers, benthic filter feeders and epifauna. The plateau's surface is rough and undulating; the northern margin is steep and intersected by large canyons (e.g. Montebello and Swan canyons), the western margin is moderately steep and smooth, and the southern margin is gently sloping and virtually free of canyons. Satellite observations suggest that productivity is enhanced along the northern and southern boundaries of the plateau and along the shelf edge, which in turn suggests that the plateau is a significant contributor to the productivity of the region. Whaling records from the 19th century suggest that the Exmouth Plateau may have supported large populations of sperm whales (Physeter macrocephalus) (DCCEEW, 2024i).				

KEF	Project Areas			Distance and direction from Operational Area
	Operational Area	Hydrocarbon Area	EMBA	
Glomar Shoals	-	✓	✓	44 km NE

National and/or regional importance

The Glomar shoals are defined as a KEF for their high productivity and aggregations of marine life.

Location

The Glomar Shoals are a submerged littoral feature located approx. 150 km north of Dampier on the Rowley Shelf at depths of 33–77 m.

Description and values

While the biodiversity associated with the Glomar Shoals has not been studied, the shoals are known to be an important area for a number of commercial and recreational fish species such as rankin cod (*Epinephelus multiinotatus*), brown striped snapper (Lutjanus vitta), red emperor (*Lutjanus sebae*), crimson snapper (*Lutjanus erythropterus*), bream (Sparidae) and yellow-spotted triggerfish (*Pseudobalistes fuscus*). These species have recorded high catch rates associated with the Glomar Shoals, indicating that the shoals are likely to be an area of high productivity.

The shoals consist of a high percentage of marine-derived sediments with high carbonate content and gravels of weathered coralline algae and shells. The area's higher concentrations of coarse material in comparison to surrounding areas are indicative of a high-energy environment subject to strong sea-floor currents. Cyclones are also frequent in this area and stimulate periodic bursts of productivity due to increased vertical mixing (DCCEEW, 2024j).

Mermaid Reef and Commonwealth waters surrounding Rowley Shoals	-	-	✓	363 km NE

National and/or regional importance

Mermaid Reef and Commonwealth waters surrounding Rowley Shoals is defined as a KEF for its enhanced productivity and high species richness, that apply to both the benthic and pelagic habitats.

Location

The Rowley Shoals are a collection of three atoll reefs (Clerke, Imperieuse and Mermaid) which are located approx. 300 km northwest of Broome. The KEF encompasses Mermaid Reef MP as well as waters from 3–6 nm surrounding Clerke and Imperieuse reefs.

Mermaid Reef lies approx. 29 km north of Clerke and Imperieuse reefs and is totally submerged at high tide. Mermaid Reef falls under Commonwealth jurisdiction; while the Clerke and Imperieuse reefs are within the Rowley Shoals Marine Park and under State jurisdiction.

Description and values

Mermaid Reef and Commonwealth waters surrounding Rowley Shoals are regionally important in supporting high species richness, higher productivity and aggregations of marine life associated with the adjoining reefs. The Rowley Shoals contain 214 coral species, approx. 530 species of fish, 264 species of molluscs and 82 species of echinoderms; no sea snakes are known to occur.

The reefs provide a distinctive biophysical environment in the region as there are few offshore reefs in the northwest. They have steep and distinct reef slopes and associated fish communities Enhanced productivity is thought to be facilitated by the breaking of internal waves in the waters surrounding the reefs, causing mixing and resuspension of nutrients from water depths of 500–700 m into the photic zone. The steep changes in slope around the reef also attract a range of migratory pelagic species including dolphins, tuna, billfish and sharks.

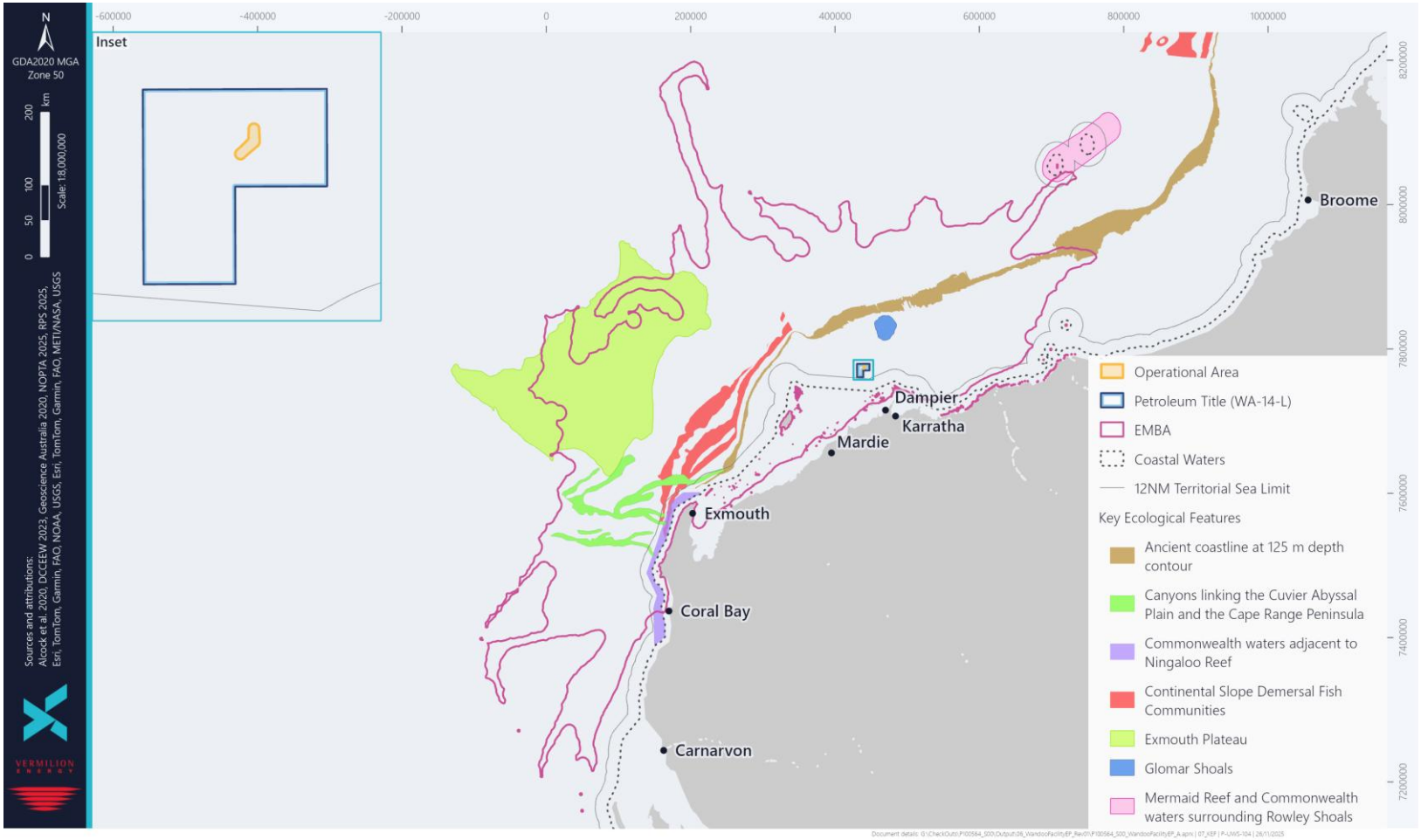
Rowley Shoals' reefs are different from other reefs in the chain of reefs on the outer shelf of the North-west Marine Region, both in structure and genetic diversity. There is little connectivity between Rowley Shoals and other outer-shelf reefs. Both coral communities and fish assemblages of Rowley Shoals differ from similar habitats in eastern Australia. In evolutionary terms, the reefs may play a role in

KEF	Project Areas			Distance and direction from Operational Area
	Operational Area	Hydrocarbon Area	EMBA	
supplying coral and fish larvae to reefs further south via the southward flowing Indonesian Throughflow.				

3.6.10 Threatened Ecological Communities

The EPBC Act provides for the listing of Threatened Ecological Communities (TECs), and these are considered as Matters of National Environmental Significance (MNES) under the EPBC Act. There are no coastal EPBC listed TECs that occur within the EMBA, Hydrocarbon Area or Operational Area.

Figure 3-55: Key Ecological Features within the EMBA



3.7 First Nations

Table 3-1 identifies that First Nations values are receptors within the Hydrocarbon Area and EMBA that may be relevant to aspects of the activities. The descriptions below provide sufficient details to assess all impacts and risks to First Nations. No First Nations receptors are identified within the Operational Area.

3.7.1 Methodology to Identify Cultural Values and Sensitivities

The definition of environment in the OPGGS(E)R includes the people and communities, heritage value of places, and their social, economic, and cultural features. For First Nations peoples, this includes cultural heritage and Sea Country values which hold a spiritual and cultural connection that may be affected by the Petroleum Activity.

VOGA recognises First Nations groups and their spiritual and cultural connection to the environment. Identification of First Nations cultural values and sensitivities was developed through consultation with First Nations groups with connection to Sea Country in the Operational Area and EMBA (refer to Section 10 for VOGA's consultation process and results).

3.7.2 Recognition of First Nations Groups

First Nations groups and Traditional Owners and connection to Country is recognised through contemporary legislation such as the Commonwealth *Native Title Act 1993* as well as various State laws such as the WA *Aboriginal Heritage Act 1972* (WA).

A review of the statutory laws, rights and recognition conferred to First Nations peoples relevant to the EP is summarised in the below sections.

3.7.3 Native Title

Native Title is the formal recognition that Aboriginal and Torres Strait Islander people continue to have rights to land and waters according to their traditional laws and customs.

The Commonwealth *Native Title Act 1993* has the following objectives:

- Provide for the recognition and protection of Native Title
- Establish a mechanism for determining claims to Native Title
- Establish ways in which future dealings affecting Native Title (future acts) may proceed
- Provide for the validation of past acts and intermediate period acts invalidated because of the existence of native title.

Native Title determination requires First Nation's people to establish and prove an unbroken and current connection to lands and waters and cultural practices from the time of European settlement.

Native Title can be granted with exclusive or non-exclusive rights to lands and waters. Exclusive rights can only be granted over limited parts of Australia, including areas already held by or for

the use of Indigenous Australians, or unallocated/vacant Crown land. Non-exclusive native title can include, for example, the right to live on or hunt in an area co-existing with the rights of other land users. In tidal and sea areas, only non-exclusive native title can be recognised. Exclusive Native Title is considered inconsistent with other common law rights regarding marine access and navigation (NNTT, 2010).

The *Native Title Act 1993* appoints Representative Aboriginal/Torres Strait Islander Bodies (RATSIB) as regional organisations with prescribed functions relating to facilitation and assistance, certification, dispute resolution, notifications and agreement making (NNTT, 2024). The EMBA overlaps the following RATSIB Areas:

- Kimberley: Kimberley Land Council Aboriginal Corporation
- Pilbara: Yamatji Marlpa Aboriginal Corporation
- Gascoyne-Midwest: Yamatji Marlpa Aboriginal Corporation.

The Federal Court of Australia first recognised Native Title over the sea for the Traditional Owners of Croker Island in Arnhem Land in 1998 (Tribunal File No. DCD 1998/001). Since the Croker Islands Seas Native Title determination, native title in Sea Country has been recognised along Australia's coastline through numerous claims and determinations under the *Native Title Act 1993*.

The First Nations groups identified as overlapping with the EMBA, or coastally adjacent, have been identified and discussed in Table 3-18 and Figure 3-56. These are the First Nation groups that were identified as relevant for consultation (Section 10).

3.7.4 Indigenous Protected Areas

Indigenous Protected Areas (IPAs) are areas of land and sea managed by Indigenous groups as protected areas for biodiversity conservation through voluntary agreements with the Australian Government. IPAs are an essential component of Australia's National Reserve System, which is the network of formally recognised parks, reserves and protected areas across Australia. No IPAs are located in the EMBA, Hydrocarbon Area or Operational Area.

3.7.5 Aboriginal Cultural Heritage

The *Aboriginal Heritage Act 1972* (WA) was amended and reinstated in 2023. The Act aims to ensure recognition, protection and preservation to all Aboriginal cultural heritage (including sites and objects) within WA. It is an offence to excavate, destroy, damage, conceal or in any way alter Aboriginal heritage under s.17 of the Act.

The WA Aboriginal Cultural Heritage Inquiry System (ACHIS) was searched for the Operational Area, Hydrocarbon Area and the EMBA. There are no registered Aboriginal Cultural Heritage sites within the Operational Area. There are 35 and 98 Aboriginal Cultural Heritage registered sites present within the Hydrocarbon Area and EMBA, respectively. However, none of these sites will be disturbed by planned activities. The closest sites to the Operational Area are located on Rosemary Island, approximately 35 km from the Operational Area. VOGA have consulted with First Nations groups within the EMBA and no feedback or concerns about impacts to specific Aboriginal Heritage sites were raised. The full results of the ACHIS searches are presented in Appendix E.

Figure 3-56: Native Title determination areas within and coastally adjacent to the EMBA

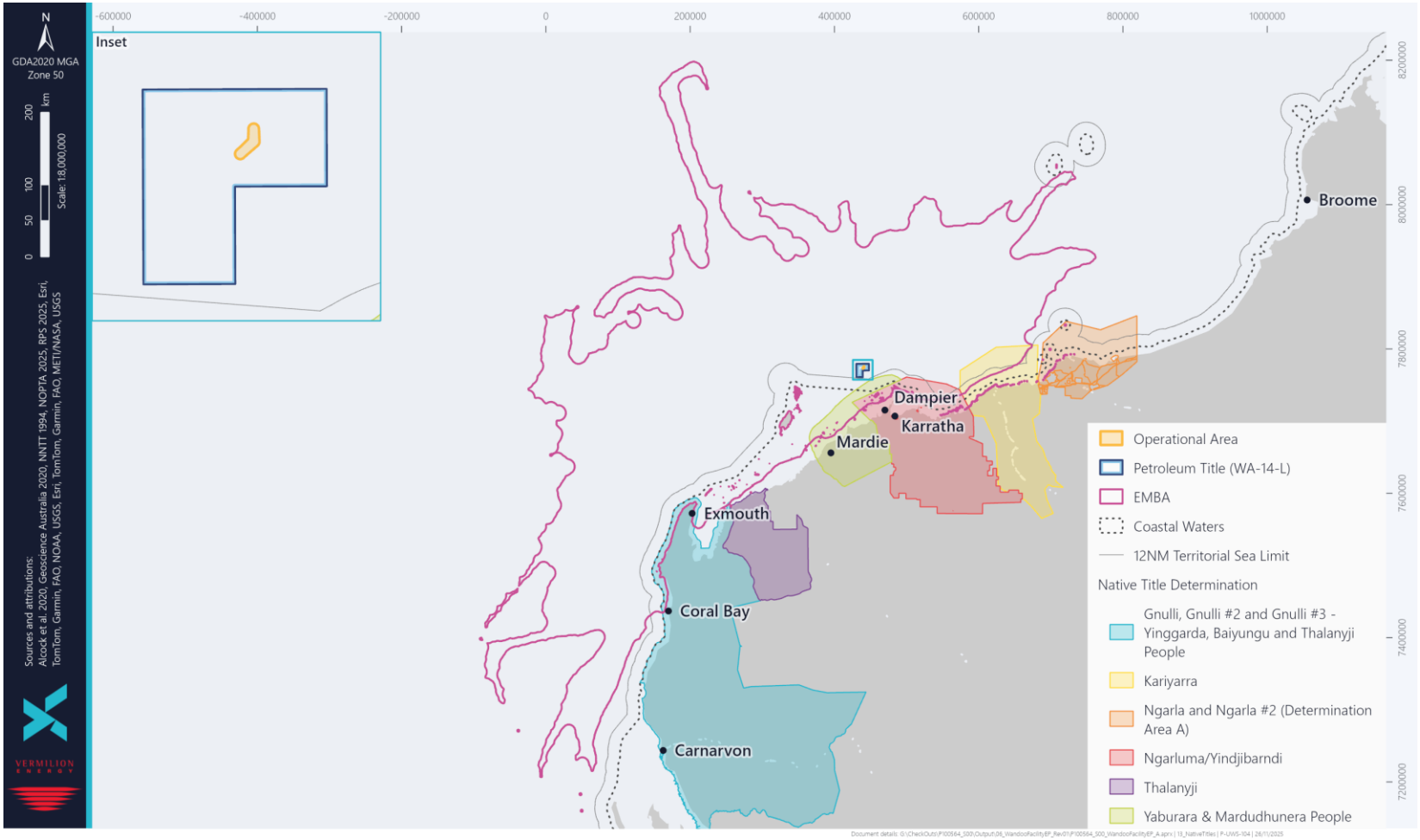


Table 3-18: Native Title Determination areas within and coastally adjacent to the EMBA

Native Title Tribunal ID	Native Title Party	Prescribed Body Corporate	Description	EMBA overlap	Coastally adjacent
WCD2005/001	Ngarluma/ Yindjibarndi	Yindjibarndi Aboriginal Corporation RNTBC	The Ngarluma/Yindjibarndi Determination Area overlaps the city of Karratha, shire of Ashburton and town of Port Hedland. It contains several protected areas both onshore and offshore including Millstream Chichester National Park and parts of Murgaroona Range Nature Reserve and Dampier Marine Park.	Yes	Yes
WCD2015/007	Ngarluma People	Ngarluma Aboriginal Corporation	The Ngarluma People native title claim overlaps the EMBA, which the Ngarluma Aboriginal Corporation is the Registered Native Title Prescribed Body Corporate.	Yes	Yes
WCD2018/006	Yaburara & Mardudhunera People	Wirrawandi Aboriginal Corporation	The Yaburara and Mardudhunera People determination area is west of Karratha to Mardie extending offshore east of Barrow Island and west and north of the Dampier archipelago.	Yes	Yes
WCD2019/016	Gnulli, Gnulli #2 and Gnulli #3 - Yinggarda, Baiyungu and Thalanyji People	Nganhurra Thanardi Garrbu Aboriginal Corporation, Yinggarda Aboriginal Corporation	The Gnulli, Gnulli #2 and Gnulli #3 – Yinggarda, Baiyungu and Thalanyji People determination area is located north of Shark Bay along the coast to Exmouth encompassing the North-West Cape, including Learmonth and coastal waters of the Exmouth Gulf past Tent Island, and overlapping Ningaloo Marine Park (Section 3.6.4).	Yes	Yes
WCD2008/003	Thalanyji People	Buurabalayji Thalanyji Aboriginal Corporation RNTBC	The Thalanyji native title claim does not overlap the EMBA. The claim is coastally adjacent to the EMBA, for which BTAC is the Registered Native Title Body Corporate.	No	Yes
WCD2018/015	Kariyarra People	Kariyarra Aboriginal Corporation RNTBC	The Kariyarra native title claim does not overlap the EMBA. The claim is coastally adjacent to the EMBA, for which the Kariyarra Aboriginal Corporation is the Registered Native Title Prescribed Body Corporate.	No	Yes

Native Title Tribunal ID	Native Title Party	Prescribed Body Corporate	Description	EMBA overlap	Coastally adjacent
WCD2007/003	Ngarla and Ngarla #2 (Determination Area A)	Wanparta Aboriginal Corporation RNTBC	The Ngarla and Ngarla #2 (Determination Area 2) determined native title claim does not overlap the EMBA. The determined native title claim is coastally adjacent to the EMBA, which the Wanparta Aboriginal Corporation is the Registered Native Title Prescribed Body Corporate.	No	Yes

3.7.6 Cultural Values and Sensitivities

3.7.6.1 Sea Country

First Nations people are the oldest surviving culture in the world and have been sustainably using and managing Sea Country for over 60,000 years (AIATSIS, 2026), and in some cases before rising sea levels created marine environments (Smyth, 2007). 'Country' is the term often used by First Nations people to describe the lands, waterways, and seas to which they are connected. The term contains complex ideas about law, place, custom, language, spiritual belief, cultural practice, material sustenance, family, and identity (AIATSIS, 2026). Archaeologists have confirmed that First Nations people have lived on Australian lands including now submerged Sea Country (also known as Saltwater Country), for tens of thousands of years and at a time when the sea level was 100 m lower than present times. Sea levels began to rise approximately 18,000 years ago, flooding the coastal plain and forcing coastal dwellers to move further inland (Smyth, 2007).

Country is a cultural landscape which includes both tangible values (i.e. cultural heritage sites) and intangible values (i.e. Creation stories and cultural practices). First Nations cultural concepts are directly connected with Country. Country describes all aspects of place, environment, spirituality, law and identity. Values of Country differ between First Nations groups, and not all First Nations groups and communities in Australia hold the same belief systems or spirituality (AIATSIS, 2026). Differences can sometimes be attributed to aspects of post-colonialism such as dispossession, genocide and restrictions on cultural practices (Tatz, 1991).

Due to the varied cultures and histories of First Nations groups across Australia and various degrees of dispossession, removal from Country, loss of connection and continuation of culture, the responses of First Nations communities to caring for Country can vary widely. As a result, a varied approach to managing cultural (both tangible and intangible) values is required.

A 'cultural landscape' refers to pre-colonial and contemporary interactions between humans and the physical environment including non-human animals, plants, physical structures, ancestors, song lines, trade routes and other significant cultural connections to Country. Cultural landscapes are reflections of how First Nations people engage with Country, intrinsically connecting the past and the present to people, stories and history (McConnel, et al., 2021).

Sea Country is Country that extends into the ocean. Smyth and Isherwood (2016) describe Sea Country as all estuaries, beaches, bays, and marine areas collectively, within a traditional estate. Sea Country contains evidence of the ancient mystical events by which all geographic features, animals, plants and people were created. Sea Country contains sacred sites and tracks (or 'Songlines') along which mythological beings travelled during the creation period (or 'Dreamtime') (Smyth and Isherwood, 2016). The sea, like the land, is integral to the identity of First Nations groups. Connection to Sea Country is accompanied by a complexity of cultural rights and responsibilities. Coastal areas traditionally were amongst the most densely populated areas due to the abundance of resources available. Formal recognition of Sea Country rights is significantly slower compared to land rights. This could be for a range of reasons including conflicting perspectives and opinions on traditional custodianship of land and how far it extends (Smyth and Isherwood, 2016).

Sea County extends to include submerged cultural landscapes which are culturally significant to First Nations people, as they contain history of First Nations occupation and cultural connections

to the now submerged continental shelf. At the last glacial maximum, the sea levels were approximately 125 m below the current sea level. Over time, sea levels rose which inundated approximately 2 million km^2 of the Australian continental shelf. This submerged cultural heritage sites spanning back to the first arrival of First Nations people to Australia approximately 65,000 years ago (O'Leary et al., 2020; Benjamin et al., 2023).

The first tangible evidence for human occupation of Australia's submerged landscape was reported by Benjamin et al. (2023), who located stone tool artefacts within the waters of Cape Bruguieres in Dampier Archipelago (Murujuga). The shallow site (2.4 m below sea level) is located within what would have been a shallow swale (now known as Cape Bruguieres channel), located between two low relief rocky hills (now Middle and North Gidley Islands). The shallow waters of the subtidal channel contained 270 artefacts for a range of different purposes. A second site which contained stone artefacts was located in Flying Foam Passage, which was significantly deeper than the Cape Bruguieres site at 14 m below sea level. This site was associated with a seabed depression which was possibly a submerged water hole. These submerged features are known to have an intangible connection passed down by oral traditions by the Ngarda-Ngarli (which is a collective term used for Yabuarra, Marthudunera, Ngarluma, Tindjibarndi and Wong-Goo-Tt-Oo people), who recognise these features as part of a known Songline (Benjamin et al., 2023).

A study using 3D seismic datasets on bathymetry data on the mid to outer shelf regions in proximity to Barrow Island showed a highly complex geomorphically mature coastal landscape which was preserved at depths of 70-75 m below sea level, revealing coastal barrier dunes, lagoonal systems, tidal flats, and estuarine channels. The coastal landforms are dated to the Marine Isotope Stage 3 at 57,000 to 29,000 years ago, which corresponds with the known onset of human occupation at Barrow Island and the wider Carnarvon bioregion, adjacent to the Pilbara region (O'Leary et al., 2020).

These submerged Sea Country environments would have provided abundant resources and areas for human occupation prior to the inundation of the continental shelf. This is supported through evidence from oral stories dating back to more than 7,000 years ago which were passed down through Australian Aboriginals, telling of a time that the former coastline of Mainland Australia was inundated by rising sea levels (Nunn and Reid, 2016).

During consultation with First Nations groups, feedback on cultural values and interests of First Nations groups and individuals that are within or adjacent to the EMBA have been identified in Table 3-19Table 3-19. Cultural values and interests identified in public literature relevant to the First Nations groups within or adjacent to the EMBA are listed in Table 3-20. VOGA will continue to consult with First Nations groups to further identify potential cultural values and interests within and surrounding the EMBA, as described in Section 10.

Table 3-19: Feedback received via consultation to inform values and interests for First Nations existing environment description

Relevant First Nation Group/ individuals	Description of value/interest	Potential for overlap	
		Operational Area	EMBA
Kariyarra Aboriginal Corporation	Value: On Country access – visiting offshore 'Kariyarra Island' at low tide. Has cultural significance to the Kariyarra people for intergenerational knowledge transfer and is a place of cultural importance.	No	Yes
	Value: Cultural obligations to care for Kariyarra Country.	Yes	Yes
	Feature: Tangible cultural heritage (sites) with engravings on the coast, considered fragile.	No	Yes
	Interest: Co-protecting Kariyarra country in the event of a hydrocarbon spill. A ranger program is being developed to address potential environmental impacts of offshore operations.	No	Yes
Ngarluma Aboriginal Corporation	Value: Strong connection to tangible cultural heritage, system, and cultural protocols. Cultural connection to the World Heritage-listed Dampier Archipelago, including Whim Creek and Delambre Island.	No	Yes
	Value: Importance of local wildlife, primarily on sea turtle nesting, marine migration, and culturally significant areas, including particular importance of the Maitland River.	No	Yes
	Interest: The Sea Rangers program has been developed, and there is an interest in upskilling for a potential offshore impact event.	No	Yes
Wanparta Aboriginal Corporation	Interest: Particular interest in potential noise impacts on migrating whales and turtle migration patterns.	Yes	Yes
	Interest: Co-protecting Wanparta Country in the event of a hydrocarbon spill. A ranger program is being developed and Wanparta is interested in capacity building for offshore operations and incident response.	No	Yes
	Value: Cultural connection to the marine environment and fauna, with stingrays being a significant animal totem to the group. Additional importance is placed on Sharks, octopus, fish and birds.	No	Yes
	Feature: Cultural heritage (sites) with the presence of song lines between three islands within the native title area, which were once accessible on foot.	Yes	Yes

Relevant First Nation Group/ individuals	Description of value/interest	Potential for overlap	
		Operational Area	EMBA
	Interest: Species of bird of high importance and was impacted on the islands due to a recent cyclone.	No	Yes
	Value: Detailed lore, culture and customs with a strong spiritual connection to the sea country. Protection and management of marine life are significant to the group.	Yes	Yes
Murujuga Aboriginal Corporation	Feature: Recent World Heritage Listing of importance to the group with cultural heritage sites on the coastline.	Yes	Yes
	Value: Whilst the protection of environmental values is a significant aspect of protecting cultural values, the nature and threshold of impact must be assessed separately. A standard of protection that is considered to minimise impact to an acceptable level by scientific or environmental standards may still have consequences for Aboriginal people.	Yes	Yes
	Value: The deviation of marine mammal migration paths, for example may have no significant environmental impact, but any change to the sighting of whales at a particular point in the landscape would impact the seasonal calendar that marks the transition between seasons.	Yes	Yes
	Value: Any development that could potentially affect the natural movement, migration and/or other behaviour of marine species may have an impact on the cultural interpretation of the seasonal landscape and seascape and associated cultural behaviours.	Yes	Yes
	Value: Some parts of the Murujuga landscape and seascape within the EMBA have strict gender restrictions and cultural safety restrictions that would need to be considered in the event of managing any unexpected environmental incident.	No	Yes
	Interest: In the event of an environmental incident whereby any of the Murujuga World Heritage Property landscape or seascape falls within the possible impact zone, Murujuga Aboriginal Corporation must be immediately contacted for consultation on management of cultural values.	No	Yes
Buurabalayji Thalanyji Aboriginal Corporation	Value: Thalanyji people have cultural and spiritual connection to, and undertake activities in, land and waters that include but are not limited to the Thalanyji Native Title Determination and Thalanyji/Nhuwala claim and extend to offshore areas that include: Monte Bello Islands; Barrow Island; Thevenard Island, Mackeral Islands, Direction Island, Airlie Island, Weld Island, North and South Islands, Ashburton Islands, Twin Island, any island or atoll proximate	No	No

Relevant First Nation Group/ individuals	Description of value/interest	Potential for overlap	
		Operational Area	EMBA
	to the above islands and a general radius of 150 km from the mouth of the Ashburton River. Together, this is Thalanyji Country.		
	Value: Thalanyji Country encompasses both the native title determination and claim and broader Sea Country.	No	Yes
	Feature: Tangible cultural heritage sites along the coastline.	No	No
	Feature: Culturally significant islands within the Thalanyji determination area that Traditional Owners seek to be protected.	No	Yes
	Interest: Co-protecting Thalanyji Country in the event of an operational incident (i.e. hydrocarbon spill). BTAC seeks to be contacted so it can coordinate with its community to activate in an incident and protect culturally significant areas.	No	Yes
	Interest: BTAC would like the Thalanyji rangers to be involved in emergency response. BTAC was also interested in ranger training opportunities and emergency exercises.	No	Yes

Table 3-20: Cultural values and interests identified in publicly available literature

Relevant First Nation group/individual	Description of values/interest	Potential for overlap	
		Operational Area	EMBA
Kariyarra Aboriginal Corporation/Kariyarra people	Value/feature: areas of cultural, spiritual, historical and environmental significance. Estimated to be 15,000 engravings in the Port Hedland Area depicting hunting of dugongs, turtles and fish (KAC, 2024).	No	Yes
	Value: Cultural connection to Country which continuous to be a source of identity, shaping beliefs, customs, and practices (KAC, 2024).	Yes	Yes
Wanparta Aboriginal Corporation/Ngarla people	Value: Unbroken and deep spiritual connection to Sea Country, with traditional practices continued today. Sea Country is culturally significant and important to identity and access to Sea Country by Nyangumarta, Karajarri and Ngarla people is important for maintaining cultural traditions, livelihoods and future socio-economic opportunities (DNP, 2018).	Yes	Yes
	Feature: culturally significant food sources include saltwater fish, turtles, dugong, crabs, and oysters DNP, 2018).	Yes	Yes

Relevant First Nation group/individual	Description of values/interest	Potential for overlap	
		Operational Area	EMBA
Murujuga Aboriginal Corporation/Ngarluma, Yaburara, Mardudhunera, Yindjibarndi, and Wong-Goo-Tt-Oo peoples	Feature: Traditional owners and caretakers of the Murujuga National Park and Murjuga World Heritage Area which contains one of the largest, densest and most diverse collections of rock art petroglyphs in the world The area also features middens, fish traps, rock shelters, ceremonial places, spiritual and sacred sites, and stone arrangements (UNESCO, 2025).	No	Yes
Yamatji Marlpa Aboriginal Corporation/Yinggarda, Baiyungu, Thalanyji, and Jinigudira people	Feature: Ningaloo Reef and adjacent shorelines have a long continuous history of Aboriginal occupancy (32,000 – 38,000 years) with the foreshore and hinterland of North West Cape Range containing cultural heritage sites including burial grounds, middens and fish traps (CALM, 2005). Feature: Aboriginal artefacts including a burial site, Shell midden scatters, stone and glass flakes, burnt shell and bone and baler shells, and possible fireplaces, grinding stones and evidence of shell tool manufacture (DBCA, 2020). Archaeological evidence of human occupation in coastal rock shelters and midden sites on Cape Range, dating back to at least 32,000 years ago in Holocene times. (Morse, 1993). Open air and rock shelter sites with middens of predominantly shell, shell beads, lithic artefacts and terrestrial mammal bones. Most of the midden sites are located on or close to the coast (DBCA, 2022). The earliest known shell middens (in Coral Bay Area) are evidence or mangroves and intertidal area during the middle Holocene period (DBCA, 2022).	No	Yes
	Feature: History and present use of coastal and Sea Country for camping, fishing and hunting of turtle and dugong in North West Cape (CALM, 2005). Customary activities including ceremonial and hunting activities (DBCA, 2022). Conservation of significant plants, animals and habitats including karst, turtle nesting areas, seabird and shorebird roosting and breeding areas, and cave fauna (DBCA, 2022).	No	Yes
	Value: Connection to Country (CALM, 2005; DBCA, 2022) -“Under traditional law, Aboriginal people are responsible for, and obliged to protect, preserve and manage areas, sites and objects of Aboriginal significance associated with their Country” (CALM, 2005).	No	Yes

Relevant First Nation group/individual	Description of values/interest	Potential for overlap	
		Operational Area	EMBA
	Feature/Value: Plants or animals that are culturally significant or totems related to creation stories, ceremonies or used as medicine or food. Significant *thalu* sites along the coast which are places for ceremonies and rituals that are used for the spiritual regeneration of culturally significant species (DBCA, 2022). *Thalu* sites include *majun* (turtles), *nhuga* (shark), *yambarna* (rays), *bilyguru* (fish), *wuruwurugaja* (squid), *manimanira* (octopus), *bigurda* (euro/hill kangaroo Macropus robustus), *gajalbu* (emu Dromaius novaehollandiae), and *bilygurumarda* (osprey) (DBCA, 2022).	No	Yes
Wirrawandi Aboriginal Corporation/Yaburara and Mardudhunera people	Value: Moral, legal and cultural obligation to obtain, own and protect our cultural materials, including evidence trail of continued cultural connection to Country and the kinship of people (WAC, 2023).	Yes	Yes

3.7.6.2 Country in the North-West Marine Region

Northern Australia was one of the first areas of Indigenous occupation in Australia. Archaeologists have concluded that Indigenous people arrived in the northwest at least 50,000 years ago when sea level was at least 100 m lower than present (Smyth, 2007). As a result, First Nations communities in the NWMR have maintained special links with Sea Country for many thousands of years through occupation, resource utilisation and other cultural practices (including stories, dance, management practices and ceremonies). Pre-colonial use of Australia's oceans by coastal First Nations groups varied over time and between regions. Patterns of use at the time of colonisation included hunting, fishing and gathering as well as extended sea voyages by canoe to exploit resources and manage clan Sea Country, sometimes out of sight of the mainland (Smyth, 2007).

First Nations people of the NWMR continue to assert inherited rights and responsibilities over Sea Country. It is understood that spiritual corridors and Songlines extend from terrestrial areas into nearshore and offshore waters, including a number of marine animals as totems (DNP, 2018).

Indigenous communities own the majority of land adjacent to the NWMR (DEWHA, 2012). Native title determinations in the NWMR recognise in law that native title exists over Sea Country and preserve continuing rights to access sea country to hunt, fish, gather and use the resources of the waters for personal, domestic, communal, cultural and spiritual needs. Traditional Indonesian fishers have also visited and used the northern coast of Australia and its islands and reefs since at least the early eighteenth century. Evidence of this (i.e. grave sites) is found within the Ashmore Reef Marine Park (DNP, 2018).

Indigenous people in the NWMR have continued their traditions of caring for Country in a contemporary manner. Contemporary industry activities apply pressure to Sea Country values, including (Smyth, 2007):

- The transit and use of Commonwealth waters by dugongs, turtles and fish important to Aboriginal people
- The transit and control of illegal foreign fishers
- The transit and control of foreign shipping
- The transit and control of unauthorised immigrants
- The management of oil and gas exploration and extraction
- Cultural stories, sites and Songlines/Dreaming lines that may extend into Commonwealth waters
- Knowledge that the flooded countries of ancestors lie beneath Commonwealth waters
- Aboriginal participation in commercial fishing
- Aboriginal involvement in tourism and charter fishing enterprises.

3.7.6.3 Marine Parks

Cultural values within AMPs are broadly defined as living and cultural heritage recognising Indigenous beliefs, practices and obligations for country, places of cultural significance and

cultural heritage sites. Table 3-21 lists cultural heritage values identified within State and Commonwealth marine parks within the Hydrocarbon Area and EMBA. Cultural heritage values are from the AMPs North-West Network Management Plan (DNP, 2018) unless otherwise stated.

Table 3-21: State and Commonwealth Marine Protected Areas within the EMBA and identified cultural heritage values

Marine Park types	Overlap in Project Areas			Identified cultural heritage values
	Operational Area	Hydrocarbon Area	EMBA	
Dampier				
Habitat Protection Zone (IUCN IV)	-	-	✓	• The Ngarluma, Yindjibarndi, Yaburara and Mardudhunera people have responsibilities for sea country in the Marine Park. • The Native Title holders for these people are represented by the Ngarluma Aboriginal Corporation and Yindjibarndi Aboriginal Corporation. • These Prescribed Body Corporates represent Traditional Owners with native title over coastal area adjacent to the Marine Park are the points of contact for their respective areas of responsibility for sea country in the Marine Park. • Murujuga National Park is Western Australia's 100th national park and the first to be co-managed by Traditional Custodians and the WA Department of Biodiversity, Conservation and Attractions (DBCA). Murujuga Aboriginal Corporation holds the freehold title to Murujuga National Park which overlaps the EMBA. Murujuga Aboriginal Corporation is made up of members from five traditional custodial groups: the Ngarluma, Mardudhunera, Yaburara, Yindjibarndi, and Wong-Goo-Tt-Oo peoples. DBCA staff and Murujuga Aboriginal Corporation National Park Rangers work closely together to jointly manage Murujuga National Park. Murujuga Cultural Landscape was recently named a World Heritage Place by UNESCO (Section 3.6.1). • The Bardi and Djawi people of the Dampier Peninsula and Buccaneer Archipelago have a deep connection to the Sea Country in the region which has been shared through Dreaming stories. These stories tell of ancestral beings who travelled the seas and created the islands, reefs, sandbanks and marine fauna found within the area. Ritual sites were established by ancestral beings throughout the islands and remain culturally significant to the First Nations people of the area today who have a cultural responsibility to manage and protect these culturally significant places (Smyth, 2007). • Early records of First Nations maritime use have been documented in the Dampier Archipelago. These records include travel to the islands for ceremonial purposes or for resource collection, such as turtle eggs during breeding season, as well as the use of rafts to travel across marine waters, and baler shells used to carry water for long

Marine Park types	Overlap in Project Areas			Identified cultural heritage values
	Operational Area	Hydrocarbon Area	EMBA	
				journeys. There are also early record describing of the preparation of mangrove seeds for propagation, spearing of turtles, and the use of fishing nets and traps made from spinifex, which were used for a wide range of target species areas (Smyth, 2007).
Gascoyne				
Habitat Protection Zone (IUCN IV) Multiple Use Zone (IUCN VI) National Park Zone (IUCN II)	-	-	✓	• The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative body for the Gascoyne Marine Park and Ningaloo Marine Park (DNP, 2018). • The Ningaloo Marine Park encompasses inshore reef along the coast and to the south of the Exmouth Gulf. The foreshore and hinterland of the North-West Cape have a long history of First Nations occupation. The coastline contains numerous culturally significant and protected Aboriginal sites including burial grounds, shell middens, and fish traps which provide tangible evidence of First Nations culture in the region (CALM, 2005). • The archaeological records from the Cape Range Peninsula are significant in that they provide the earliest confirmed record of Pleistocene marine resource use in Australia (Smyth, 2007). Current uses of the area by First Nations people includes camping, fishing including the fishing of culturally significant species such as turtle and dugong (CALM, 2005).
Montebello				• The Montebello Islands Marine Park and Barrow Islands Marine Park includes complex seabed and island topography, sheltered lagoons, reefs, macroalgal and seagrass communities. There is limited information on the cultural significance of these areas (DNP, 2018), and there are no recorded Aboriginal sites in the waters of the reserves. • However, it is possible that there are Aboriginal archaeological sites on the seabed that were created before the most recent sea level rise (DEC, 2007).
Multiple Use Zone (IUCN VI)	-	✓	✓	
Montebello Islands and Barrow Islands (jointly managed)				
Marine Park Conservation Park Marine Management Area	-	✓	✓	

Marine Park types	Overlap in Project Areas			Identified cultural heritage values
	Operational Area	Hydrocarbon Area	EMBA	
Ningaloo				
Recreational Use Zone (IUCN IV)	-	-	✓	• Ningaloo Reef and the adjacent foreshore have a long history of occupancy by Aboriginal communities. The foreshore and hinterland of North-West Cape contain numerous Aboriginal sites such as burial grounds, middens and fish traps that provide a historical account of the early habitation of the area and a tangible part of the culture of local Aboriginal groups. • The earliest Aboriginal groups to inhabit the peninsula were the Jinigudira and the Baiyungu people. The Jinigudira inhabited most of the land adjacent to the reef and northern cape, while the Baiyungu inhabited the southern areas of foreshore adjacent to the reef. The archaeological record of the Cape Range Peninsula is significant in that it provides the earliest confirmed record of Pleistocene marine resource use in Australia. Aboriginal habitation of the North-West Cape and Exmouth is thought to have commenced at least 32,000 years (with some reports of 38,000 years before present and continues up to the present (WA Planning Commission, 2004 as cited in CALM and MPRA, 2005). • Although the majority of local Aboriginal people live in towns such as Carnarvon and Onslow, individuals and families retain strong ties to particular sites. The Jinigudira and the Baiyungu still maintain and associate with the North-West Cape and are recognised as the traditional owners of these lands (Gnulli Park Council, pers. comm.). Cardabia pastoral station surrounding Coral Bay is owned and managed by the Baiyungu community. Despite disruptions to traditional life, Aboriginal people seek to retain social, religious and personal bonds with their traditional lands. Current Aboriginal usage of the area includes camping and fishing, as well as limited hunting of turtle and dugong (CALM and MPRA, 2005).
Pilbara Islands Nature Reserve (Little Rocky Island and Thevenard Island)				
Nature Reserve	-	-	✓	Not recorded.

Section 4 Risk Assessment Methodology

4.1 Overview

Environmental risk assessment is a key component of the environmental risk management process. Environmental risk is assessed by determining the consequence (impact) of an environmental hazard and the likelihood that the consequence will occur, taking consideration of both existing and additional proposed control measures.

Key terminology used in this section of the EP includes:

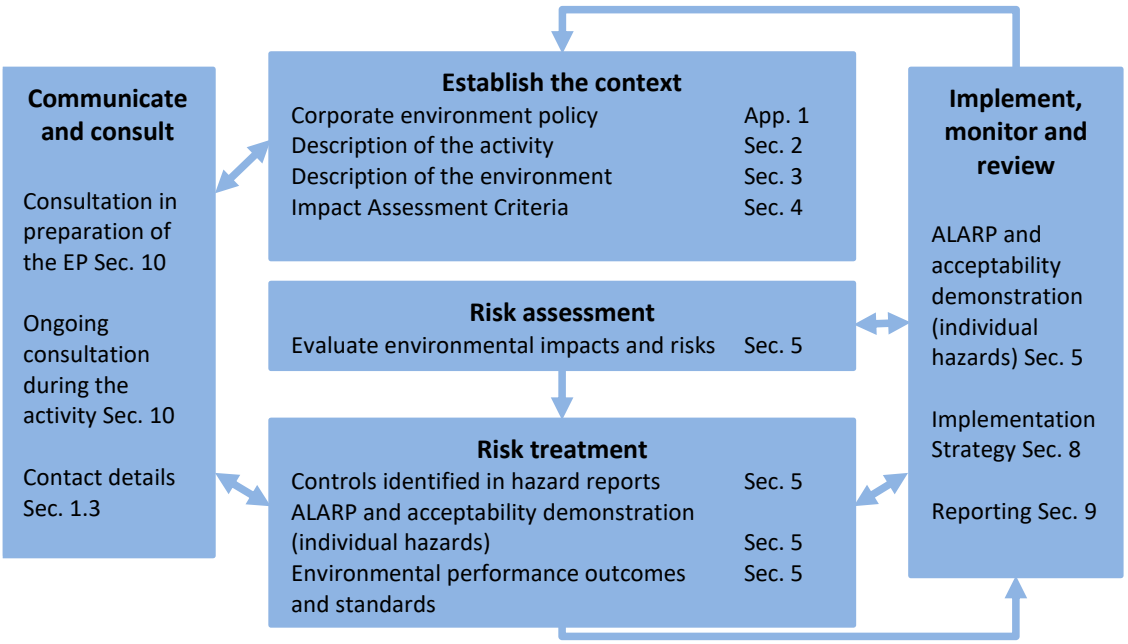
- **Acceptable:** a tolerable level of impact or risk (either quantitative or qualitative) when assessed in relation to the principles of Ecologically Sustainable Development (ESD), internal and external contextual consideration and other relevant requirements (Section 4.9).
- **Activity:** An activity is a 'Petroleum Activity' as defined within Section 5 of the OPGGS(E)R. Specifically, in the context of this EP, 'Activity' relates to a survey activity.
- **ALARP:** A level of risk that is tolerable, where the cost of reducing it further (e.g. financial, time, effort) is grossly disproportionate to any risk reduction gained (as per VOGA Risk Management Manual VOG-2000-MN-0001). The methodology for demonstrating ALARP is described in further detail below (Section 4.8).
- **Catastrophic Environmental Event (CEE):** any event which has an environmental impact ranked as "4 – Catastrophic" on the VOGA risk matrix (Section 4.6).
- **Cause:** The cause of a particular environmental impact. The cause may be an 'activity', or the cause could be an unplanned event, e.g. "vessel collision with facility".
- **Consequence ranking:** A measure of the severity of the environmental impact in accordance with the VOGA risk matrix (Section 4.6).
- **Control measures:** A means of reducing environmental risk by prevention, frequency reduction, or impact reduction. Control measures take many forms including systems, procedures, people and equipment.
- **Critical Control:** a control that has a key role in preventing, detecting, controlling or mitigating a CEE (as assessed on the VOGA risk matrix [Section 4.6]).
- **Environment:** is and includes the social, economic and cultural features of:
  - ecosystems and their constituent parts, including people and communities
  - environmental assets such as:
    - natural and physical resources
    - the qualities and characteristics of locations, places and areas
    - the heritage value of places.
- **Environmental hazard:** A situation with the potential for causing an environmental impact.
- **Environmental impact:** Any change to the environment arising from an environmental hazard.

- **Environmental performance outcome**: A measurable level of performance required for the management of environmental aspects of the activity to ensure that environmental impacts and risks of the activity will be of an acceptable level.
- **Environmental performance standard:** A statement of the performance required of a control.
- **Likelihood ranking:** A measure of the chance of an environmental impact occurring (expressed as chance, probability or frequency) in accordance with the VOGA risk matrix (Section 4.6).
- **Measurement criteria:** Tangible indicators, quantifiable where possible, that will be used to evaluate the achievement (or otherwise) of environmental performance standards and objectives.
- **Mitigation controls:** Controls which will be utilised in the event that the environmental hazard, requires steps to be taken to return the activity and/or the environment to an acceptable state, i.e. consistent with the environmental objective.
- **Preventive controls:** Controls which will prevent an environmental impact.
- **Residual risk:** The residual risk rating considering the effectiveness and availability of controls (existing and additional).
- **Risk:** A change to the environment that may occur as a result of an unplanned event.

4.2 Framework

The environmental risk assessment was undertaken in accordance with VOGA Risk Management Manual [VOG-2000-MN-0001] and in line with the requirements of the OPGGS(E)R. The framework adopted by VOGA in compiling this EP is consistent with the methodology described in AS/NZS ISO 31000 and NOPSEMA Guidance Note [N04750-GN1344]. Figure 4-1 depicts this methodology with reference to relevant sections of this EP where the requirements are addressed.

Figure 4-1: Content Requirements of this EP (within the Framework Outlined in AS/NZ ISO 31000)



The scope of activities covered by this EP was confirmed in terms of its timing(s), extent, and the nature of the activities included within it. This scope is reflected in the activities described in Section 1.4.

Potential environmental hazards associated with activities and unplanned events were identified, and impacts determined in a qualitative manner in an environmental hazard review workshop. Existing controls were identified in the same workshop. Each hazard employs a hierarchy of controls which relies on the following (in order of preference):

- Elimination: Refers to the elimination of a hazard, for example the use of a renewable energy source eliminates the emissions associated with power generation.
- Substitution: This refers to scenarios where an alternative arrangement is used to reduce the risk levels. For example, using a lower emission fuel type.
- Prevention: removing the causes of a particular impact or decrease their likelihood. As an example, a simpler plant with fewer leak points.
- Reduction: Limits the scale and consequence of a particular impact. For example, changes to process systems to reduce the size of hazardous inventories.
- Mitigation: Controls in place to respond to an incident, such as oil spill contingency planning.

In the case of complex or high hazard risks, environmental impact modelling was carried out to ensure that the impacts were thoroughly understood.

The severity, frequency, and subsequently the initial risk ranking was allocated to each hazard in accordance with the VOGA Risk Management Manual [VOG-2000-MN-0001]. The risk rankings were reviewed, and additional controls were considered to reduce the residual risk to ALARP and acceptable levels.

The Environmental Performance Outcomes (EPOs), environmental performance standards (EPS) and measurement criteria associated with the controls were developed in a series of performance standard workshops. The residual risk score for each environmental hazard was assigned considering the risk reduction from both the existing and any additional controls. The implementation strategy (Section 8) describes how the additional controls will be implemented.

4.3 Impact Assessment

An assessment of impact for each identified hazard was conducted by:

- Defining impact assessment criteria
- Quantifying magnitude of the stressor, including where applicable, quantity, concentration of contaminant and level of disturbance
- Consideration of timing and duration of the impact and other factors affecting the impact and risk (depth, temperature, tides, etc.)
- Consideration of environmental features affected either directly or indirectly
- Evaluation of the acceptability of the impact and risk.

4.3.1 Cumulative Impacts

In the context of offshore petroleum activities, cumulative environmental impacts are defined by NOPSEMA as successive, additive, or synergistic impacts of collectively significant activities or projects with material impacts on the environment that have the potential to accumulate over temporal and spatial scales (NOPSEMA, 2024b).

VOGA has assessed the cumulative impacts of the Wandoo Facility activities in relation to other current or foreseeable activities, including other petroleum and greenhouse gas activities, that could realistically result in overlapping temporal and spatial extents. Assessment of these impacts from concurrent or parallel activities has been included in Section 6.

4.4 Catastrophic Environmental Events and Critical Controls

In the context of the Wandoo Facility activity, an event with a consequence ranking of Catastrophic (5) as per Table 4-3 is defined as a CEE. A physical control, measure or procedure that has a key role in preventing, detecting, controlling or mitigating a CEE is defined as a Critical Control. Although environmental performance outcomes are developed for all environmental controls, Critical Controls are subjected to more stringent management. Management of critical controls is discussed in the Implementation Strategy (Section 8).

4.4.1 Identifying Catastrophic Environmental Events

Environmental hazards for the Wandoo Facility activities are discussed in Section 5. It is important to note that there will usually be a range of possible impacts resultant from each hazard and only some of these may have catastrophic potential. The overview of all environmental hazards (Section 5) and each individual hazard report identify the worst credible impact resultant from each hazard.

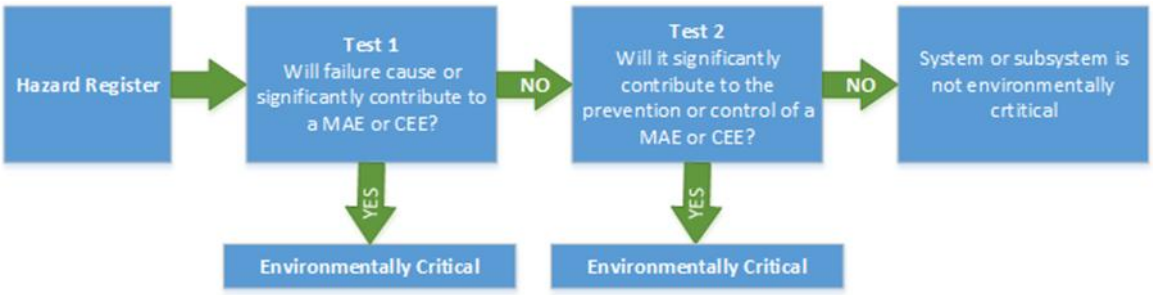
Based on the description of the hazard and the range of possible impacts for each hazard in Section 5 it is possible to determine those circumstances where a release would have catastrophic potential. It is only under these circumstances that a CEE would result. These events have been designated as a CEE and a CEE-XX numerical designator allocated.

4.4.2 Identifying Critical Controls

Once an event has been identified as a CEE the controls associated with that event must be assessed to determine which controls are considered critical. To confirm the applicability of a control measure as critical, it is necessary to apply a reasoned process as depicted in Figure 4-2.

For identified CEEs, the controls associated with those events have been subjected to the above process and Critical Controls identified. Critical Controls, where identified have been defined in the relevant hazard assessments in Section 5.

Figure 4-2: Critical Element identification process



4.5 Determination of Likelihood

The VOGA Environmental Risk Matrix (Table 4-1) provides for the likelihood of an impact (consequence) occurring to be determined on the basis of either chance, probability or frequency.

For higher-order risks, the probability of the impact occurring should be evaluated (where possible) on industry data of previous events that have caused impacts to occur. Where statistical industry data is not available, the frequency of events should be determined via other means such as corporate knowledge.

For lower-order risks, or where historical industry information may be unavailable, either 'frequency' or chance' may be used to determine likelihood of the impact occurring.

The determination of likelihood should only be evaluated using a single evaluation technique, i.e. either probability, frequency or chance in decreasing order of precedence.

4.6 VOGA Risk Ranking

The risk ranking was carried out in accordance with VOGA Risk Management Manual [VOG-2000-MN-0001] and utilised through to Section 5.

Table 4-1 is the VOGA corporate risk matrix representing the environmental consequence evaluation in relation to the frequency rating of the occurrence of the environmental hazard,

assuming identified controls are in place. The residual risk level is used to establish the actions required to manage potential impacts and risks to ALARP and acceptable levels, and provides environmental consequence definitions in the context of the nature of receptors potentially impacted by the petroleum activity as described in Section 2 of this EP.

The risk action table defines risk levels and the actions required to reduce the risk (Table 4-2). VOGA considers residual environmental risks to be acceptable when at a Residual Risk (RR) level of RRIV (Low) or RRIII (Medium). Table 4-3 details the criteria for socio-economic impacts.

Table 4-1: VOGA Environmental Risk Matrix

				LIKELIHOOD					
			Chance	Rare	Unlikely	Possible	Likely	Almost Certain
			Probability	1 in 10 000 - 100 000 (10^-5)	1 in 1 000 - 10 000 (10^-4)	1 in 100 - 1 000 (10^-3)	1 in 10 - 100 (10^-2)	1 in 1-10 (10^-1)
			Frequency	Not known to have occurred, but believed to be a credible scenario	Has occurred within our own industry	Has occurred within Vermilion, or has occurred multiple times per year within our own industry	Has occurred several times within Vermilion	Has occurred typically once or more per year within Vermilion
	Environment			A	B	C	D	E
POTENTIAL CONSEQUENCE	Irreversible effects on habitat, ecological communities, land, air or water Persistent reduction in sensitive ecosystem function (extends beyond area abandonment timeframe) Effects extend beyond regional scale and/or operating area/district	5	Catastrophic					
	Persistent but reversible, long-term (>10 years) effects on habitat, ecological communities, land, air or water Effects are widespread within region and/or specific operating area	4	Major					
	Reversible, medium-term (5-10 years) effects on habitat, ecological communities, land, air or water Effects extend into the immediate surroundings of the operating area/lease and/or localized off-lease	3	Moderate					
	Reversible, short term (1-5 years) effects on habitat, ecological communities, land, air or water Effect within operating area/lease boundaries or localized off-lease	2	Minor					
	Reversible, short term (<1 year) effects on habitat, ecological communities, land, air or water Effect within operating area and/or contained on-lease	1	Incidental					

Table 4-2: Risk action table

Risk Level (includes inherent risk in the event no safeguards are available)	Inherent Risk Action to Reduce Risk to an Acceptable Level	Residual Risk Action to Reduce Risk to an Acceptable Level
RRI or Extreme	Immediate implementation of temporary safeguard. Stop activities until risk controls/safeguards that will reduce the risk are implemented Implement permanent safeguard to reduce risk to acceptable level.	Review Environment Acceptability criteria (Section 4.7)
RRII or High	Immediate implementation of temporary safeguard. Establish a team for the: a) Evaluation of permanent safeguards b) Implementation of permanent safeguards to reduce risk to an acceptable level.	
RRIII or Medium	Safeguards are re-evaluated to determine suitability and acceptability. Establish a team for the evaluation and maintenance of current safeguards. Evaluate for ALARP. Implement permanent safeguards or accept risk as per defined authority.	
RRIV or Low	Controls are reviewed to ensure effectiveness. No further risk treatment if ALARP.	

Table 4-3: Wandoo-specific supplementary environmental consequence definitions

Term Used	Definition in the context of this EP
Geographical extent of impact	
Regional scale	Extent of impact across multiple bioregional provinces (EMBA).
Widespread	Extent of impact beyond the Operational Area (<200 km).
Localised off lease	Extent of impact mostly within the Operational Area with some effect extending beyond the boundaries of the area (<40 km).
Within operating area	Extent of impact limited to the Operational Area (2 km from the well location).
Socio-economic criteria: Environment criteria applies for impact and duration. Below are a range of examples for socio-economic impacts and how they are applied to environment consequence ranking in the context of this EP	
5 Catastrophic	Widespread damage to or exclusion from commercial enterprise or collapse of commercial enterprise.
4 Major	Damage to or long-term exclusion (>10 years) from large proportion of commercial or recreational enterprise (e.g. fishery closure).

Term Used	Definition in the context of this EP
3 Moderate	Medium-term (5–10 years) damage to or temporary exclusion from large proportion of commercial or recreational enterprise where recovery is expected to occur within 1 year of the activity stopping.
2 Minor	Temporary or permanent exclusion to minor proportion of commercial or recreational enterprise.
1 Incidental	Very short-term exclusion to minor proportion of commercial or recreational enterprise; or community disturbance impact e.g. low-level noise, vibration, lighting.

4.7 Determining Acceptability

For an environmental hazard to be assessed as acceptable, VOGA considers the following items:

- Principles of Ecologically Sustainable Development (ESD) are not compromised
- External context – objects or claims may by external relevant persons considered
- Internal context – VOGA HSE policy/procedures are being met
- Other requirements, e.g., industry notices and guidance
- RR < High (RRII)
- EPO(s) manage impacts to acceptable level(s).

4.8 Demonstrating ALARP of Impact and Risk

4.8.1 Demonstration of ALARP

Demonstrating ALARP has been undertaken in accordance with VOGA's Risk Management Manual [VOG-2000-MN-0001] and NOPSEMA's ALARP Guidance Note N-04300-GN0166 [with the key principles of this Guidance Note (Health and Safety) also applying to Environmental Management]. Demonstrating that risks levels are ALARP is a two-step process. Firstly, residual risk levels must be tolerable, that is not within the "High" or "Extreme" risk area of the VOGA Risk Matrix as per Table 4-2. Secondly, once deemed tolerable further risk reduction measures must be identified and assessed for implementation as described below.

Following the identification of standard industry 'good practice' risk mitigation controls and recovery measures, VOGA reviews the residual risk and assesses whether there are any further measures required to reduce the residual risk to ALARP. For Wandoo Facility activities and well intervention projects, risks are considered to have been reduced to ALARP if the risks are within the tolerable region of the VOGA Risk Matrix and have been subject to a detailed assessment process that has concluded that there are no additional reasonably practicable measures that can be implemented to further reduce the level of risk.

When deciding whether risks are managed to ALARP, the following items are considered:

- Duration and regularity of operations
- Risk
- Layers of protection

- Feasibility of additional controls or alternative arrangements
- Practicality of additional controls or alternative arrangements
- Cost of additional controls or alternative arrangements
- Effectiveness of additional controls or alternative arrangements
- Impact on risks from additional controls or alternative arrangements
- Lessons learnt from past campaigns and industry.

This decision is valid where:

- All environmental hazards have been identified and assessed
- Risk levels have been evaluated
- Residual risk levels are tolerable, compliant and ALARP.

EPSs have been defined to ensure that the risks are reduced to ALARP on an ongoing basis. The VOGA risk matrix defines an upper threshold above which no risk is tolerable. Below this threshold is the ALARP region, where risks should be further reduced until the cost of any additional action outweighs the incremental benefit gained.

4.8.2 Concept Evaluation ALARP Demonstration

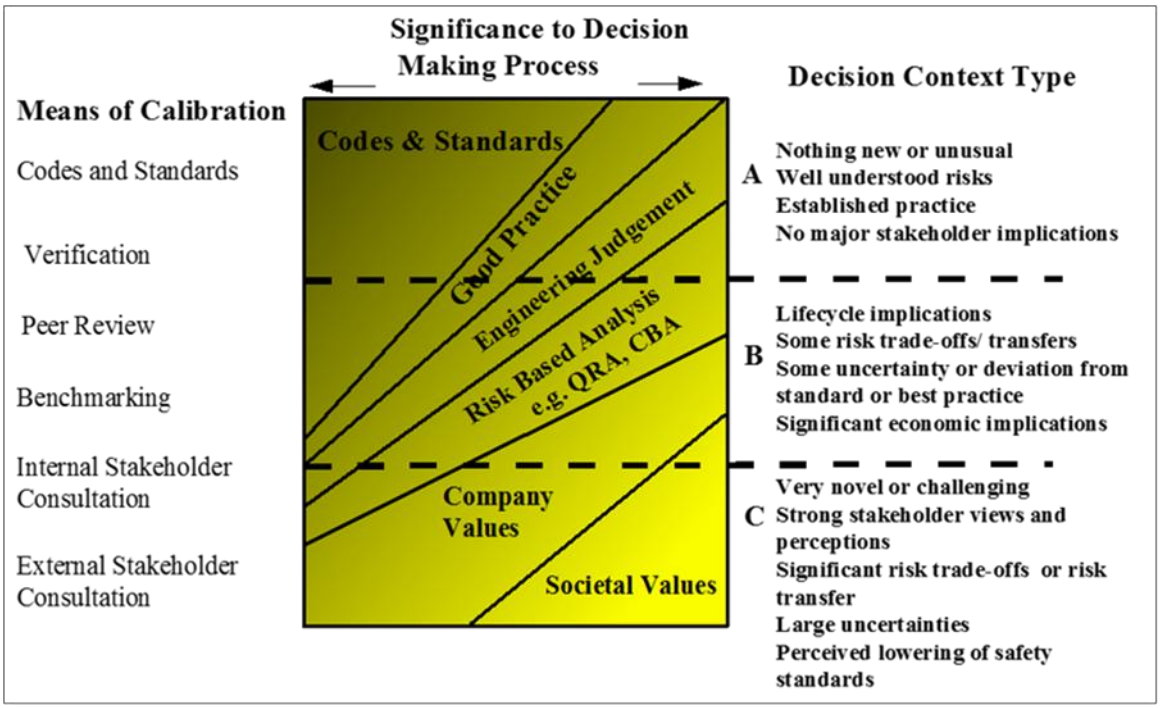
For evaluation of concepts, a specific ALARP Demonstration Worksheet is completed in accordance with the processes defined in VOGA's Risk Management Manual [VOG-2000-MN-0001]. For concept evaluations, demonstration of ALARP contains elements of the following process:

- Identification and consideration of a range of potential measures for further risk reduction
- Systematic analysis of each of the identified risk reduction measures and a view formed on the HSE benefit associated with each of them
- Evaluation of the reasonable practicability of the identified measures
- The implementation (or planned implementation) of the identified risk reduction measures
- Recording of the process and results.

The United Kingdom Offshore Operators Association (UKOOA) has produced guidelines for assisting with the ALARP decision-making process and for recording and demonstrating the robustness of the decision as depicted in Figure 4-3. These are regarded as good practice internationally and have been adopted globally as the standard guidance for ALARP decision making.

The UKOOA guidelines describe a framework that is intended to help decision-makers identify the various decision factors and establish a basis for the decision based on these. The decision framework assesses the significance to the decision process of codes and standards, good practice, engineering judgement, risk analysis, cost benefit analysis, and company and societal values. They aim to encourage the development of transparent decision-making processes.

Figure 4-3: UKOOA Decision Support Framework



The first step in the decision-making process is to establish the decision context. This is done by assigning a decision context type (A-C), based on the categories and prompts detailed in Table 4-4.

Table 4-4: ALARP decision context type.

Decision context	Description
A	Nothing new or unusual Well understood risks Established practice No major stakeholder implications
B	Lifecycle implications Some risk trade-offs/transfers Some uncertainty or deviation from standard or best practice Significant economic implications
C	Very novel or challenging Strong stakeholder views and perceptions Significant risk trade-offs or risk transfer Large uncertainties Perceived lowering of safety standards

The ALARP template provides questions around the decision context and prompts discussion to determine the appropriate context type.

Once the decision context has been established, Table 4-5 is then consulted to determine an appropriate method of decision making. For example, a design which involves nothing new or

unusual, has well understood risks and no major uncertainties or shareholder implications, would be assigned a decision context in the middle of Type A as shown by the band in Table 4-4.

Reading across this band indicates the relative importance of each of the decision-making criteria; that is, the decision should be primarily based on the requirements of codes and standards, then engineering judgement and finally good practice. Quantitative Risk Assessment (QRA) should not be allowed to have a great influence on the decision. Consulting the codes and standards provides an appropriate means to calibrate the decision.

However, if the costs associated with the problem were considerable, or there were significant risk uncertainties, this would push the context towards Type B. In this case, some use of QRA and consideration of the company values would be appropriate.

Table 4-5 provides further explanation of each of the decision-making criteria.

Table 4-5: Decision criteria definitions

Decision criteria	Definition
Codes and standards	Decision basis is to follow the requirements of relevant codes and standards. Codes and standards embody the lessons learnt over past years, and for well understood hazards and situations often provide an appropriate solution.
Good practice	Decision basis is to follow what is generally accepted as current standard or good/best practice. Good practice embodies both the requirements of codes, etc. and other good engineering, analysis and management practices for common situations. Good practice may include solutions that have not yet found their way into codes and standards. What is good practice may differ from situation to situation. Care should be taken to benchmark against the relevant good practice or emerging practice.
Engineering judgement	Decision basis is to follow what sound engineering judgement indicates is the best solution. This would be expected to include a recognition of what is good/best emerging practice, and an understanding and application of sound engineering and scientific principles and methods. It could include: engineering analysis, consequence modelling, deterministic cases for hazard management as well as competent judgment and interpretation of these and other information.
Risk-based analysis (QRA, cost benefit analysis (CBA), etc.)	Decision basis is to make use of the results of probabilistic analyses such as QRA, reliability analysis and CBA to support the decision-making process. The assessment could be qualitative or quantitative. Uncertainties and the resolution of the analysis vs the needs of the decision will be key issues to address.
Company values	Decision basis should take account of the views, concerns and perception of the stakeholders directly affected by the decision/option and the values of the company in terms of its safety commitment, image, etc.
Societal values	Decision basis should take account of the views, concerns and perceptions of all the relevant stakeholders, including society at large.

The ALARP Demonstration Worksheet provides documentary evidence that the above process has been followed and requires a recommendation of the proposed solution that best meets the appropriate criteria.

4.9 Evaluating Acceptability of Residual Impacts or Risks

Regulation 21(5)(c) of the OPGGS(E)R requires demonstration that environmental impacts and risks are of an acceptable level.

VOGA only considers the level of residual impact or risk to be of an acceptable level when (in combination):

- The relevant Principles of ESD have not been compromised
- Both internal and external context requirements have been achieved
- All other requirements have been met
- The predicted level of residual risk is below the level considered as unacceptable and is demonstrably ALARP.

To demonstrate that potential environmental impacts and risk associated with the survey activities are of an acceptable level, the following process has been adopted to establish an acceptable level of residual risk for each aspect of the activity (either qualitative or quantitative) considering:

- The principles of ESD: the activity must be carried out in a manner consistent with the relevant ESD principles, namely:
    - Decision making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations. This principle is inherently applied via the risk assessment methodology, inclusive of the demonstration of ALARP, detailed within this EP. As such, this principle is not evaluated separately within each hazard assessment.
    - If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. This principle applied via the ALARP process in which a precautionary approach may be adopted where residual risks may be high-level or where there is a high degree of uncertainty in the outcomes of the activity.
    - The principle of inter-generational equity, that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations. This principle is inherently applied via the risk assessment methodology, inclusive of the demonstration of ALARP, detailed within this EP. As such, this principle is not evaluated separately within each hazard assessment.
    - The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision making. This principle is applied by evaluating residual risks of survey activities to particular values and sensitivities, including matters protected under Part 3 of the EPBC Act, giving consideration to relevant recovery plans and species conservation advices as detailed within Table 1-3.
- Internal context: the activity must be undertaken in a manner consistent with the objectives of the VOGA HSE policy and relevant procedural controls.

- External context: where a relevant organisations' or persons' activity, function or interest may be affected by the survey activity, any objections or claims that have been assessed as having merit and are relevant to the survey activity should be considered when establishing the acceptable level of residual risk of the activity. The predicted level of residual risk presented within this EP shall be taken as acceptable in the context of external stakeholder expectations when:
  - The level of residual risk is equal to or below existing stakeholder expectations in regard to their function, activity or interest, or
  - Where no objection or claim is received from a relevant organisation or person.
- Other requirements: the residual risks associated with the survey activity are considered acceptable in the context of external requirements when they are within the bounds identified in relevant laws, policies, standards, conventions and do not compromise the objectives of relevant recovery plans and species conservation advices as detailed within Table 1-3.

4.10 Environmental Performance Outcomes, Environmental Performance Standards and Measurement

EPOs, EPSs, and their measurement criteria, are defined for each control to ensure overall environmental performance is maintained at ALARP and acceptable levels.

The EPOs detailed in this EP are consistent with the principles of ESD as detailed in Section 4.8, provide for Matters Protected under Part 3 of the EPBC Act, are relevant to the potential impacts and risks associated with the Wandoo Facility activity and maintain potential impacts and risks to acceptable levels based on the context described in Section 4.9.

The EPOs detailed within this EP can be measured in various ways depending on whether the acceptable level of impact or risk is quantitative or qualitative.

Quantitative levels of performance embedded within EPOs can be directly monitored and measured either prior to or after an impact has occurred (either planned or unplanned). Qualitative levels of performance can be assessed by validating whether the EPO remains achievable, relevant, or that the EPO has been maintained (or breached).

Hazard report tables, included in Section 5, contain the relevant EPOs, and associated standards and measurement criteria for each of the material controls identified.

Each EPO is a measurable level of performance required for the management of environmental aspects of the activity to ensure that environmental impacts and risks of the activity will be of an acceptable level. Where multiple controls protect against the same hazard, they may share a common performance outcome.

Once the EPO has been confirmed, a more specific statement on the level of performance required of the control is established – this is the EPS. The EPS may be a quantitative or qualitative statement of the functional requirement of a specific control. Note that for administrative controls such as procedures, EPSs are typically less specific than those for physical equipment.

Once EPOs and EPSs are developed, it is important that the performance of the control can be tracked or monitored in some way to confirm it continues to meet the environmental performance standards. To achieve this, a measurement criterion or means of assurance is specified. The measurement criterion varies, depending on the nature of the control. VOGA would also accept internal or external audit records, maintenance and testing records, certificates, operations records, purchasing records, material specifications etc. as a means of assurance or measurement criteria.

Each hazard assessment in Section 5 contains the EPOs and associated standards and measurement criteria for each of the material controls identified. These are also presented in Section 7.

4.11 Criteria Hazard Report Template

The risk assessment section of this EP is structured such that each of the hazards has a dedicated subsection. Each sub-section commences with a Hazard Report Table, which is a tabular summary of the hazard, its causes, controls and impacts.

Each Hazard Report Table consists of heading rows containing:

- EP risk number, a unique identification number applied to each risk
- The activity/cause of the hazard
- The extent of the hazard, e.g. area disturbed, or volume released
- A high-level summary of the impacts to the environment which the hazard may cause.

The second part of the table presents the controls relevant to the hazard and contains the following fields:

- Management controls: This contains a description of the adopted controls grouped under the following control hierarchy headings:
  - elimination
  - substitution
  - prevention
  - reduction
  - mitigation.
- Control type: The controls are further categorised as either an engineering control (i.e. a physical element/system) or administrative control (i.e. procedures).
- Environmental performance standard
- Measurement criteria.

The remainder of the table consists of:

- A summary of the impact and risk evaluation, including residual risk
- The relevant EPOs
- A summary of acceptable level demonstration.

4.12 Accidental Release Scenarios and Quantification

4.12.1 Credible Scenarios

VOGA has identified several credible, worst case oil spill scenarios that may occur during the activities outlined in this EP. These are summarised in Table 4-6. Further details are provided in the assessment sections for each scenario.

Table 4-6: Credible spill scenarios

Scenario	Description	Hydrocarbon Type	Discharge parameters	EP Section
1	Loss of Wandoo Crude from flow lines and risers	Wandoo Crude	0.8 m^3*	Section 5.7
2	Loss of produced fluids from topsides process	Produced Fluids	100 m^3 comprising 2-3% oil*	Section 5.6
3	Loss of Wandoo Crude from the offtake export system	Wandoo Crude	300 m^3 surface release over 1 hour	Section 5.2
4	Loss of Well Control (LOWC) from B10 gas injector well	Wandoo Crude	250 m^3 over 78 days, with no oil released for first 63 days due to low reservoir pressure*	Section 5.1
5	Loss of Containment of Marine Diesel Oil (MDO) from a vessel due to collision/failure	MDO	300 m^3 over 6 hours	Section 5.5
6	Vessel collision resulting in damage to Shaft 2 and a release of diesel	Diesel	2,200 m^3 surface release over 12 hours	Section 5.3

**not modelled as do not represent the worst-case release scenario for Wandoo Crude.*

The previous revision of this EP included a CGS Wandoo Crude release scenario as a conservative inclusion, reflecting limited structural information and the absence of integrity studies at that time. This approach aligned with NOPSEMA's earlier expectation that potential hydrocarbon release pathways be retained unless clearly demonstrated to be not credible.

To address this uncertainty, VOGA engaged Spire Engineering Services, a specialist structural integrity and advanced engineering consultancy based in Houston, USA, to undertake finite-element modelling of the Wandoo CGS. Spire completed two detailed modelling studies to determine whether:

- An extreme seismic event (10,000-year return period Reliability Level Earthquake) could cause structural damage to the CGS sufficient to create a hydrocarbon release pathway (Spire, 2024a)
- A vessel collision could damage the CGS sufficiently to cause a hydrocarbon release (Spire, 2024b).

These studies assessed the CGS response under credible seismic and collision load cases using high-resolution finite-element models. The work was independently peer reviewed by Professor Ashraf Ayoub, City, University of London (Ayoub, 2023), an internationally recognised expert in nonlinear structural mechanics and advanced FEA.

The combined modelling and peer-review evidence demonstrates no physically plausible failure mode that could breach the crude storage cells. In addition, the CGS stores crude under sub-hydrostatic conditions, meaning that, if there were a breach, it would result in seawater ingress, not oil egress. More than 30 years of inspection records further confirm no degradation trends that could compromise containment. On this basis, a CGS Wandoo Crude release does not meet NOPSEMA's definition of a credible spill scenario and is not evaluated further.

In contrast, the Shaft 2 diesel release remains a credible and representative hydrocarbon spill scenario. Diesel is stored under positive head and handled through active transfer systems, providing a clear, physically plausible pathway for loss of containment. A release of up to 2,200 m^3 over 12 hours reflects the facility's diesel inventory and operational configuration. Diesel's low viscosity and mobility also warranted modelling to understand potential surface transport and shoreline exposure.

Accordingly, the Shaft 2 diesel release is retained as the primary hydrocarbon spill scenario for the Wandoo Facility, while the CGS Wandoo Crude release scenario is removed on the basis of robust, peer-reviewed structural evidence demonstrating that it is not credible.

4.12.2 Physical Properties of Hydrocarbons used during Wandoo Production

A summary of the oil types used in the Wandoo production is presented in Table 4-7 and Table 4-8 Either diesel 10 or MGO could be used as fuel for the facility and vessels. These are both low-viscosity distillates with similar spill behaviour characterised by rapid spreading, high evaporation rates, limited emulsification, and low persistence. For the purpose of spill modelling and impact assessment, diesel, MDO and MGO can be treated as functionally equivalent distillates.

Table 4-7: Physical properties of oil types used in Wandoo activities

Properties	Wandoo Crude	Diesel 10/MGO
Density (kg/m^3)	937 (at 16 °C)	829 (at 25 °C)
API	19.4	37.6
Dynamic viscosity (cP)	161 (at 25 °C)	4 (at 25 °C)
Pour point (°C)	-24	-14
Hydrocarbon property category	Group IV	Group II

Properties	Wandoo Crude	Diesel 10/MGO
Hydrocarbon property classification	Persistent	Light persistent

Table 4-8: Boiling point ranges for oil types used in Wandoo activities

Characteristic Oil Type	Volatiles (%)	Semi-volatiles (%)	Low volatiles (%)	Residual (%)
Boiling Point (°C)	< 180	180 - 265	– 380	> 380
	Non-persistent			Persistent
Wandoo Crude	1.7	10.2	33.1	55.0
MDO	4.0	32.0	54.0	10.0
MGO	6.0	34.6	54.4	5.0

Wandoo Crude (API 19.4) was used for this oil spill modelling study. The unweathered mixture has a density of 937.7 g/cm^3 (at 16°C), a dynamic viscosity of 161 cP and a pour point of -24°C, which ensures that this crude will remain in a liquid state over the annual temperature range observed.

Wandoo Crude is composed of approximately 1.7% (by mass) of volatile hydrocarbons (boiling point (BP) <180°C) that will evaporate within the first 12 hours. A further 10.2% of the oil is characterised as the semi-volatile compounds (180°C< BP <265°C) that will likely evaporate within the first 24 hours when on the surface and 33.1% represent the low volatiles (265°C< BP <380°C), which typically evaporate over several weeks. A relatively high proportion (55%) of hydrocarbon compounds is persistent, which are unlikely to evaporate and will decay over time. According to AMSA (2023) classifications the crude is categorised as a Group IV persistent.

MDO is categorised as a group II oil (light-persistent) according to the AMSA (2023) classifications. The classification is based on the specific gravity of hydrocarbons in combination with relevant BP ranges. It is important to note that some of the heavier components contained in the MDO (i.e. low volatile and persistent portions) will have a strong tendency to physically entrain into the upper water column in the presence of moderate winds (i.e. >12 knots) and breaking waves but can re-float to the surface if these energies abate. The low viscosity (14 cP) indicates that this oil will spread quickly when released and will form a thin to low thickness film on the sea surface, increasing the rate of evaporation.

Generally, about 4% of the MDO mass should evaporate within the first 12 hours (BP <180°C); a further 32% should evaporate within the first 24 hours (180°C< BP <265°C); and an additional 54% should evaporate over several days (265°C< BP <380°C). Approximately 10% (by mass) of MDO will not evaporate, though will decay slowly over time (RPS, 2024).

MGO has a density of 829 kg/m^3 at 25°C (API of 37.6) and a low pour point of -14°C. The oil comprises of a significant portion of volatiles and semi- to low volatiles (~95 % total) with 5% residual components. This means most of the hydrocarbons will evaporate when on the water surface, with the persistent components to remain on the water surface over a longer period. The MGO is categorised as a Group II oil (light-persistent) according to the AMSA (2023) classifications.

4.12.3 Oil Spill Modelling

Oil spill modelling is required to determine the potential spatial and temporal extent of exposure associated with an unplanned release of hydrocarbons to the marine environment.

Oil Spill Trajectory Modelling (OSTM) was carried out based on the credible worst-case oil spill scenarios associated with the operation of the Wandoo Facility. Details of the scenarios were based on the latest reservoir modelling information available to VOGA, the storage capacity of the WNB shaft 2 and tank size of vessels used in operations. Details regarding the oil spill modelling undertaken by RPS to support this EP are provided below and in Appendix B.

The spill modelling was carried out using a purpose-developed oil spill trajectory and fates model, SIMAP (Spill Impact Mapping Analysis Program). This model is designed to simulate the transport and weathering processes that affect the outcomes of hydrocarbon spills to the sea, accounting for the specific oil type, spill scenario, and prevailing wind and current circulation patterns (RPS, 2024).

The scenarios were modelled using summer, winter and transitional wind and current conditions. Modelling outputs were used to predict the probability and the number of days for specific hydrocarbon threshold concentrations to contact identified values and sensitivities.

Table 4-9 summarises the spill model inputs and parameters for each scenario. Scenarios 1, 2 and 4 were not modelled, as they do not represent the worst-case scenario for a release of Wandoo Crude (or produced fluids, which is mostly formation water). Note these scenarios are still risk assessed separate, as they are due to different initiating events and have differing controls.

Table 4-9: Summary of the spill model settings used for each scenarios

Model settings	Scenario	
Scenario	Scenario 3 – Surface release of Wandoo Crude from offtake export system	
Location	WNB	
	Latitude*	Longitude*
	20° 7' 2" S	116° 26' 2" E
No. of spill simulations	100 per season	
Period	Summer (October to February) Winter (April to July) Transitional (March, August and September)	
Spill volume	300 m^3	
Oil type	Wandoo crude	
Release depth	0 m (surface)	
Release duration	1 hours	
Simulation length	30 days	
Scenario	Scenario 6 – Surface release of MGO from Wandoo B's shaft 2	
Location	Wandoo B	
	Latitude*	Longitude*
	20° 7' 43" S	116° 26' 4" E
No. of spill simulations	100 per season	

Model settings	Scenario	
Period	Summer (October to February) Winter (April to July) Transitional (March, August and September)	
Spill volume	2,200 m^3	
Oil type	MGO	
Release depth	0 m (surface)	
Release duration	12 hours	
Simulation length	50 days	
Scenario	Scenario 5 – Accidental release of MDO	
Location	Kullingal (Closest to WNA) within WA-14-L	
	Latitude*	Longitude*
	20° 10’ 16.32" S	116° 24’ 11.88" E
No. of spill simulations	100 per season	
Period	Summer (October to February) Winter (April to July) Transitional (March, August and September)	
Spill volume	300 m^3	
Oil type	MDO	
Release depth	0 m (surface)	
Release duration	6 hours	
Simulation length	30 days	

*Datum: WGS 1984

4.12.4 Weathering and Fate

4.12.4.1 Wandoo Crude

A series of weathering tests were conducted to illustrate the potential behaviour following a 50 m^3 instantaneous surface release of Wandoo crude when exposed to:

- 5 knot (2.6 m/s) constant wind speed, 27°C water temperature and currents
- Variable wind speeds (1 – 12 m/s or 2 to 24 knots), 27°C water temperature and currents.

The first case is indicative of the potential weathering rates under calm conditions that would not generate entrainment, while the second case would be more representative of the moderate winds experienced over the region.

The mass balance forecast for the constant wind case (Figure 4-4) shows that 13.0% of the crude is predicted to evaporate within 24 hours. The remaining hydrocarbon on the water surface will weather at a slower rate and be subject to more gradual decay through biological and photochemical processes.

In the variable wind speeds test (Figure 4-5), characterised by stronger average winds and breaking waves, there is an increased entrainment of the crude into the water column. Approximately 24 hours into the spill, the forecast indicates that 3.2% of the crude will have

evaporated, with additional 93.9% expected to have entrained. Hence, less than 1% of floating oil remains on the water surface 24 hours into the spill.

Figure 4-4: Mass balance plot for an instantaneous 50 m^3 surface release of Wandoo crude subjected to a constant 5 knot (2.6 m/s) wind, currents and 27°C water temperature

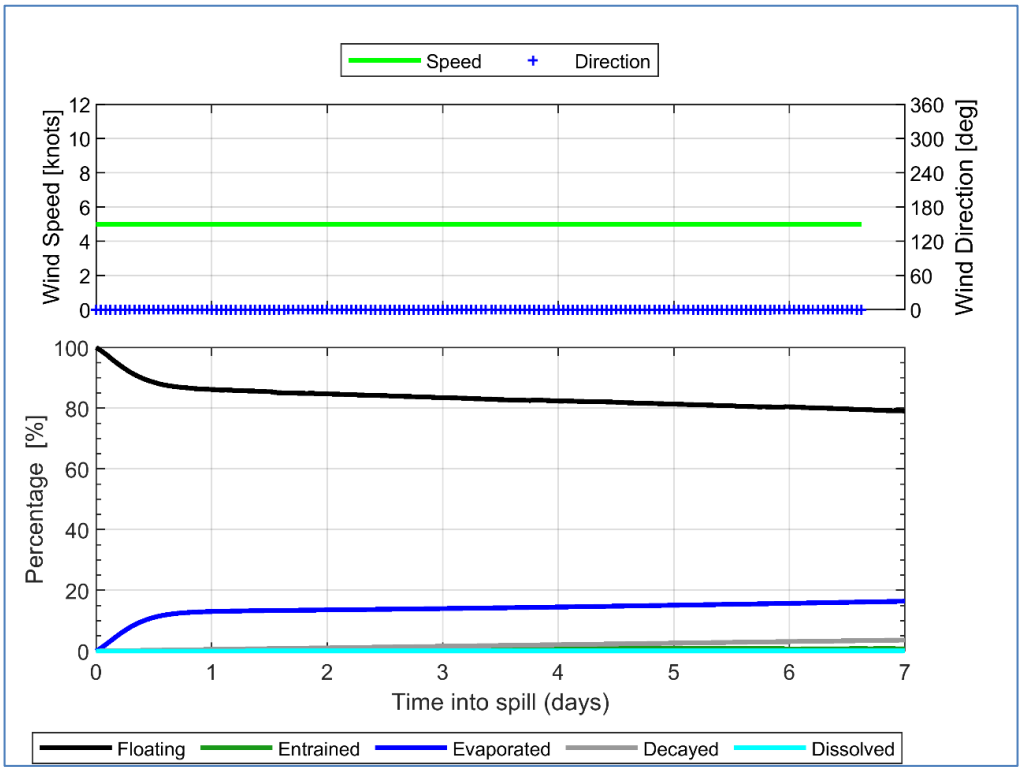
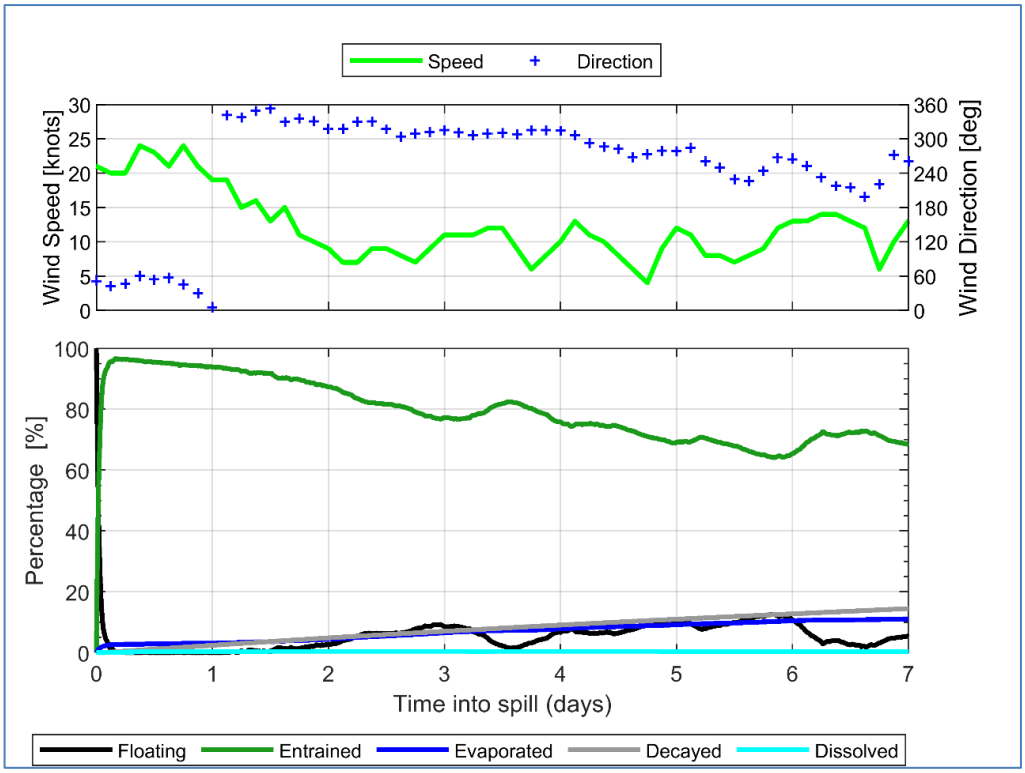


Figure 4-5: Mass balance plot for an instantaneous 50 m^3 surface release of Wandoo crude subjected to variable wind speeds (1 – 12 m/s or 2 to 24 knots), currents and 27°C water temperature



4.12.4.2 Marine Diesel Oil/Marine Gas Oil

A series of weathering tests were conducted to illustrate the potential behaviour following a 50 m^3 instantaneous surface release of MGO when exposed to:

- 5 knot (2.6 m/s) constant wind speed, 27°C water temperature and currents; and
- Variable wind speeds (1–12 m/s or 2 to 23 knots), 27°C water temperature and currents.

The first case is indicative of conditions that would not generate entrainment, while the second case represents conditions that would likely cause entrainment. Both scenarios provide examples of potential behaviour during a spill once the oil is on the sea surface.

The mass balance forecast for the constant wind case (Figure 4-6) shows that 39.3% is expected to evaporate within 24 hours. Under calm conditions, the majority of the remaining oil on the water surface will weather at a slower rate due to being comprised of the less volatile, longer-chain compounds. Evaporation shall cease when only the residual compounds remain, and they will be subject to more gradual decay through biological and photochemical processes.

For the variable wind speed case (Figure 4-7), where the winds are of greater strength on average, entrainment of hydrocarbons into the water column is shown to increase. Approximately 24 hours after the spill, 78.1% of the mass is shown to have entrained and a further 17.4% has evaporated, leaving only a small proportion floating on the water surface (<1%).

The increased level of entrainment in the variable-wind case result in a higher percentage decaying at an approximate rate of ~2.7% per day with 19.1% after 7 days, compared to 0.2% per

day and a total of 1.4% after 7 days for the constant-wind case. Given the proportion of entrained oil and the tendency for it to remain mixed in the water column, the remaining hydrocarbons will decay over time scales of several weeks.

Figure 4-6: Mass balance plot for an instantaneous 50 m^3 surface release of MGO subjected to a constant 5 knot (2.6 m/s) wind, currents and 27°C water temperature

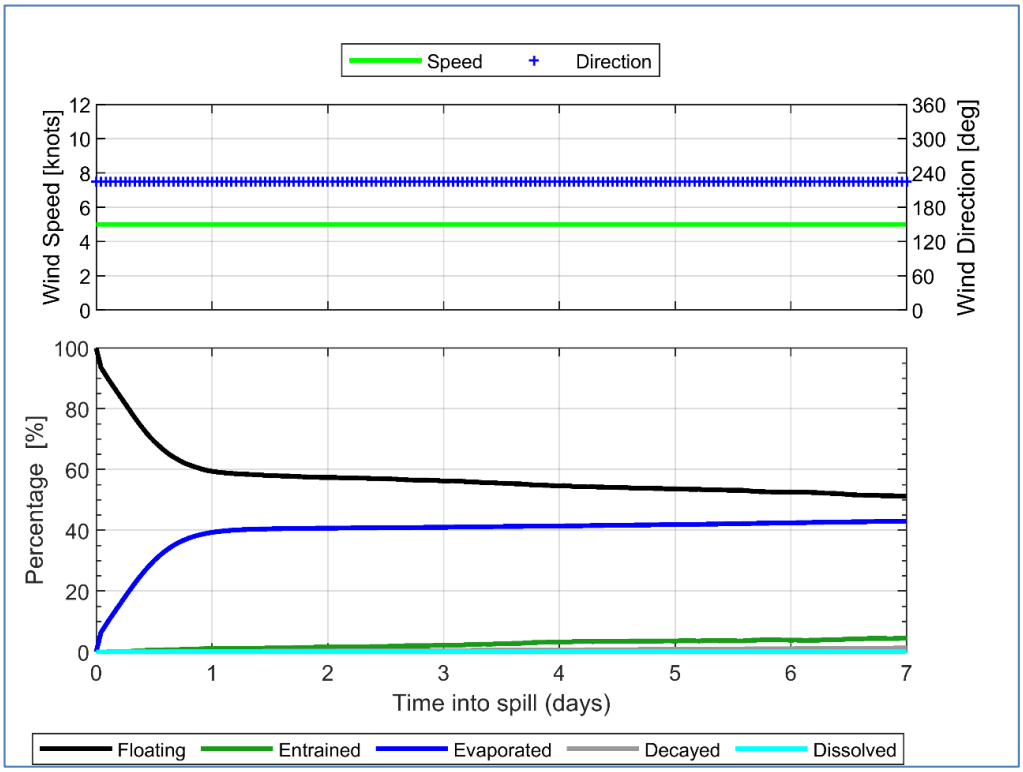
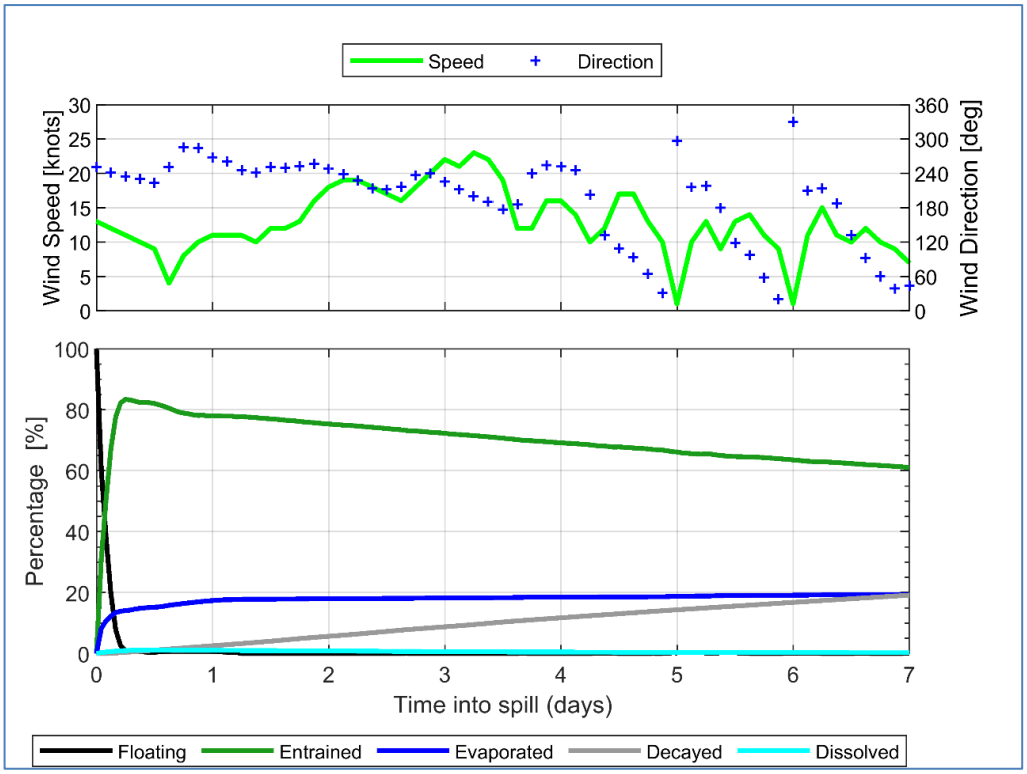


Figure 4-7: Mass balance plot for an instantaneous 50 m³ surface release of MGO subjected to variable wind speeds of 2 to 23 knots (1 – 12 m/s), currents and 27°C water temperature



4.12.5 Exposure Thresholds

The SIMAP model tracks oil concentrations to very low levels, therefore it is important to define meaningful threshold concentrations for the recording of contact by oil components and determining the probability of exposure at a location (calculated from the number of replicate simulations in which this contact occurred).

The thresholds for surface, shoreline, and in-water oil (dissolved and entrained) used in this EP are consistent with those outlined by NOPSEMA's most recent recommendations (NOPSEMA, 2025) for spill modelling input selection and consequence evaluation (Table 4-10).

NOPSEMA (2025) recognises these values as conservative exposure criteria for defining the EMBA, and as suitable for determining ecological, social, economic and cultural features potentially exposed to hydrocarbons in an offshore spill scenario.

The thresholds adopted in this EP align with the stochastic modelling undertaken by RPS (2024). Therefore, the EMBA represents the maximum credible spatial extent of potential hydrocarbon exposure and function as an intentional "outer-bound" value, applying the utmost rigour to ensure that no potentially affected receptor is excluded from appropriate assessment.

Table 4-10: Hydrocarbon threshold levels (NOPSEMA, 2025)

Exposure level	Threshold	Description
Surface oil		
Low	1 g/m^2	Approximates range of socio-economic effects and establishes planning area for scientific monitoring.
Moderate	10 g/m^2	Approximates lower limit for harmful exposures to birds and marine mammals.
High	50 g/m^2	Approximates surface oil slick and informs response planning.
Shoreline oil accumulation		
Low	10 g/m^2	Predicts potential for some socio-economic impact.
Moderate	100 g/m^2	Loading predicts area likely to require cleanup effort.
High	1,000 g/m^2	Loading predicts area likely to require intensive cleanup effort.
Dissolved in-water oil		
Low	10 ppb	Establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers.
Moderate	50 ppb	Approximates potential toxic effects, particularly sublethal effects to sensitive species.
High	400 ppb	Approximates toxic effects including lethal effects to sensitive species.
Entrained in-water oil		
Low	10 ppb	Establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers.
High	100 ppb	As appropriate given oil characteristics for informing risk evaluation.

The risk evaluation is based on the exposure thresholds relevant to each receptor. Whilst recent updates to recommended exposure values have been published (NOPSEMA, 2025), the risk evaluations resulting from hydrocarbon exposure within the EP are still deemed valid due to the conservative nature of the original thresholds (NOPSEMA, 2019) and the relevance of the toxic effects of the updated exposure pathways.

Floating and shoreline exposure thresholds continue to align with earlier recommendations (NOPSEMA, 2019) and represent the level where response techniques are most effective.

It is noted that NOPSEMA (2025) provides refined dissolved and entrained thresholds using Polycyclic Aromatic Hydrocarbons (PAH) for dissolved and Total Hydrocarbons (THC) for entrained exposures. PAH represents the toxic, soluble fraction of hydrocarbons with French-McCay (2025) stating that ecotoxicological risk in the water column is overwhelmingly governed by dissolved phase hydrocarbons which are bioavailable to aquatic organisms. While THC measures the total concentration of suspended oil droplets in the water column, the soluble toxic fraction of oil droplets represents a low proportion of the THC. In addition, THC is largely not bioavailable and is rapidly depleted during weathering (Negri et al., 2025).

Whilst “high” exposure values (high in this context relates to oil concentration and does not necessarily correlate to the degree of consequences/impacts on the environment [NOPSEMA 2025a]) for dissolved pathways have been revised to 300 ppb (NOPSEMA, 2025), this EP has used the original conservative value of 400 ppb (NOPSEMA, 2019). RPS (2024) found there was no

exposure predicted to any receptor at concentrations above 400 ppb. Dissolved moderate exposure levels have remained unchanged.

Negri et al. (2025) states that the entrained exposure thresholds derived by French-McCay (2025) and NOPSEMA (2025) could be considered conservative when applied in oil spill risk assessments as:

- Exposures in offshore and open coastal waters are short (typically hours) but the thresholds were derived from longer exposure tests (typically ~48 h). Since uptake of the toxic hydrocarbon fraction is time dependent, the proposed thresholds overestimate risk.
- Entrained oil droplets become depleted of their soluble fraction by weathering, no longer being a source of dissolved hydrocarbons. There is currently little evidence of harm from entrained droplets, especially highly weathered droplets, and they could be considered not acutely toxic.

French-McCay (2025) also states that entrained oil concentrations must be significantly higher than dissolved phase thresholds (on the order of 1,000–3,000 ppb total hydrocarbons (THC)), to approach levels associated with biological effects, reinforcing that values used in the earlier NOPSEMA (2019) guidance are an extremely conservative screening figure rather than a toxicological threshold. Negri et al. (2025) notes that legacy NOPSEMA entrained oil thresholds (10 ppb) are at least 100-fold more conservative than effect-based THC thresholds and therefore remain valid.

Therefore, as dissolved phase hydrocarbons are known to drive ecotoxicological effects and low entrained oil thresholds remain highly conservative, the impact assessment undertaken in this EP (with respect to a loss of MDO event) remains appropriately precautionary. In addition, the assessment meets the requirements of Regulation 21(5) and Regulation 21(6) of the OPGGS(E) Regulations (2023).

Section 5 Hazard Assessment

Planned activities and unplanned events associated with the Wandoo Facility activities pose a range of different environmental hazards. The risks of these hazards occurring have been assessed using the methodology outlined in Section 4. A matrix of the hazards listed against the activities outlined in Section 2 is provided in Table 5-1. Descriptions of these hazards and how they may occur, along with measures to prevent and mitigate potential environmental impacts, are included in this section.

Table 5-1: Relationship between activities and environmental hazards

		Activity																												Residual risk ranking			
		Field infrastructure	Hydrocarbon production	Flaring, blowdown and	Export of hydrocarbons	Platform support operations	Vessel and MODU	Helicopter operations	Rigless well intervention	Purging of gas from vessels	Pigging	Welding and cutting	Chemical cleaning	Deck cleaning	Topside maintenance	Fire protection systems	Metrology	Survey and Metocean	Diving and ROV	Cleaning and marine	Subsea welding and cutting	Flowline stabilisation	Scour protection	Subsea inspection	Cathodic protection	Flushing and leak testing	Anchoring/mooring	Unutilised assets	Spill response activities				
EP Risk No.	**Hazard**	**2.4**	**2.5**	**2.5.9**	**2.5.11**	**2.6.1**	**2.6.2, 2.6.3**	**2.6.4**	**2.7.1**	**2.7.2**	**2.7.3**	**2.7.4**	**2.7.5**	**2.7.6**	**2.7.7**	**2.7.8**	**2.8.1**	**2.8.2 – 2.8.5**	**2.8.6**	**2.8.7**	**2.8.8**	**2.8.9**	**2.8.10**	**2.8.11**	**2.8.12**	**2.8.13**	**2.8.14**	**2.9.2**		**Consequence**	**Likelihood**	**Residual risk**	**Section**
EP-OP-R01	Accidental release – Loss of well control		x		x	x	x		x																				3	A	RRIV	5.1
EP-OP-R02	Accidental release – Crude from offtake export system				x	x	x																						4	B	RRIII	5.2
EP-OP-R03	Accidental release – Concrete gravity structure		x		x	x	x																						3	B	RRIII	5.3
EP-OP-R04	Environmental impacts of oil spill response																											x	3	B	RRIII	5.4
EP-OP-R05	Accidental release – Diesel handling, storage and distribution				x	x	x																						3	B	RRIII	5.5
EP-OP-R17	Accidental release – Produced fluids from topsides process					x									x														2	B	RRIV	5.6
EP-OP-R22	Accidental release – Crude from flow lines and risers		x		x	x	x																						1	B	RRIV	5.7
EP-OP-R06	Discharge of PFW and ballast water		x								x																		1	E	RRIII	5.8
EP-OP-R21	Introduction of invasive marine species				x	x	x																	x					4	B	RRIII	5.9
EP-OP-R14	Accidental discharge of waste and solid objects		x			x					x				x														2	B	RRIV	5.10
EP-OP-R15	Planned maintenance, inspection and repair discharges		x								x		x			x									x	x			1	E	RRIII	5.11
EP-OP-R07	Noise emissions		x		x	x	x	x								x	x	x											1	E	RRIII	5.12
EP-OP-R08	Atmospheric and greenhouse gas emissions		x	x	x	x	x	x		x																			1	E	RRIII	5.13
EP-OP-R09	Light emissions		x	x	x	x	x																						1	E	RRIII	5.14
EP-OP-R10	Discharge of cooling water		x			x	x																						1	E	RRIII	5.15
EP-OP-R12	Discharge of deck drainage, bilge water, sewage, greywater and putrescible waste from facility and vessels				x	x	x							x	x														1	E	RRIII	5.16
EP-OP-R13	Discharge of desalination brine		x			x	x																						1	E	RRIII	5.17

EP Risk No.	Hazard	Activity: Field infrastructure 2.4	Hydrocarbon production 2.5	Flaring, blowdown and 2.5.9	Export of hydrocarbons 2.5.11	Platform support operations 2.6.1	Vessel and MODU 2.6.2, 2.6.3	Helicopter operations 2.6.4	Rigless well intervention 2.7.1	Purging of gas from vessels 2.7.2	Pigging 2.7.3	Welding and cutting 2.7.4	Chemical cleaning 2.7.5	Deck cleaning 2.7.6	Topside maintenance 2.7.7	Fire protection systems 2.7.8	Metrology 2.8.1	Survey and Metocean 2.8.2 – 2.8.5	Diving and ROV 2.8.6	Cleaning and marine 2.8.7	Subsea welding and cutting 2.8.8	Flowline stabilisation 2.8.9	Scour protection 2.8.10	Subsea inspection 2.8.11	Cathodic protection 2.8.12	Flushing and leak testing 2.8.13	Anchoring/mooring 2.8.14	Unutilised assets 2.9.2	Spill response activities	Residual risk ranking: Consequence	Likelihood	Residual risk	Section
EP-OP-R16	Disturbance to marine fauna and seabirds				x	x	x	x																						1	C	RRIV	5.18
EP-OP-R18	Ancillary hydrocarbon and chemical spills					x																								1	C	RRIV	5.19
EP-OP-R19	Physical presence – Interaction with other marine users	x			x		x																					x		1	B	RRIV	5.20
EP-OP-R20	Seabed disturbance						x											x	x	x	x	x	x		x		x			1	C	RRIV	5.21

5.1 Accidental Release – Loss of Well Control

5.1.1 Hazard Report

Table 5-2: Hazard report – Liquid hydrocarbon release from wells

HAZARD	Liquid hydrocarbon release from wells
EP risk no.	EP-OP-R01
Activity cause	Well intervention operation. Loss of barrier envelope during production operations. Well maintenance equipment failure. Human error during work-over, intervention or production operations. Structural failure of the platform due to fatigue/ageing asset. Dropped object/swinging load onto wellhead during well intervention activities. Passing vessel collision with Platform (applicable to new external wells). Attending vessel collision with Platform. Tanker station keeping failure.
Potential impacts	Release of up to 53 m^3 of Wandoo Crude (commencing 64 days after incident on WNB well B10).
Extent and duration	Localised and short term impact from oil release.
CEE	CEE-01 – Production well blowout.

PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Well intervention operation. Rigless well intervention SL/ electric line/coiled tubing/hydraulic workover/well pumping operations. Entering production well.	Primary well control systems (only required for heavy workovers).	Engineering	Prevention	EPO-OP-01 No unplanned discharge of hydrocarbons or chemicals to the marine environment.	Primary well control shall be maintained at all times during well intervention operations.	The VOGA HWU Ready to Operate and Verification Checklist (which includes confirmation that monitoring equipment is in place and working) has been completed prior to commencement of a heavy workover.
	Secondary well control equipment.	Engineering	Prevention		Well Control and Pressure Control Equipment shall be appropriate for providing control of the well.	The VOGA HWU Ready to Operate and Verification Checklist, which includes confirmation that Well Control Equipment is tested, available and in serviceable condition, is completed.
	Well barrier envelope.	Engineering	Prevention		Well barriers are confirmed to contain anticipated pressure during the program and be in accordance with the Well Intervention program.	The required status of well barriers, and their verifications are specified in the Well Intervention Programme. Barrier verifications shall be recorded on a Barrier Verification Sheet, which shall be signed off. Whenever the status of the barriers change, the barrier verification process shall be recorded, and appropriately signed, on a Barrier Verification Sheet.

PREVENTION						
					All cement slurries when designed to act as barriers shall, following implementation, result in the cured cement providing a barrier which meets the barrier specifications defined in the WCSM.	The results of cementation operations will be verified by VOGA Well intervention Supervisor to confirm that VOGA's barrier specifications have been met.
Human error during work-over, intervention or production operations.	Permit to work system.	Administrative	Reduction		To ensure that permitted operations are controlled and conducted accordance with the Work Management Manual [WPA-7000-YG-0021].	During the Campaign Permit to work forms are completed in accordance with the Work Management Manual [WPA-7000-YG-0021].
	Contractor/vendor selection and management.	Administrative	Reduction		Contractors/vendors shall undertake activities without compromising VOGA's HSE performance and objectives. A pre-qualification process exists that ensures contractors/vendors have the capability to meet VOGA HSE performance requirements and objectives.	Records of Contractor HSE prequalification records as per requirements of VOGA Contractor/Vendor Selection And Management Manual [VOG-1000-MN-0001].
Loss of barrier envelope during production operations.	Well design.	Engineering	Prevention		Wellhead and trees shall contain pressurised hydrocarbons.	Records from leak off tests for WNA and WNB wells (A0001904 to A0001908 and A00002124). Records from wellhead maintenance for WNA and WNB wells (A0001900 to A0001902, A0003018 to A0003021, A00002125 and A00002126).
					WAVs shall close on demand and contain pressurised hydrocarbons.	Records from leak off tests for WNA and WNB B wells (A0001904 to A0001908 and A00002124). Records from wellhead maintenance for WNA and WNB wells (A0001900 to A0001902, A0003018 to A0003021, A00002125 and A00002126).
					SSSVs shall meet minimum API 14B leak rates.	Records from leak off tests for WNA and WNB wells (A0001904 to A0001908 and A00002124). Records from Wellhead Maintenance for WNA and WNB wells (A0001900 to A0001902, A0003018 to A0003021, A00002125 and A00002126)
					GLV shall isolate well fluids.	Records from leak of tests for WNA and WNB wells (A0001904 to A0001908 and A00002124). Records from wellhead maintenance for WNA and WNB wells (A0001900 to A0001902, A0003018 to A0003021, A00002125 and A00002126).
					Production and Surface Annuli shall contain pressurised hydrocarbons should a primary barrier fail.	Records of Production and surface casing. pressures measured and documented in lab records.
	Well integrity management and monitoring of barrier status.	Administrative	Reduction		Well integrity management systems provide for the inspection, maintenance, monitoring and testing of wells to identify deterioration and ensure ongoing integrity.	Well integrity performance monitoring records.

PREVENTION						
Structural failure of the platform due to fatigue/ageing asset.	Structures (Super- and Substructures)	Engineering	Prevention		Physical condition of primary structures shall provide support to Well bay area and equipment: and anomalous effects shall satisfy fitness for service.	Records from structural inspection tasks: • A0002183:1010 (WNB Topside) • A0002184:1010 (WNA Topside) • A0002055:1030 (WNB) • A0002056:1020 (WNA).
Dropped object/ swinging load onto wellhead when lifting over open hatch during well intervention activities.	Lifting management procedures.	Administrative	Reduction		Crane operations shall be managed as per the Crane Operations, Maintenance and Inspection Manual [WPA-7000-YM-0002] to ensure safe lifting operations when lifting over or near open well hatches.	Documentation as per Critical lifting requirements and Crane Operator Checklist completed prior to crane operation.
Passing vessel collision with Platform (applicable to new external wells).	Emergency communications.	Engineering	Prevention	EPO-OP-01 No unplanned discharge of hydrocarbons or chemicals to the marine environment.	VHF and UHF radios shall be in good working order to ensure communication between CCR and external parties.	Records from inspection and maintenance tasks: • A0001000 • A0000987 • A0001003 • A0001004 • A0001005.
	Navigation aids (lights and Automatic Identification System (AIS).	Engineering	Reduction		Navigation lights. To provide visual indication to marine vessels of the position of the installation (WNA & WNB) so that they may take timely action to avoid the area.	Nightshift check sheet includes check of Navigation lights- conducted when WNB is staffed.
					AIS: To provide marine vessels the position of Wandoo (WNB) so that they may take timely action to avoid the area.	Records of inspection and maintenance tasks: • A0002153:1010 to A0002153:1030.
	Platform location published on Marine Charts.	Administrative	Reduction		Wandoo facilities are marked on marine charts and any changes to Wandoo facilities notified via Notices to Mariners.	Records to confirm that Wandoo facilities are on chart and applicable Notice to Mariners.
	500 m PSZ surrounding the facility.	Administrative	Reduction		500 m PSZ surrounding the facility, as per the Wandoo Marine Operations Manual [WNB-1000-YV-0001].	Wandoo Marine Operations Checklist [WNB-1000-NV-0001].
Attending vessel collision with Platform.	Station keeping requirements for vessels.	Administrative	Reduction		Dynamic positioning requirements, as per Section 9 of the Wandoo Marine Operations Manual [WNB-1000-YV-0001].	Wandoo Marine Operations Checklist [WNB-1000-NV-0001].
	Vessel operations restricted in adverse weather.	Administrative	Reduction		Vessel operations restricted in adverse weather, as per the Wandoo Marine Operations Manual [WNB-1000-YV-0001].	Wandoo Marine Operations Checklist [WNB-1000-NV-0001].
	Permission required for field entry, CALM Buoy approach, mooring-up and departure.	Administrative	Reduction		Vessels shall comply with permissioning protocols for vessels entering the field, CALM Buoy approach, mooring-up and departure, as per the Wandoo Marine Operations Manual [WNB-1000-YV-0001].	Wandoo Marine Operations Checklist [WNB-1000-NV-0001].

PREVENTION						
Tanker station keeping failure.	Hawser is fit for purpose.	Engineering	Reduction		Hawser, chains and shackles shall be checked for mechanical damage and wear prior to offtake, as per the SPM Marine Facility Procedures [WPA-7000-YV-0002].	Offtake Maintenance Report.
	CALM Buoy mooring.	Engineering	Reduction		Physical condition and anomalous effects shall satisfy fitness for service.	Records of inspection and maintenance tasks: • A0002147:1010 • A0002145:1010 • A0002057:1010.
	Weather restrictions apply to offtake activities.	Administrative	Reduction		Offtake operations shall be restricted in adverse weather, as per the SPM Marine Facility Procedures [WPA-7000-YV-0002].	Offtake Maintenance Report.
	Wandoo Mooring Master on board tanker during offtake.	Administrative	Reduction		Wandoo Mooring Master meets minimum competency standard as per contract.	Training records confirmed for Mooring Master.
	Static tow by support vessel to control tanker position.	Engineering	Reduction		A support vessel shall be present to assist with each offtake operation and must remain connected to the Tanker, providing static tow, throughout the offtake as per as per the SPM Marine Facility Procedures [WPA-7000-YV-0002].	Safety Checklist.

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Shutdown system.	Engineering	Mitigation	EPO-OP-01 No unplanned discharge of hydrocarbons or chemicals to the marine environment. EPO-OP-02 In the event of loss of hydrocarbons, implement NOPSEMA-accepted spill response documents.	On receipt of signal from field initiators Integrated Control System shall operate and send an output signal in accordance with the Cause and Effects.	Maintenance records for Function Test of ESD 1 and ESD 2: • A0001129:1040.
	Engineering	Mitigation		SIMOPS plan shall cover ESD and Wandoo Emergency Response Plan (ERP) actions between well intervention team and Wandoo operations.	SIMOPS plan is issued and available and Well intervention induction covers ERP and ESD response actions.
Wandoo Emergency Response Plan [VOG-2000-RD-0017].	Administrative	Mitigation		Emergency response arrangements are adequate to manage identified oil spill emergency scenarios Emergency/oil spill response organisational arrangements shall allow effective response management regardless of the scale of the emergency Emergency/oil spill response personnel shall be competent for the ICT role to which they are assigned	Annual oil spill response capability review confirms following arrangements are in place: • Oil spill response testing as per VOGA Emergency Response Schedule [VOG-1100-YH-0001]. • Post exercise and incident review of emergency response arrangements. • Training and competency records are maintained for ICT members.
Source Control Contingency Plan [WNB-3000-PD-0007].	Administrative	Mitigation		Source control plan is in place and resources are available to implement plan.	Annual oil spill response capability review confirms arrangements are in place.

MITIGATION					
The NOPSEMA-accepted Wandoo Field Oil Spill Contingency Plan Document 2: Oil Pollution Emergency Plan [WAN-2000-RD-0001.02] will be implemented.	Administrative	Mitigation		Oil spill response strategies shall be implemented in accordance with the Wandoo Field Oil Spill Contingency Plan Document 2: Oil Pollution Emergency Plan [WAN-2000-RD-0001.02].	IAP records.
The NOPSEMA accepted Wandoo Field Operational and Scientific Monitoring Bridging Implementation Plan [VOG-1100-RG-0002] will be implemented.	Administrative	Mitigation		Oil spill operational and scientific monitoring shall be implemented in accordance with the VOGA Operational and Scientific Monitoring Bridging Implementation Plan [VOG-1100-RG-0002].	IAP records.

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Moderate (3)	Rare (A)	Low

ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
Low risk is defined as tolerable on demonstration of ALARP under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		
Additional management controls	**Assessment of option**	**Adopted/not adopted**
Refer to Section 5.4 for source control and oil spill response ALARP evaluation tables.		
Standby vessel in situ 24 hrs/day.	Monitor the PSZ and be equipped with an automatic identification system to aid in its detection at sea, and radar to aid in the detection of approaching third-party vessels. Reduces risk of vessel collision and subsequent unplanned release of hydrocarbons High cost associated with contracting standby vessel. Costs of operating navigational equipment. The costs associated with having a vessel on location 24/7 are considered disproportionate to the environmental benefit gained, particularly given the infrastructure are marked on charts and navigational aids are present.	Not adopted

RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Moderate (3)	Rare (A)	Low

5.1.2 Description of Hazard

5.1.2.1 Overview

Based on the Safety Case and environmental hazard review workshops held, a well barrier failure resulting in a loss of hydrocarbon could occur from the following activity/causes:

- Well intervention operations
- Loss of well integrity
- Structural failure of platform due to fatigue/ageing asset
- Vessel collision with platform
- Dropped object or swinging load onto the wellhead.

5.1.2.2 Well Intervention Operations

VOGA prepares a detailed program for each well activity to communicate the intended work scope and the well barriers to be in place during the campaign. As part of VOGA's risk management process, the primary failure modes associated with other industry loss of control events are considered during the engineering, designing, planning and preparation for well construction and intervention operations.

MoC procedures are applied to ensure that a rigorous process is applied to assess and manage any risk associated with changes to designs or plans.

For well integrity critical equipment, VOGA only procure or rent equipment that meets relevant API or ISO standards. The relevant standards for the various equipment types used during VOGA's well construction and intervention activities are specified in the VOGA Well Construction Standards Manual. Pressure control equipment that meets VOGA's well construction standards is installed and tested on a well in accordance with the operations program.

The operations program defines the barriers that are to be in place at each phase of the planned activity, and the verification process required to demonstrate effectiveness. VOGA has a rigorous barrier verification process, including interfaces between well construction and production during the well handover phase. The Intervention Contractor's lead hand and VOGA's Intervention Supervisor have to sign off at any point where barrier systems change, to confirm that the VOGA barrier standards have been effectively applied.

Pressure control equipment is pressure tested prior to mobilisation.

VOGA requires that their contractors demonstrate that they operate under a competency management system that ensures their personnel are competent for their assigned positions.

VOGA's senior intervention personnel will hold current well control certification from the International Well Control Forum or International Association of Drilling Contractors, providing an internationally recognised level of well control competence assurance. Training and induction processes will ensure that the contractors intervention team have complete autonomy and understand that VOGA's expectation is that the well will be shut-in at any time when concerns are raised with respect to well control.

Critical intervention equipment is maintained in accordance with the Intervention Contractor's preventative maintenance system.

While well construction operations are ongoing, the reservoir will continue to exhibit a sub-hydrostatic pressure regime requiring a very high level of underbalance to achieve flow to surface.

5.1.2.3 Loss of Well Integrity

Monitoring of annulus pressures and leak testing of wellhead valves and seals is carried out during production operations a per VOGA performance standards. Seal failure would not result in a continuous loss of well fluids; rather it would be similar in nature to riser leak events provided in Section 5.7. Should the seals fail, then the SSSV would impede the hydrocarbon flowing into the marine environment.

Risk to well integrity encountered during production operations is addressed by effective well design with critical erosion and corrosion tolerances. The SSSV is designed against erosion, and erosion would not result in complete well failure. As they are installed in the fluid flow path, there is an expectation that they will leak on closure. ISO standards allow for a limited leak rate from SSSVs on testing.

Risk to well integrity encountered during production operations is addressed by design specification of the well and corrosion monitoring, and the use of corrosion inhibition treatment during operations.

5.1.2.4 Structural Failure of Platform Due to Fatigue/Aging Asset

The Asset Integrity Management System provides a process to maintain and monitor the performance of the WNA and WNB structures to relevant codes and standards as per the facilities' Basis of Design.

Independent design validation/verification for life extension to manage asset beyond design life.

5.1.2.5 Vessel Collision with Platform

Collision avoidance controls vary depending on whether the potential colliding vessel is a passing vessel, attending vessel or an offtake tanker. Controls for passing and attending vessels include communication and navigation systems, and management systems (e.g. 500 m restriction zone, weather restrictions).

Controls to prevent loss of offtake tanker station keeping include the following:

- A hawser fit for purpose
- Structural integrity of CALM Buoy mooring
- Static tow operations
- Management controls over the offtake operation including weather restrictions and use of a Mooring master on the tanker.

The feasibility of installing and using AIS (Automatic identification system) on the Wandoo facilities is currently being assessed.

5.1.2.6 Dropped Objects/Swinging Loads onto Wellhead

Crane operations are managed on the Wandoo Facilities through the administrative procedures within the Crane Operations, Maintenance and Inspection Manual [WPA-7000-YM-0002] and Lifting Management Manual [WPA-7000-YM-0002]. Certified lifting equipment is considered essential in preventing dropped objects and therefore a Critical Control in protecting against potential environmental hazards. All lifting equipment on WNA and WNB are managed as a Critical Element, with lifting over live wells managed as a critical lift.

5.1.2.7 Reservoir Simulation Modelling

VOGA undertook reservoir simulation modelling to determine the worst-case credible release following a LOWC (Technical Report [WNB-7500-RG-0002]). The review was based on VOGA's understanding of Wandoo reservoir physical conditions and properties along with dynamic reservoir simulation, with no obstructions or flow restrictions in the well, in accordance with the methodology of the Society of Petroleum Engineers (SPE) Technical Report: Calculation of Worst-Case Discharge (WCD) (SPE, 2015).

To ensure conservatism, VOGA applied assumptions that reasonably envelope both existing and potential future well designs and reservoir conditions. This approach ensures that the predicted spill rate and duration capture the maximum credible release for the Wandoo Field.

Reservoir simulation and Nodal Analysis were performed using Rock Flow Dynamics' Navigator software to investigate uncontrolled flow rates across several credible scenarios. For all scenarios involving the existing injection well B10, modelling was undertaken assuming:

- No obstructions or restrictions in the wellbore
- As-installed equipment with the largest expected wellbore diameter
- No artificial lift, consistent with a LOWC event
- Unrestricted flow from the reservoir to surface.

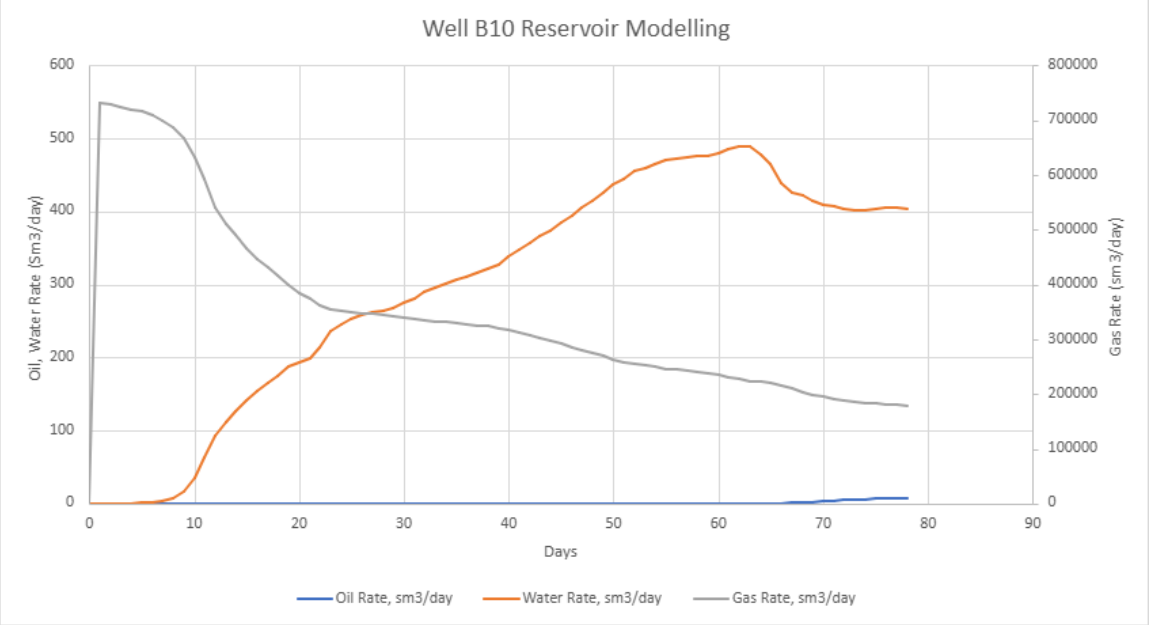
Analysis of the simulation data for B10 demonstrated that oil will not flow until Day 64 following a loss of well integrity (Figure 5-1). This delay is due to the high water cut and low reservoir pressure, which limit the ability of the reservoir to sustain oil flow.

After Day 64, the model predicts a low oil flow rate of approximately 4 m^3/day. Modelling was extended to Day 78, at which point the cumulative predicted release was:

- 53 m^3 of Wandoo Crude (all released after Day 64)
- ~23,368 m^3 of water
- ~27.45 million m^3 of gas.

These results confirm that even under highly conservative, unrestricted-flow assumptions, the existing wells in the Wandoo reservoir are only capable of producing very low oil volumes during a LOWC event, with a prolonged delay before any oil reaches surface.

Figure 5-1: B10 reservoir modelling



5.1.3 Impact and Risk Evaluation

The loss of well control may result in:

- Change in water quality.

The potential risks from a change in water quality caused by the loss of well control include:

- Disruption to marine fauna.

The following receptors within the Operational Area may be impacted:

- Benthic habitats
- Marine fauna, such as:
  - plankton
  - benthic invertebrates
  - fish, sharks and rays.

A detailed description of impacts from a larger volume of Wandoo Crude are described in Section 5.2. Based on the potential cumulative volume of oil released during a worst-case LOWC scenario, it can be assumed that other scenarios (i.e. loss of containment from the offtake export system) represent the worst-case consequence for Wandoo Crude, and therefore no further discussion on impacts related to oil exposure are describe here.

Water volumes are substantially less than the planned volumes released from Produced Formation Water (Section 5.8), therefore the impact evaluation presented there provides the worst-case consequence.

5.1.4 Risk Ranking

The activities undertaken within the Operational Area have the potential to result in an accidental loss of well control (LOWC) and subsequent release of hydrocarbons to the marine environment. While considered potentially credible, the likelihood of such an event occurring during Wandoo production operations is inherently very low.

The IOGP's Risk Assessment Data Directory Report No. 434–2 (IOGP, 2019) provides blowout frequency data based on blowout information from operations between 1980 and 2014 within the U.S, U.K and North Sea. This report stated that the likelihood of a blowout from a production well (which includes injection) in offshore operations carried out to North Sea standards, is 3.7 x 10^{-5} (average).

The use of OGP data is considered appropriate as it is drawn from spheres of operation that are carried out to a similar standard. VOGA's operations are carried out under the NOPSEMA regulatory regime which is similar to that applied in the offshore North Sea. It is therefore reasonable to assume that the standard of VOGA's operations will be similar to offshore North Sea standards.

The use of OGP data is conservative as:

- Oil wells have a lower blowout frequency; however, we have conservatively used the average of oil and gas wells from OGP which results in a slightly higher frequency than for oil wells alone.
- OGP data assumes that wells being drilled can flow to surface which is not true of all Wandoo wells drilled. Therefore, blowout frequency at Wandoo is likely to be lower than statistical data provided in OGP.
- A loss of secondary well control is possible, but unlikely, because of the controls applied during the planning and execution phases of VOGA's drilling operations.

Consequently, the total loss of well control during production activities within Wandoo Field is considered to have an extremely low probability event with a frequency of 3.7 x 10^{-5}. This frequency results in a likelihood rating of Rare (A) in accordance with the VOGA risk assessment process (Section 4.6).

Given the nature and scale of the potential credible LOWC scenario and the associated consequence, impacts were anticipated to be predominantly localised, with short-medium term impacts to individuals or habitats, not affecting species populations. Due to the persistent nature of the Wandoo Crude, one long-term impacts, to species or habitats of recognized conservation value or to local ecosystem function, was identified. Therefore:

- The consequence ranking of '3' (Moderate) was assigned to a change in water quality and subsequent related impacts, and a likelihood of 'A' (Rare) was considered appropriate, resulting in a risk ranking of 'Low' (RRIV).

5.1.5 ALARP Demonstration

Table 5-2 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual

impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with a LOWC. No additional controls were identified that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with a LOWC are assessed as low as reasonably practicable.

5.1.6 Acceptability Demonstration

Table 5-3: Acceptability demonstration - Accidental release – Loss of well control

ACCEPTABLE LEVEL OF RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant principles of ESD not compromised given proposed controls.
External context – objections or claims considered	N/A – no external objections or claims received.
Internal context – VOGA HSE policy/procedures met	Yes – Risk managed in accordance with VOGA HSE policy. Potential spills to be managed in accordance with the Wandoo Field OSCP [WAN-2000-RD-0001] and Source Control Contingency Plan.
Other requirements met	Yes – including: • Notice to Mariners issued via AMSA in a timely manner. • Potential spills to be managed in accordance with SOPEP/SMPEP (equivalent to class). It is considered that the petroleum activity is consistent with the objectives and actions of the following EPBC management plans that identify marine pollution as a threat (Table 1-3): • National recovery plan for the red goshawk *Erythrotriorchis radiatus* (DCCEEW, 2012) • Approved Conservation Advice for *Anous tenuirostris melanops* (Australian lesser noddy) • National Recovery Plan for the Australian Fairy Tern (*Sternula nereis nereis*) (DAWE, 2020a) • Approved Conservation Advice for *Sternula nereis nereis* (Fairy Tern) (TSSC, 2011) • Approved Conservation Advice for *Calidris canutus* (Red Knot) (DCCEEW, 2024k) • Approved Conservation Advice for *Calidris frruginea* (Curlew sandpiper) (DCCEEW, 2023a) • Approved Conservation Advice for *Papasula abbotti* (Abbott's booby) (TSSC, 2020a) • Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW, 2024o) • Conservation Advice for *Charadrius leschenaultii* (greater sand plover) (DCCEEW, 2023e) • Conservation Advice for *Limnodromus semipalmatus* (Asian dowitcher) (DCCEEW, 2024m) • Conservation Advice for *Numenius madagascariensis* (far eastern curlew) (DCCEEW, 2023g)

ACCEPTABLE LEVEL OF RISK DEMONSTRATED	
	• Conservation Advice *Phaethon lepturus fulvus* white-tailed tropicbird (Christmas Island) (DoE, 2014) • Conservation Advice for *Tringa nebularia* (common greenshank) (DCCEEW, 2024p) • Wildlife Conservation Plan for Migratory Shorebirds – 2015 (DoE, 2015b) • Approved Conservation Advice for *Pristis zijsron* (green sawfish) (DEWHA, 2008b) • Approved Conservation Advice for *Pristis clavata* (dwarf sawfish) (DEWHA, 2009) • Sawfish and River Sharks Multispecies Recovery Plan: (*Pristis pristis, Pristis zijsron, Pristis clavata, Glyphis glyphis and Glyphis garricki*) (DoE, 2015c).
RR < High (RRII)	Yes – Low (RRIV).
EPO(s) manage impacts to acceptable level(s)	Yes – The following relevant EPOs will be maintained: • EPO-OP-01 • EPO-OP-02 See Section 7 for further details.
Acceptability summary: The impacts and potential risks of an accidental release of liquid hydrocarbon from wells have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-98), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.9).	

5.2 Accidental Release - Crude from Offtake Export System

5.2.1 Hazard Report

Table 5-4: Hazard report – Crude release from export system

HAZARD	Crude release from export system
EP risk no.	EP-OP-R02
Activity cause	Offtake tanker station keeping failure causing hose rupture. Crude oil spill due to submarine hose, FHA or marine breakaway coupling failure (includes spurious activation and FHA detachment). Dropped objects/ swinging load onto export systems. Crude oil spill due to anchor drag during project activities. Attending or passing vessel collision with tanker whilst on station and connected to the Wandoo asset.
Potential impacts	Loss of crude oil from export system, i.e. <300 m^3 crude oil to sea.
Extent and duration	Exposure up to 500 km. Transient short term impact.
CEE	CEE-02 – Loss of Containment Crude release from export equipment submarine hose, floating hose or export flow lines.

PREVENTION						
Activity/cause	Existing management controls	Control type	Control hierarchy	Performance outcome	Environmental performance standard	Measurement criteria
Offtake tanker station keeping failure causing hose rupture.	Marine breakaway coupling on FHA.	Engineering	Reduction	EPO-OP-01 No unplanned discharge of hydrocarbons or chemicals to the marine environment.	Marine breakaway coupling shall be installed on FHA and designed to part prior to failure of FHA to prevent loss of containment if excessive forces occur.	Marine breakaway coupling testing record. Offtake Maintenance Report.
	Hawser is fit for purpose.	Engineering	Reduction		Hawser, chains and shackles shall be checked for mechanical damage and wear prior to offtake, as per the SPM Marine Facility Procedures [WPA-7000-YV-0002].	Offtake Maintenance Report.
	CALM Buoy mooring.	Engineering	Reduction		Physical condition and anomalous effects shall satisfy fitness for service.	Records of inspection and maintenance tsks: • A0002147:1010 • A0002145:1010 • A0002057:1010.
	Weather restrictions apply to offtake activities.	Administrative	Reduction		Offtake operations shall be restricted in adverse weather, as per the SPM Marine Facility Procedures [WPA-7000-YV-0002].	Offtake Maintenance Report.
	Wandoo Mooring Master on board tanker during offtake.	Administrative	Reduction		Wandoo Mooring Master meets minimum competency standard as per contract.	Training records confirmed for Mooring Master.
	Static tow by support vessel to control tanker position.	Engineering	Reduction		A support vessel shall be present to assist with each offtake operation and must remain connected to the Tanker, providing static tow, throughout the offtake as per as per the SPM Marine Facility Procedures [WPA-7000-YV-0002].	Safety Checklist.

PREVENTION						
Release from export risers	Export risers contain export system liquids.	Engineering	Prevention		The wall thickness of export risers shall be sufficient to satisfy fitness for service.	Records of inspection task: A0003000
Release from export flowline	Production flow lines contain export system liquids.	Engineering	Prevention		• There shall be no visible damage to the outer sheath . • There shall be no over-bending of the flowline. • There shall be no evidence of leaking from the flowline.	Records of inspection task: • Visual Inspection A0002158 : 1010 • Visual Inspection A0002158 : 1020.
Crude oil spill due to submarine hose, FHA or marine breakaway coupling failure (includes spurious activation and FHA detachment).	Operating within design limits.	Engineering	Reduction		Pre-start checks undertaken, as per the SPM Marine Facilities Procedures [WPA-7000-YV-0002].	Offtake Maintenance Report.
Use of temporary reducing spool with missing material traceability information (potential increase in corrosion rate)	Increased frequency of spool visual inspections:	Administrative	Reduction		Whilst Temporary MOC 6839 is open and spool is in service, spool visual inspections: 6 monthly inspections for the first 12 months, then 12 monthly assuming no accelerated degradation noted.	Records of Inspection
Dropped objects/ swinging load onto export systems.	Lifting management procedures.	Administrative	Reduction		Crane operations shall be managed as per the Crane Operations, Maintenance and Inspection Manual [WPA-7000-YM-0002] to ensure safe lifting operations when lifting over live export system.	Documentation as per Critical lifting requirements and Crane Operator Checklist completed prior to crane operation.
Crude oil spill due to anchor drag during project activities	Cautionary zones around the subsea production systems are marked on field navigational charts.	Administrative	Reduction		Anchoring location and cautionary zone identified in the Wandoo Marine Operations Manual (vessels) and SPM Marine Facilities Procedures [WPA-7000-YV-0002] (tankers).	Operations log (tankers). Wandoo Marine Operations Manual provided to vessels.
Attending or passing vessel collision with tanker whilst on station and connected to the Wandoo asset.	Weather restrictions.	Administrative	Reduction		Offtake operations shall be restricted in adverse weather, as per the SPM Marine Facility Procedures [WPA-7000-YV-0002].	Offtake Maintenance Report.
	Platform location published on Marine Charts.	Administrative	Reduction		Wandoo facilities are marked on marine charts and any changes to Wandoo facilities shall be notified via Notices to Mariners.	Records to confirm that Wandoo facilities are on Marine Charts and applicable Notice to Mariners.
	Tanker navigation aids.	Engineering	Reduction		Regulatory compliant tanker navigation aids, as per the SPM Marine Facilities Procedures [WPA-7000-YV-0002].	Safety Checklist.
	Tanker communications in place.	Engineering	Reduction		Radio communications in place with production facility and available to support vessel and passing vessels during berthing, loading and unberthing.	Safety Checklist.

PREVENTION						
	Emergency communications.	Engineering	Prevention		VHF and UHF radios shall be in good working order to ensure communication between CCR and external parties.	Records from inspection and maintenance tasks: • A0001000 • A0000987 • A0001003 • A0001004 • A0001005.
	500 m PSZ surrounding the facility.	Administrative	Reduction		500 m PSZ surrounding the facility, as per the Wandoo Marine Operations Manual [WNB-1000-YV-0001].	Wandoo Marine Operations Checklist [WNB-1000-NV-0001].
	Station keeping requirements for vessels.	Administrative	Reduction		Dynamic positioning requirements, as per Section 9 of the Wandoo Marine Operations Manual [WNB-1000-YV-0001].	Wandoo Marine Operations Checklist [WNB-1000-NV-0001].
	Vessel operations restricted in adverse weather.	Administrative	Reduction		Vessel operations restricted in adverse weather, as per the Wandoo Marine Operations Manual [WNB-1000-YV-0001].	Wandoo Marine Operations Checklist [WNB-1000-NV-0001].
	Static tow by support vessel to control tanker position.	Engineering	Reduction		A support vessel shall be present to assist with each offtake operation and must remain connected to the Tanker, providing static tow, throughout the offtake as per as per the SPM Marine Facility Procedures [WPA-7000-YV-0002].	Safety Checklist.
	Permission required for field entry, CALM Buoy approach, mooring-up and departure.	Administrative	Reduction		Vessels shall comply with permissioning protocols for vessels entering the field, CALM Buoy approach, mooring-up and departure, as per the Wandoo Marine Operations Manual [WNB-1000-YV-0001].	Wandoo Marine Operations Checklist [WNB-1000-NV-0001].

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Wandoo Emergency Response Plan [VOG-2000-RD-0017].	Administrative	Mitigation	EPO-OP-02 In the event of loss of hydrocarbons, implement NOPSEMA-accepted spill response documents.	Emergency response arrangements are adequate to manage identified oil spill emergency scenarios Emergency/oil spill response organisational arrangements shall allow effective response management regardless of the scale of the emergency Emergency/oil spill response personnel shall be competent for the ICT role to which they are assigned	Annual oil spill response capability review confirms following arrangements are in place: • Oil spill response testing as per VOGA Emergency Response Schedule [VOG-1100-YH-0001]. • Post exercise and incident review of emergency response arrangements. • Training and competency records are maintained for ICT members.
Visual monitoring of FHA during offtake.	Administrative	Mitigation		Visual monitoring of hose and connections for leaks during loading, including night time operations via torchlight, as per SPM Marine Facilities Procedures [WPA-7000-YV-0002].	Safety Checklist.
Emergency shutdown of crude oil transfer in the event of a leak.	Isolation	Mitigation		Emergency shutdown of crude oil transfer in the event of a leak, as per SPM Marine Facilities Procedures [WPA-7000-YV-0002].	Safety checklist records that emergency shutdown procedures are agreed upon between tanker and production facility.

MITIGATION					
The NOPSEMA-accepted Wandoo Field Oil Spill Contingency Plan Document 2: Oil Pollution Emergency Plan [WAN-2000-RD-0001.02] will be implemented.	Administrative	Mitigation		Oil spill response strategies shall be implemented in accordance with the Wandoo Field Oil Spill Contingency Plan Document 2: Oil Pollution Emergency Plan [WAN-2000-RD-0001.02]	IAP records.
Holdback device on marine breakaway coupling.	Engineering	Mitigation		Holdback device installed on Marine breakaway coupling to prevent spurious detachment of FHA.	Inspection records.
The NOPSEMA accepted Wandoo Field Operational and Scientific Monitoring Bridging Implementation Plan [VOG-1100-RG-0002] will be implemented.	Administrative	Mitigation		Oil spill operational and scientific monitoring shall be implemented in accordance with the VOGA Operational and Scientific Monitoring Bridging Implementation Plan [VOG-1100-RG-0002].	IAP records.

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Major (4)	Unlikely (B)	Medium

ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
A medium risk is defined as tolerable on demonstration of ALARP under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		
Additional management controls	**Assessment of option**	**Adopted/not adopted**
Refer to Section 5.4 for source control and oil spill response ALARP evaluation tables.		
Standby vessel in situ 24 hrs/day: monitor the PSZ and be equipped with an automatic identification system to aid in its detection at sea, and radar to aid in the detection of approaching third-party vessels.	Reduces risk of vessel collision and subsequent unplanned release of hydrocarbons. High cost associated with contracting standby vessel. Costs of operating navigational equipment. The costs associated with having a vessel on location 24/7 are considered disproportionate to the environmental benefit gained, particularly given the infrastructure are marked on charts and navigational aids are present.	Not adopted
An alternative to exporting via a tanker is a pipeline to shore.	This arrangement is not only cost prohibitive but also could potentially introduce higher spill frequency, and impacts due to the pipeline length, inventory, and proximity to shoreline sensitivities.	Not adopted
Load monitoring system (to support weather criteria during export/offtake operations)	A load monitoring system would provide a tool for supporting weather criteria associated with export, however it does not provide sufficient risk reduction which considering existing controls. A load monitoring system would provide an additional tool for monitoring tension and loads on the Floating Hose Assembly (FHA) during offtake operations and could theoretically support decision-making related to weather criteria. However, the system does not provide sufficient incremental risk reduction when considered alongside existing engineering and procedural controls already in place for FHA integrity and weather-related operational limits. Given these existing controls, a load monitoring system would not materially reduce the likelihood or consequence of FHA failure.	Not adopted

RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Major (4)	Unlikely (B)	Low

5.2.2 Description of Hazard

As outlined in Section 2.5.11, crude oil is exported from the Wandoo facilities into an offtake tanker every 2 to 8 weeks, typically lasting up to 72 hours depending on the cargo size. The transport of hydrocarbons carries an inherent risk of spills which needs to be managed.

The following credible crude oil spill hazard scenario has been identified:

- Loss of crude oil from export system (estimated at 300 m^3 of Wandoo Crude).

Possible causes for a release of hydrocarbon during offloading include:

- Offtake tanker moving during the transfer process (i.e. a station keeping failure) causing the floating offloading hose to rupture
- A failure of the submarine hose, FHA or marine breakaway coupling
- Dropped object onto the subsea export system
- Damage to the subsea export system due to anchor drag during project activities between the north face of WNB and the CALM Buoy
- Internal or external corrosion of offloading system components (including export riser, PLEM, reducing spool and CALM Buoy pipework).

As the offtake process is continuously supervised, any release would be seen by the tanker or Facility personnel, and the offtake pumps would be stopped. This is considered to limit the volume of the release to a maximum of 300 m^3 of crude oil.

There is the potential for the marine breakaway coupling to part during periods between offtakes. Conservatively a maximum of 30 m^3 of crude is contained within the length of the FHA during normal operations, with <5 m^3 of crude stored within the sections beyond the marine breakaway coupling. Given the potential for crude to also leak from the attached FHA during a period of time until detection, the maximum volume of crude released to the surrounding marine environment is considered to be up to a maximum of 30 m^3. This is less than the worst-case volume modelled (as above).

5.2.2.1 Spill Modelling Results

Descriptions of the spill model used, modelling parameters, exposure thresholds and hydrocarbon characteristics are provided in Section 4.12.

Table 5-5 provides a summary of the results from the stochastic modelling report (RPS, 2025; Appendix B) for an accidental release of Wandoo crude from the offtake export system.

Table 5-5: Summary of the hydrocarbon modelling results for an accidental release of Wandoo crude from the offtake export system (RPS, 2025)

Exposure values	Summary of worst-case predicted exposure
Surface exposure	
Low (1 g/m^2)	The maximum distance for floating surface hydrocarbon exposure at or above this threshold from the source was predicted to be 347km. The highest probability of hydrocarbon exposure was 3% at Glomar Shoals KEF, with the minimum time to contact in that scenario of 3 days and 19 hours.
Moderate (10 g/m^2)	The maximum distance for floating surface hydrocarbon exposure at or above this threshold from the source was predicted to be 56 km (during transitional seasonal conditions). No exposure was predicted to any receptor(s) at this threshold.
High (50 g/m^2)	The maximum distance for floating surface hydrocarbon exposure at or above this threshold from the source was predicted to be 20 km (during winter seasonal conditions). No exposure was predicted to any receptor(s) at this threshold.
Shoreline exposure	
Low (10 g/m^2)	The highest probability of hydrocarbon accumulation on any shoreline at or above this threshold was 66%. The minimum time to shore at or above the low threshold was 2 days 20 hours (Barrow Island and Montebello Islands). The maximum total volume of hydrocarbon ashore for a single spill trajectory was 62.8 m^3. The maximum length of hydrocarbon ashore above the low threshold on any shoreline was 125 km.
Moderate (100 g/m^2)	The highest probability of hydrocarbon accumulation on any shoreline at or above the moderate threshold was 26%. The minimum time to shore at or above the moderate threshold was 3 days 10 hours (Barrow Island and Montebello Islands). The maximum total volume of hydrocarbon ashore for a single spill trajectory was 50.2 m^3. The maximum length of hydrocarbon ashore above the moderate threshold on any shoreline was 19 km.
High (500 g/m^2)	No exposure at this threshold was predicted.
In-water exposure – dissolved	
Low (10 ppb)	The maximum distance for dissolved hydrocarbons at or above this threshold from the source was predicted to be 45 km. No exposure to receptors was predicted.
Moderate (50 ppb)	No exposure at this threshold was predicted.
High (400 ppb)	No exposure at this threshold was predicted.
In-water exposure – entrained	
Low (10 ppb)	The maximum distance for entrained hydrocarbons at or above this threshold from the source was predicted to be 504 km.

Exposure values	Summary of worst-case predicted exposure
	The minimum time to dissolved hydrocarbon exposure at any given receptor(s) was 18 hours (Montebello AMP). The probability of intersect with the Montebello AMP is 63%.
High (100 ppb)	The maximum distance for entrained hydrocarbons at or above this threshold from the source was predicted to be 326 km. The minimum time to dissolved hydrocarbon exposure at any given receptor(s) was 19 hours (Montebello AMP). The probability of intersect with the Montebello AMP is 28%.

5.2.3 Impact and Risk Evaluation

The accidental release of crude from the offtake export system may result in:

- Change in water quality.

The potential risks from a change in water quality caused by the accidental release of crude from the offtake export system include:

- Disruption to marine fauna
- Injury/mortality to marine fauna
- Change in ecosystem dynamics and conservation values
- Changes to the functions, interests, or activities of other marine users
- Change in submerged cultural heritage.

The following receptors within the Operational Area may be impacted:

- Benthic habitats.
- Coastal communities.
- Marine fauna, such as:
  - plankton
  - benthic invertebrates
  - seabirds and shorebirds
  - fish, sharks and rays
  - marine mammals
  - marine reptiles
  - Protected and significant areas.
- Social and economic environment, such as:
  - recreational fishing, fisheries and aquaculture
  - other marine users.
- First Nations values.

5.2.3.1 Risk Assessment

Water Quality

Change in Water Quality

The accidental release of Wandoo Crude from the offtake export system into the marine environment has the potential to cause a localised reduction of the water quality in the receiving marine environment. A visible oil sheen on the water surface may also occur in the event of a hydrocarbon spill.

As discussed in Section 3.3.2, the marine water quality within the Hydrocarbon Area and EMBA is expected to be representative of the typically pristine and high-water quality found in offshore WA waters and previous surveys identified no detectable hydrocarbons. The hydrocarbon modelling predicted that the maximum distance for floating surface hydrocarbon exposure at any threshold would extend out to 347 km, and 45 km and 504 km for dissolved and entrained hydrocarbons, respectively (RPS, 2025). Therefore, changes to water quality will occur outside of the Operational Area in the unlikely event of a release of Wandoo Crude from the offtake export system.

Due to the highly dispersive environment typical of the offshore area, high levels of entrainment may be expected for the persistent hydrocarbon depending on the weather conditions, with 0% up to 93.9% of the volume having the potential to entrain within 24 hours of the release (Section 4.12.4.1 As such, changes to water quality may be medium-term. The consequence ranking of '3' (Moderate) was assigned to a change in water quality due to the duration of change and extent of the spill outside the Operational Area.

Benthic Habitats

Benthic habitats have been assessed based on the hydrocarbon exposure at the thresholds that have the potential to cause ecological impacts, which is defined as the Hydrocarbon Area (refer to Section 3.1.1). Table 5-6 evaluates the potential impact that hydrocarbon spills for this activity may have on benthic habitat receptors found within the Hydrocarbon Area.

Table 5-6: Risk assessment for an accidental release of Wandoo Crude – Benthic habitats

Benthic habitats
Exposure evaluation:
The seafloor in the Hydrocarbon Area is comprised of fine silt/sand substrates with low densities of benthic communities. Coral, seagrass, or macroalgae communities are found in nearshore areas of islands within the Hydrocarbon Area (i.e. Montebello Islands) (Section 3.4.1). The seafloor of the deeper waters of the NWS is primarily a soft sediment habitat that can support scavengers, benthic filter feeders and epifauna communities (Brewer et al., 2007). Any areas of exposed hard substrate are likely to be colonised by deep water filter-feeding organisms, such as hydroids and sponges. Biologically significant coral reef formations are found within the Hydrocarbon Area, such as hard corals found at the Montebello Islands. Seagrasses are found through shallower areas of the Hydrocarbon Area. Montebello Island contain sparse seagrass habitat (McMahon et al., 2017), however, the closest known key areas of seagrass habitat to the Operational Area are the Exmouth Gulf and Ningaloo Reef area, outside of the Hydrocarbon Area. Macroalgae is widespread within shallower hard substrate areas within the Hydrocarbon Area. Due to the widespread nature of macroalgal habitat within the Hydrocarbon Area, there are no identified areas of significant environmental value. The maximum distance for dissolved hydrocarbons at moderate exposure (50 ppb) from the source was predicted to be 45 km and 326 km for entrained hydrocarbons at the high threshold (100 ppb). Release of Wandoo Crude will be at the surface, with the majority of hydrocarbon and weathered products remaining at or near the surface. In general, only a small number of residual oil types are sufficiently dense enough to sink when spilled into the marine environment. Typically, hydrocarbons with an API value less than 7 will be denser and may sink in seawater, and an API less than 10 will be denser for freshwater and may sink (EPA, 2006). The API for Wandoo Crude is 19.4 (4.12.4.1), as such it will float on the surface or remain suspended within the water column (typically within 0-10m) when released into the marine environment. The hydrocarbon will only sink if it is mixed with denser sediments resulting in sedimentation to occur. This can be common in areas of large tidal action (ITOPF, 2024).
Predicted impact:
In-water
Corals Exposure of entrained hydrocarbons to shallow subtidal corals has the potential to result in lethal or sublethal toxic effects, resulting in acute impacts or death at moderate to high exposure thresholds (Shigenaka, 2011). Physical effects from entrained hydrocarbons have the potential to coat contacted coral reefs. The phenomena of smothering of exposed coral surfaces or polyps by hydrocarbon spills has only been reported where very large oil spill quantities, or very sticky oil slicks, have been encountered. Contact with corals may lead to reduced growth rates, tissue decomposition, impaired fertilisation and larval settlement, and poor resistance and mortality of sections of reef (NOAA, 2010).

Benthic habitats
In-water exposure (dissolved or entrained) at relevant exposure thresholds is typically only predicted to occur within the upper 0–10 m of the water column, therefore, corals found in water depths below 10 m are not anticipated to be impacted by in-water hydrocarbon exposure. Seagrass In-water exposure (dissolved or entrained) is only predicted to occur within the upper 0 – 10 m of the water column (RPS, 2024); therefore, benthic habitat, such as seagrass, within intertidal or shallow nearshore waters has the potential to be exposed. Intertidal and subtidal seagrass ecosystems can be damaged in a number of ways. Direct mortality from smothering can occur, however, sub-lethal impacts from smothering are more likely to occur than lethal impacts because much of seagrasses' biomass is underground in their rhizomes and less likely to be exposed to hydrocarbons (Zieman et al., 1984). However, exposure also can take place via uptake of hydrocarbons through plant membranes and seeds may be affected by contact with oil contained within sediments (NRDA, 2012). Petroleum fractions absorbed into the seagrass tissues, can also lower the organism's tolerance to other stressors and reduce growth rates (Zieman et al., 1984) (Runcie et al., 2010). Studies of offshore benthic seaweeds in the northwest Gulf of Mexico prior to and after the Macondo well blowout at Sackett and Ewing banks (in water depths of 55 – 75 m) found a dramatic die-off of seaweeds after the spill (60 species pre-spill compared with 10 species post-spill) (Felder et al., 2014). However, these banks are exposed to influences from Mississippi River discharges that vary year to year, so definitive links to the oil spill were not possible. Petroleum residues were observed on Ewing Bank and it is possible that this may have caused localised mortalities. Entrained hydrocarbon within the water column can affect light qualities and the ability of macrophytes, including seagrasses and macroalgae, to photosynthesise. Macroalgae Macroalgae are predicted to be exposed to in-water hydrocarbons. In-water exposure (entrained and dissolved) is only predicted to occur within the upper 0-10 m of the water column; therefore, benthic habitats, such as macroalgae, within intertidal or shallow nearshore waters has the potential to be exposed. Intertidal macroalgal beds are more prone to hydrocarbon spills than subtidal beds because, although the mucous coating of the macroalgae prevents oil adherence, oil that is trapped in the upper canopy may be more persistent, which impacts site-attached species. Additionally, when oil sticks to dry fronds on the shore, they can become heavy and break as a result of wave action (IPIECA, 2002). The physical effects of smothering, fouling and asphyxiation has been documented from oil contamination in marine plants (Blumer, 1971; Cintron et al., 1981). In macroalgae, oil can act as a physical barrier for the diffusion of CO_2 across cell walls (O'Brien and Dixon, 1976). The effect of hydrocarbons, however, is largely dependent on the degree of direct exposure and how much of the hydrocarbon adheres to algae, which will vary depending on the oils physical state and relative 'stickiness'. The morphological features of macroalgae, such as the presence of a mucilage layer or the presence of fine 'hairs' will influence the amount of hydrocarbon that will adhere to the algae. A review of field studies conducted after spill events by Connell et al. (1981) indicated a high degree of variability in the level of impact, but in all instances, the algae appeared to be able to recover rapidly even from very heavy oiling. The rapid recovery of algae was attributed to the fact that for most algae, new growth is produced near the base of the plant while the distal parts (which would be exposed to the oil contamination) are continually lost. Other studies have

Benthic habitats
indicated that kelp beds oiled by crude oil had a 90% recovery within 3–4 years of impact, however, full recovery to pre-spill diversity may not occur for long periods after the spill (French-McCay, 2004). The toxicity of hydrocarbons to macroalgae varies for the different macroalgal life stages, with water-soluble hydrocarbons more toxic (Van Overbeek and Blondeau, 1954; Kauss et al., 1973; cited in O'Brien and Dixon, 1976). Toxic effect concentrations for hydrocarbons and algae have varied greatly among species and studies, ranging 0.002–10,000 ppm (Lewis and Pryor, 2013). The sensitivity of gametes, larva and zygote stages, however, have all proven more responsive to oil exposure than adult growth stages (Thursby and Steele, 2004; Lewis and Pryor, 2013). Entrained hydrocarbon within the water column can also affect light qualities and the ability of macrophytes, including seagrasses and macroalgae, to photosynthesise.
Predicted impact summary:
There is a high probability of intersect of in-water hydrocarbons with receptors where benthic habitats, such as coral, seagrass, and macroalgae, are known to occur (Section 3.4.1). However, these benthic habitats are typically restricted to shallow nearshore and intertidal waters only, outside of the main exposure area predicted within 0 – 10 m of the sea surface. Any impacts to benthic habitats and associated communities is anticipated to be localised and short-term, with recovery expected within 5 years.

Coastal Communities

Coastal communities have been assessed based on the hydrocarbon exposure based on the hydrocarbon exposure at the thresholds that have the potential to cause ecological impacts, which is defined as the Hydrocarbon Area (refer to Section 3.3). Table 5-7 evaluates the potential impact that hydrocarbon spills for this activity may have on coastal receptors found within the Hydrocarbon Area.

Table 5-7: Risk assessment for an accidental release of Wandoo Crude – Coastal communities

Mangroves		
Exposure evaluation:		
Regionally significant areas of mangrove communities are found within the Dampier Archipelago, Montebello Islands, Ningaloo Coast and scattered areas along the coast between Onslow and just north of Port Hedland (Section 3.4.2.1). The spill modelling identified that the highest probability of hydrocarbon accumulation on any shoreline at or above the moderate threshold (100 g/m^2) was 26%. The minimum time to shore was 3.42 days (82 hours) and the maximum total volume of hydrocarbon ashore for a single spill trajectory was 50.2 m^3 (Table 5-5). The Barrow Island and Montebello Islands (A) shoreline cell Montebello Island recorded the maximum length of hydrocarbon ashore above the moderate threshold (14 km) (RPS, 2025).		
Predicted impact:		
Surface	**In-water**	**Shoreline**
Mangroves are considered to have a high sensitivity to hydrocarbon exposure. The severity of exposure for mangroves depends on the amount and type of oil entering the intertidal zone (Duke, 2016). In contrast to light oils, heavy oils with high specific gravity (such as Wandoo Crude) are particularly proficient at coating and smothering small plants and aerial root systems (Hensel et al., 2014; Connolly et al., 2020). Mangroves can be killed by heavy or viscous oil, or emulsification, that covers the trees' breathing pores thereby asphyxiating the subsurface roots, which depend on the pores for oxygen.	Mangroves can also take up in-water hydrocarbons from contact with leaves, roots or sediments, and it is suspected that this uptake causes defoliation through leaf damage and tree death (Wardrop et al., 1987). Acute impacts to mangroves can be observed within weeks of exposure, whereas chronic impacts may day months to years to detect.	Oil can enter mangrove forests when the tide is high and be deposited on the aerial roots and sediment surface as the tide recedes. The physical smothering of aerial roots by standard hydrocarbons can block the trees' breathing pores used for oxygen intake and result in the asphyxiation of sub-surface roots (International Petroleum Industry Environmental Conservation Association (IPIECA, 1993). Burns et al. (1993) identified that mangrove communities may take up to 20 years or longer to recover from the toxic impact of catastrophic oil spills. This is due to the long-term persistence of oil trapped in anoxic sediments and subsequent release into the water column. This result was a part of the findings from a long-term assessment of an oil spill of medium-weight crude oil which impacted a coastal fringe mangrove ecosystem in Panama (Burns et al., 1993). Similarly, other studies have determined that mangroves can take more than 30 years to recover from severe oil spill impacts. (NOAA, 2014b). A recent long-term study by

		Connolly et al. (2020) on the recovery of mangroves to the Era tanker spill in Spence Gulf of southern Australia analysed aerial images which showed there no recovery in heavily oiled areas for 10 years following the oiling event and only 50% of the mangrove canopy had recovered after 25 years. Predictive modelling indicates complete mangrove recovery to heavy oiling could therefore take up to 55 years, longer than anticipated (Connolly et al., 2020).
Predicted impact summary:		
Impacts to significant coastal mangrove communities located at Dampier Archipelago, Montebello Islands, Ningaloo Coast and scattered areas along the coastline may occur given the extent of the Hydrocarbon Area and physical characteristics of the Wandoo Crude, as a persistent hydrocarbon, which is predicted to remain either floating at the sea surface, or persist as entrained droplets within the water column, depending on the weather conditions (4.12.4.1, until it slowly decays or degrade over time following the release into the marine environment. Furthermore, limited weathering is expected prior to shoreline impact, with the minimum time to shoreline accumulation predicted after ~3 days. Given the high sensitivity of mangrove communities to hydrocarbons and the potential recovery rates, the potential consequence to mangroves is persistent but reversible, long-term impacts, to species or habitats of recognized conservation value or to local ecosystem function.		
Saltmarsh		
Exposure evaluation:		
Saltmarsh habitat is common within tidal flats or wetland habitats within the wider EMBA (Section 3.4.2.2), with regionally significant saltmarsh habitats found along the Pilbara coastline, including Barrow Island (Figure 3-6). The spill modelling identified that the highest probability of hydrocarbon accumulation on any shoreline at or above the moderate threshold was 26%. At a specific shoreline, spill modelling identified that the highest probability of hydrocarbon accumulation, at or above the moderate threshold (100 g/m^2) was 14% at the Barrow Island and Montebello Islands (A) shoreline cell. The minimum time to this shore was 3.42 days (82 hours) and the maximum total volume of hydrocarbon ashore for a single spill trajectory was 38 m^3. Montebello Island also recorded the maximum length of hydrocarbon ashore above the moderate threshold (14 km).		
Predicted impact:		
Shoreline		
Saltmarsh is considered to have a high sensitivity to hydrocarbon exposure. Hydrocarbon (in liquid form) will readily adhere to the marshes, coating the stems from tidal height to sediment surface. However, heavy oil coating is unlikely due to the highly volatile nature of the condensate hydrocarbon.		

Oil can enter saltmarsh systems during the tidal cycles if the estuary/inlet is open to the ocean. Saltmarsh vegetation offers a large surface area for oil absorption and tends to trap oil. Similar to mangroves, this can lead to a patchy distribution of the oil and its effects, because different places within the inlets are at different tidal heights. Evidence from case histories and experiments shows that the damage resulting from oiling, and recovery times of oiled marsh vegetation, are highly variable. In areas of light to moderate oiling where oil is mainly on perennial vegetation with little penetration of sediment, the shoots of the plants may be killed but recovery can be relatively rapid, occurring the following growing season or earlier. However, when oil penetrates the soil and the initial mortality of the vegetation is extensive, recovery to reference conditions may take 3 – 4 years (Hester and Mendelssohn, 2000).
Predicted impact summary:
Impacts to saltmarsh habitat common within tidal flats or wetland habitats along the Pilbara coastline and at certain offshore islands within the Hydrocarbon Area may occur given the extent of the Hydrocarbon Area and physical characteristics of the Wandoo Crude, as a persistent hydrocarbon, which is predicted where limited weathering is expected prior to shoreline impact, with the minimum time to shoreline accumulation predicted after ~3 days. These habitats are considered highly sensitive to hydrocarbons. Previous studies have identified that recovery rates following heavy oiling may take 3 – 4 years (Hester and Mendelssohn, 2000). To account for their sensitivity to hydrocarbons, the potential consequence to saltmarsh habitats has been assessed conservatively, on the potential for localised, medium-term impacts, to species or habitats of recognized conservation value or to local ecosystem function.
Rocky and sandy beaches
Exposure evaluation:
Intertidal beaches and mudflats, sandy beaches, rocky beaches and intertidal reef platforms occur in inland shores within the wider EMBA region. Rocky substrate shorelines are the dominant shoreline found within the Hydrocarbon Area at Montebello Islands (Figure 3-7). The highest probability of hydrocarbon accumulation on any shoreline within the Hydrocarbon Area was 26% within 82 hours. The maximum length of hydrocarbon ashore above the moderate threshold was 19 km. As discussed within Section 3.4.2, sandy beaches are a dominant coastal shoreline on the Montebello Islands, with patchy of rocky beaches and rocky limestone outcrops.
Predicted impact:
Shoreline
Hydrocarbons can become concentrated as it strands ashore. However, most of the oil is concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA, 1995). Sandy Shoreline

Sandy beaches provide habitat for a diverse assemblage (although not always abundant) of infauna (including nematodes, copepods and polychaetes); and macroinvertebrates (e.g. crustaceans).

A sandy beach may also allow oil to percolate through the sand, thus increasing its ability to hold more oil ashore over tidal cycles and various wave actions than an equivalent area of water; hence oil can increase in thickness onshore over time. The viscosity of the oil will influence how likely it will percolate into the sand. For example, lower viscosity oils, such as condensates and marine diesels, are more like to permeate into sand areas compared to heavier, highly viscous oils.

The influence of tidal action and wave washing are expected to lead to increase levels of weathering of any hydrocarbons in the intertidal area and reduce the level of smothering or toxicity effects to exposed fauna along shorelines.

Rocky Shoreline

The sensitivity of a rocky shoreline to oiling is dependent on a number of factors including its topography and composition, position, exposure to oceanic waves and currents etc. Exposed rocky shorelines have been shown to be less sensitive than sheltered rocky shorelines.

Rocky shorelines provide habitats for invertebrates (e.g. sea anemones, sponges, sea-squirts, molluscs) and can also be utilised by pinniped (haul-out sites) and bird species; noting that foraging and breeding/nesting typically occurs above high tide line.

The impact of oil on any organism depends on the toxicity, viscosity and amount of oil, on the sensitivity of the organism and the length of time it is in contact with the oil. Even where the immediate damage to rocky shores from oil spills has been considerable, it is unusual for this to result in long-term damage and the communities have often recovered within 2 or 3 years (IPIECA, 1995)

Predicted impact summary:

Impacts to sandy and rocky beaches may occur given the extent of the Hydrocarbon Area and physical characteristics of the Wandoo Crude, as a persistent hydrocarbon, which is predicted where limited weathering is expected prior to shoreline impact, with the minimum time to shoreline accumulation predicted after ~3 days.

Due to the volume predicted to accumulate on the shorelines, the shoreline sensitivity, and expected time to impact, the potential consequence to sandy and rocky beaches and intertidal mudflat habitats has been assessed conservatively, on the potential for localised, medium-term impacts, to species or habitats of recognized conservation value or to local ecosystem function.

Marine Fauna

Marine fauna has been assessed based on the hydrocarbon exposure based on the thresholds that have the potential to cause ecological impacts (Section 3.1.1), defined as the Hydrocarbon Area. Table 5-8 evaluates the potential impact that hydrocarbon spills for this activity may have on marine fauna receptors found within the Hydrocarbon Area.

Table 5-8: Risk assessment for an accidental release of Wandoo Crude – Marine fauna

Plankton	
Exposure evaluation:	
Plankton has been identified as a receptor that may be present within the Hydrocarbon Area. Plankton are drifting organisms which includes eggs and larvae of fish and other animals. As discussed in Section 3.4.3.1, plankton are found in nearshore and open waters beneath the surface and form the basis for the marine food web, including whales and whale sharks which migrate through the Hydrocarbon Area. These organisms migrate vertically through the water column to feed in surface waters at night and, when doing so, may be exposed to surface hydrocarbons and, to a greater extent, hydrocarbons dissolved or entrained in the water column (NRDA, 2012). Plankton species are known to be sensitive to the toxic effects of oil at low concentrations and large numbers of planktonic organisms may be affected in the event of a spill event (ITOPF, 2014b). Plankton risk exposure through ingestion, inhalation and dermal contact. The maximum distance for entrained hydrocarbon exposure at the high threshold was predicted to be 326 km (Table 5-5). The maximum distance for floating surface hydrocarbon exposure at this threshold from the source was predicted to be 56 km. No receptors were predicted to be exposed to dissolved hydrocarbons at, or above, the moderate threshold (RPS, 2025).	
Predicted impact:	
Surface	**In-water**
Phytoplankton (photosynthetic organisms) can accumulate rapidly, due to their small size and high surface area to volume ratio, therefore populations are typically not sensitive to the impacts of oil (Hook et al., 2016). However, if phytoplankton are exposed to hydrocarbons at the sea surface, their ability to photosynthesise via smothering may be directly affected and would have implications for the next trophic level in the food chain (e.g. small fish) (Hook et al., 2016). In addition, the presence of surface hydrocarbons may result in a reduction of light penetrating the water column, which may again affect the rate of photosynthesis which may inhibit growth, particularly in instances where there is prolonged presence of surface hydrocarbons over an extensive area (Volkman et al., 1994).	Plankton species are sensitive to toxic effects of oil at low concentrations and large numbers of planktonic organisms may be affected (ITOPF, 2014a). Some zooplankton also have high lipid content, which facilitates hydrocarbon uptake and bioaccumulation (Hook et al., 2016). Water column organisms that come into contact with oil risk exposure through ingestion, inhalation and dermal contact (NRDA, 2012), can cause immediate mortality or declines in egg production, hatching rates and a decline in swimming speeds (Hook et al., 2016). However, any direct effects on plankton communities from spilled hydrocarbons is expected to be localised and temporary, as reproduction by survivors or migration from unaffected areas is likely to rapidly replenish any losses (Volkman et al., 1994). Furthermore, the proximity of nutrient-rich seasonal upwelling events which occur within the vicinity will further assist recovery rates. Once background water quality conditions have re-established, the plankton community may take weeks to months to recover due to short generation times (ITOPF, 2014a), allowing for seasonal influences on the assemblage characteristics.

Predicted impact summary:
Plankton populations are numerous and widespread and expected to rapidly recover following an accidental release of Wandoo Crude. Due to the highly dispersive environment of the offshore environment, and the rapid generation anticipated for plankton populations following an impact, any impacts to plankton from exposure to Wandoo Crude are anticipated to be reversible, short-term, with relatively rapid recovery expected.
Benthic invertebrates
Exposure evaluation:
Benthic invertebrates may present within the Hydrocarbon Area (Section 3.4.3.2) and may be exposed to hydrocarbons following an accidental release of Wandoo Crude. The benthic invertebrates within the Hydrocarbon Area are anticipated to be comparable to similar sites within the NWS region, of low abundance but highly diverse species, comprised largely of polychaete worms, crustaceans, echinoderms, and molluscs. (Rainer, 1991). In general, only a small number of residual oil types are sufficiently dense enough to sink when spilled into the marine environment. Most hydrocarbons will float on the surface or remain suspended within the water column (in general within the top 0-10 m). Most hydrocarbons will only sink if mixed with denser sediments, common in areas of large tidal action (ITOPF, 2024). The maximum distance for entrained hydrocarbons at high exposure threshold was predicted to be 326 km (Table 5-5). No receptors were predicted to be exposed to dissolved hydrocarbons at, or above, the moderate threshold (RPS, 2025).
Predicted impact:
In-water
Entrained and dissolved hydrocarbons can have negative impacts on marine invertebrates and associated larval forms. Impacts to some adult species (e.g. crustaceans) is reduced as a result of the presence of an exoskeleton, while others with no exoskeleton and larval forms may be more prone to impacts. Acute or chronic exposure through contact and/or ingestion can result in toxicological risks. For some taxa, the presence of an exoskeleton (e.g. crustaceans) reduces the impact of hydrocarbon absorption through the surface membrane. Invertebrates with no exoskeleton and larval forms may be more prone to impacts. Sessile invertebrates could be exposed to varying levels of condensate; exposure timeframes would be expected to be short given the propensity of condensate to rapidly evaporate and disperse. Localised impacts to larval stages may occur which could impact on population recruitment that year. Filter-feeding benthic invertebrates such as sponges, bryozoans, abalone and hydroids may be exposed to sub-lethal impacts, however, population level impacts are considered unlikely. Exposure to hydrocarbons has been found to impact metamorphosis and attachment of sponge larvae, however, only at high concentrations of over 10,000 ppb (Negri et al., 2016). Given in-water exposure concentrations are not anticipated at this level, impacts to sponges are not anticipated. Tissue taint may occur and remain for several months in some species (e.g. lobster, abalone) however, this will be localised and low level with recovery expected. Tainting of recreation or commercial species is considered unlikely to occur, however if it did it is expected to be localised, low level and recoverable. Exposure to microscopic oil droplets may also impact aquatic biota either mechanically (especially filter feeders) or act as a conduit for exposure to semi-soluble hydrocarbons (that might be taken up by the gills or digestive tract) (French-McCay, 2009). Toxicity is primarily attributed to water soluble PAHs, specifically the substituted naphthalene (C2 and C3) as the higher C-ring compounds become insoluble and are not bioavailable.

Localised impacts to larval stages may occur which could impact population recruitment. If invertebrates are contaminated by hydrocarbons, tissue taint can remain for several months, although taint may eventually be lost. For example, it has been demonstrated that it took 2-5 months for lobsters to lose their taint when exposed to a light hydrocarbon (NOAA, 2002).

Other possible impacts from the presence of dispersed and non-dispersed oil include effects of oxygen depletion in bottom waters due to bacterial metabolism of oil (and/or dispersants), and light deprivation under surface oil (NRDA, 2012).

Water quality in benthic habitats exposed to entrained hydrocarbons would be expected to return to background conditions within weeks to months of contact. Several studies have indicated that rapid recovery rates may occur even in cases of heavy oiling (National Academies Press, 2003).

Predicted impact summary:

Given the levels of entrainment expected following a release of Wandoo Crude, 0-93.9% depending on the weather conditions (Section 4.12.4.1), exposure to benthic invertebrate which filter feed may occur. However, benthic invertebrate are typically restricted to shallow nearshore and intertidal waters only, outside of the main exposure area predicted within 0 – 10 m of the sea surface, indicating that the coating of benthic assemblages and the subsequent prolonged exposure to hydrocarbons is unlikely following a release from the offtake export system.

Seabirds and shorebirds

Exposure evaluation:

Several threatened, migratory and/or listed marine species in the region have the potential to be rafting, resting, diving and feeding within the area predicted to be contacted by surface hydrocarbons; diving or foraging within in-water hydrocarbons; and foraging or nesting within shoreline exposure (Section 3.4.3.3).

Six breeding BIAs for seabirds intersect the Hydrocarbon Area (Section 3.4.4), including:

- Brown booby (EPBC listed migratory) (Figure 3-8)
- Fairy tern (EPBC Act listing as vulnerable (for the subspecies)) (Figure 3-9)
- Lesser crested tern (EPBC Act: not listed) (Figure 3-10)
- Lesser frigatebird (Figure 3-11)
- Roseate tern (EPBC Act listing as migratory) (Figure 3-13)
- Wedge-tailed shearwater (EPBC Act listing as migratory) (Figure 3-14).

Breeding for the following species occurs:

- Brown booby: several islands including the Lacepede Islands, Bedout Island, White Island and Ashmore Reef, throughout the year.
- Fairy tern: on offshore islands in the Gascoyne and Pilbara with breeding occurring late July to September.
- Lesser crested tern: around offshore islands in Gascoyne, Pilbara and Kimberley in March to June.
- Lesser frigatebird: known to breed on Bedout island between March and September.
- Roseate tern: around offshore islands in Gascoyne, Pilbara and Kimberly during mid-March to July.

- Wedge-tailed shearwater: in inshore islands around Montebello Islands between mid-August to April (Pilbara).

Refer to Section 3.4.3.3 for further details.

The modelling predicted that the maximum distance for floating surface hydrocarbon exposure at the moderate threshold (10 g/m^2) from the source was predicted to be 56 km.

The minimum time to shore at or above the moderate threshold (100 g/m^2) was 82 hours (Barrow Island and Montebello Island), with the minimum time to entrained hydrocarbon exposure at any given receptor(s) 18 hours at Montebello AMP.

Predicted impact:

Surface	In-water	Shoreline
Seabirds rafting, resting, diving or feeding within surface hydrocarbons may be exposed to surface hydrocarbons. Species most at risk include those that readily rest on the sea surface (such as shearwaters) and surface plunging species, such as terns. Direct contact with hydrocarbons is likely to foul plumage, which may result in hypothermia due to a reduction in the ability of the bird to thermo-regulate and impaired waterproofing (ITOPF, 2014a). Increased heat loss as a result of a loss of water-proofing results in an increased metabolism of food reserves in the body, which is not countered by a corresponding increase in food intake and may lead to emaciation (DSEWPC, 2011). A bird suffering from cold, exhaustion and a loss of buoyancy (resulting from fouling of plumage) may dehydrate, drown or starve (ITOPF, 2014a; DSEWPC, 2011; AMSA, 2013). Physical smothering may also result in impaired navigation and flight performance (Hook et al., 2016). Toxic effects on birds, including internal tissue irritation in their lungs and stomachs, may also result where the oil is ingested as the bird attempts to preen its feathers (ITOPF, 2014a). The preening process may also spread oil over otherwise clean areas of the body (ITOPF, 2014a). Whether this toxicity ultimately results in mortality will depend on the amount consumed and other factors relating to the health and sensitivity of the bird.	Seabirds could be impacted by in-water hydrocarbon exposure directly (i.e. whilst diving through the water column foraging) or indirectly (i.e. by consuming hydrocarbon-tainted fish, resulting in sub-lethal or toxic impacts). As seabirds are top order predators, any impact on other marine life (e.g. pelagic fish) from hydrocarbon exposure may disrupt and limit food supply both for the maintenance of adults and the provisioning of young. Impacts are not anticipated at a population level due to the localised and temporary exposure of moderate levels of surface hydrocarbons.	Shorebird species foraging for invertebrates in intertidal feeding habitats, such as exposed sand and mud flats at lower tides, will be at potential risk of both direct impacts through contamination of individual birds (ingestion or soiling of feathers) and indirect impacts through the contamination of foraging areas that may result in a reduction in available prey items (Clarke, 2010). Any direct impact of oil on terrestrial habitats has the potential to contaminate seabirds present at the breeding sites (Clarke, 2010). Bird eggs may also be damaged if an oiled adult sits on the nest. Fresh crude was shown to be more toxic than weathered crude, which had a medial lethal dose of 21.3 mg/egg (Clarke, 2010). Studies of contamination of duck eggs by small quantities of crude oil, mimicking the effect of oil transfer by parent birds, have been shown to result in mortality of developing embryos (French-McCay, 2009). Shoreline accumulation will be concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA, 1995). As breeding activities of shorebirds and seabirds generally occurs above the high tide mark, exposure to hydrocarbons is considered unlikely to occur.

In a review of 45 marine hydrocarbon spills, there was no correlation between the numbers of bird deaths and the volume of the spill (Burger, 1993).		However, oiled bird species may track oil into their nests, which may then have subsequent impacts on any eggs present.
Predicted impact summary:		
Impacts to rafting or foraging seabirds to hydrocarbons in the event of a accidental release from the offtake export system is likely to occur given the extent of the Hydrocarbon Area and physical characteristics of the Wandoo Crude, as a persistent hydrocarbon, which may persist at the sea surface depending on the weather conditions (Section 4.12.4.1). However, given the transitory nature of foraging individuals and the absence of offshore aggregation areas in the Hydrocarbon Area, the presence of birds within the offshore environment at the time of the spill may be low. Breeding BIAs for several bird species intersect the Hydrocarbon Area at several offshore Pilbara islands within the Hydrocarbon Area, including the Montebello Islands which is a known nesting site for wedge-tailed shearwaters. Given the hydrocarbon characteristics of the Wandoo Crude, as a persistent heavy hydrocarbon, limited weathering is expected prior to shoreline impact, with the minimum time to shoreline accumulation predicted after ~3 days at, or above, the moderate threshold. There is the potential for indirect impacts to seabirds in offshore waters as a result of hydrocarbon exposure, such as reduced prey abundance Consequently, due to the volume predicted to accumulate on the shorelines, expected time to impact, the potential consequence to seabird and shorebirds is limited to impacts to individual species of recognized conservation value, including those undertaking foraging and breeding activities, however, only short-term impacts at a population level is expected.		
Fish, sharks and rays		
Exposure evaluation:		
Various fish and shark species were identified by the EPBC Protected Matters Search for the Hydrocarbon Area (Section 3.4.3.4). A foraging BIA for the whale shark was identified within the Hydrocarbon Area (Figure 3-16). Any pelagic fish and shark species that occupy the water column, specifically within the upper 0–10 m of the water column the surface layers of the water column (where in-water hydrocarbon exposure is predicted), are more susceptible to entrained and dissolved hydrocarbons. Since fish, sharks, and rays do not generally break the sea surface, the impacts of surface hydrocarbons to fish and shark species are unlikely to occur. Near the sea surface, fish are able to detect and avoid contact with surface slicks meaning fish mortalities rarely occur in the event of a hydrocarbon spill in open waters (Volkman et al., 1994). There may be demersal species may be susceptible to oiled sediments, particularly species that are site restricted. No receptors were predicted to be exposed to dissolved hydrocarbons at, or above, the moderate threshold (RPS, 2025). The maximum distance for entrained hydrocarbons at the high exposure threshold from the source was predicted to be 326km.		
Predicted impact:		
In-water		

Fish, sharks, and rays can be exposed to in-water hydrocarbon droplets through a variety of pathways, including:

- Direct dermal contact (e.g. whilst swimming through oil or waters with elevated dissolved hydrocarbon concentrations and other constituents, with diffusion across their gills (Hook et al., 2016))
- Ingestion (e.g. directly or via food base, fish that have recently ingested contaminated prey may themselves be a source of contamination for their predators)
- Inhalation (e.g. elevated dissolved contaminant concentrations in water passing over the gills).

A Foraging BIA for the whale shark intersects the Hydrocarbon Area (Figure 3-16). Whale sharks are suction filter feeders and are known to congregate in Ningaloo during March to July to feed on the seasonal concentrations of krill and other zooplankton which occur during coral spawning events. The whale shark is generally encountered close to or at the surface spending 40% of their time in the upper 15 m of the water column and 50% of time at depths equal to or less than 30 m. Hydrocarbon spills may pose a threat to whale sharks (DoE, 2024).

Exposure to hydrocarbons entrained or dissolved in the water column can be toxic to fish. Studies have shown a range of impacts including changes in abundance, decreased size, inhibited swimming ability, changes to oxygen consumption and respiration, changes to reproduction, immune system responses, DNA damage, visible skin and organ lesions and increased parasitism. However, many fish species can metabolise toxic hydrocarbons, which reduces the risk of bioaccumulation of contaminants in the food web (and human exposure to contaminants through the consumption of seafood) (NRDA, 2012).

Sub-lethal impacts in adult fish include altered heart and respiratory rates, gill hyperplasia, enlarged liver, reduced growth, fin erosion, impaired endocrine systems, behavioural modifications and alterations in feeding, migration, reproduction, swimming, schooling, and burrowing behaviour (Kennish, 1998). Fish exposed to aromatics in the water have been shown to have a reduced aerobic capacity, which may be a result of the process to eliminate ingested oil from the fish (Cohen et al., 2005). However, generally these species are highly mobile species, and their patterns of movements makes it unlikely for them to remain within the area long enough to be exposed to hydrocarbons to experience sub-lethal impacts (ITOPF, 2014a). The exception would be in areas such as reefs and other seabed features where species are less likely to move away into open waters (i.e. site-attached species).

Pelagic species fish are able to detect and avoid contact with surface slicks meaning fish mortalities rarely occur in the event of a hydrocarbon spill in open waters (Volkman et al., 1994). As a result, wide-ranging pelagic fish of the open ocean generally are not highly susceptible to impacts from surface hydrocarbons. Adult fish kills reported after oil spills, occur mainly to shallow water, near-shore benthic species (Volkman et al., 1994).

Fish are most vulnerable to hydrocarbons during their embryonic, larval and juvenile life stages. Embryos and larvae may sustain mechanical damage to feeding and breathing apparatus from contact with oil droplets, and genetic damage, physical deformities and altered developmental timing from hydrocarbons in water (Fodrie and Heck, 2011). There may also be chronic effects to fish exposed to hydrocarbons in early life stages, such as disruption of predator avoidance behaviour (Hjermann et al., 2007). Eggs and larvae exposed to weathered concentrations of hydrocarbons in water for a prolonged period of time have been shown to be immunosuppressed (Hjermann et al., 2007).

Hydrocarbons in the water column can physically affect fish with high site fidelity. When exposed for an extended duration (weeks to months) coating of gills may lead to lethal and sub-lethal effects from reduced oxygen exchange and coating of body surfaces may lead to increased incidence of irritation and infection. Fish may also ingest hydrocarbon droplets or contaminated food, leading to reduced growth (Volkman et al., 1994).

Recovery of fish assemblages depends on the intensity and duration of an unplanned discharge, the composition of the discharge and whether dispersants are used, as each of these factors influences the level of exposure to potential toxicants. Recovery would also depend on the life cycle attributes of fishes. Species that are

abundant, short-lived and highly fecund may recover rapidly. Whereas less abundant, long-lived species may take longer to recover. The range of movement of fishes will also influence recovery. The nature of the receiving environment would influence the level of impact on fishes.

Predicted impact summary:

As identified in Section 3.4.3.4, a number of fish and shark species, including the whale shark may occur in the Hydrocarbon Area.

Given the wide distribution of fish species in the region, the widespread foraging area typical of whale sharks (Figure 3-16), and the nature of potential impacts, impacts to an entire population or population's overall viability is not anticipated. Fish and shark populations are widespread throughout the Hydrocarbon Area, and as such, any impacts to fish and shark populations from exposure to hydrocarbons following an accidental release of Wandoo Crude are anticipated to be reversible, short-term, and not expected to affect species population functioning or general ecosystem functioning.

Marine mammals

Exposure evaluation:

Several marine mammal species were identified by the EPBC Protected Matters Search for the Hydrocarbon Area (Section 3.4.3.5), including:

- Sei whale (EPBC Act listed vulnerable), foraging likely to occur
- Blue whale (EPBC Act listed endangered) known to occur, Hydrocarbon Area overlaps PBW foraging and migration BIAs (Figure 3-19)
- Fin whale (EPBC Act listed vulnerable), foraging likely to occur
- Southern right whale (EPBC Act listed endangered), likely to occur, Hydrocarbon Area overlaps breeding and migration BIAs (Figure 3-20)
- Humpback whale (EPBC Act listed migratory), known to occur, Hydrocarbon Area overlaps migration (north and south) BIA (Figure 3-18)
- Australian snubfin dolphin (EPBC Act listed vulnerable), known to occur
- Australian humpback dolphin (EPBC Act listed vulnerable), known to occur
- Dugong (EPBC Act listed migratory), breeding known to occur, breeding, calving, nursing and foraging BIAs (Figure 3-21).

The maximum distance for entrained hydrocarbons at the high exposure (100 ppb) was predicted to be 326 km (Table 5-5). The modelling predicted that the maximum distance for floating surface hydrocarbon exposure at the moderate threshold (10 g/m^2) from the source was predicted to be 56 km.

Predicted impact:

Surface	**In-water**
Marine mammals may come into contact with surface hydrocarbons when surfacing. However, direct surface oil contact with hydrocarbons is considered to have little deleterious effect on marine mammals, and any effect is likely to be minor and temporary. This may be due to the skin's effectiveness as a barrier to toxicity (Geraci and St Aubin, 1988). Cetaceans have mostly smooth skins with limited areas of pelage (hair covered skin) or rough surfaces such as barnacled skin. Oil tends to adhere to rough	Cetaceans exposed to entrained hydrocarbons can result in physical coating as well as ingestion (Geraci and St Aubin, 1988). Such impacts are associated with 'fresh' hydrocarbon, the risk of impact declines rapidly as the hydrocarbon weathers. The susceptibility to ingested hydrocarbon has also been shown to vary with feeding habits. Specifically, toothed whales and dolphins may be susceptible to ingestion of dissolved and entrained oil as they gulp feed at depth. There are reports of declines in the health of individual pods of killer whales (a toothed whale species), though not the

surfaces, hair or calluses of animals, so contact with hydrocarbons by cetaceans is expected to cause only minor hydrocarbon adherence. The inhalation of oil droplets, vapours and fumes is a distinct possibility if cetaceans' surface in slicks to breathe. Exposure to hydrocarbons in this way could damage mucous membranes, damage airways, or even cause death. Given the mobility of whales, only a small proportion of a population is anticipated to surface in the affected areas, resulting in short-term and localised consequences, with no long-term population viability effects. The susceptibility to ingested hydrocarbon has also been shown to vary with feeding habits. Baleen whales (such as blue, southern right and humpback whales) are not particularly susceptible to ingestion of oil in the water column but are susceptible to oil at the sea surface as they feed by skimming the surface. Oil may stick to the baleen while they 'filter feed' near slicks. Sticky, tar-like residues are particularly likely to foul the baleen plates. Habitat modification is identified as threats for the blue whale, southern right whale, and dugong. Activities within this EP will not be inconsistent with the conservation and management priorities outlined in these Conservation Management Plans.	population as a whole, in Prince William Sound after the Exxon Valdez vessel spill (heavy oil) (Hook et al., 2016). Geraci (1988) found little evidence of cetacean mortality from hydrocarbon spills; however, some behaviour disturbance (including avoidance of the area) may occur. Pelagic species have been said to avoid hydrocarbon, mainly because of its noxious odours, but this has not been proven. In the event avoidance was to occur, the potential for physiological impacts from contact with hydrocarbons would be reduced, however, active avoidance of an area may disrupt behaviours such as migration, or displace individuals from important habitat, such as foraging, resting or breeding. Although, the strong attraction to specific areas for breeding or feeding (e.g. the breeding, calving and nursing grounds within the North-West Cape region for the dugong) may override any tendency for marine mammals to avoid the noxious presence of hydrocarbons. Dolphin populations from Barataria Bay, Louisiana, USA, which were exposed to prolonged and continuous oiling from the Macondo oil spill in 2010, had higher incidences of lung and kidney disease than those in the other urbanised environments (Hook et al., 2016). The spill may have also contributed to unusually high perinatal mortality in bottlenose dolphins (Hook et al., 2016).
Predicted impact summary:	
As highly mobile species, in general it is very unlikely that cetaceans will be constantly exposed to concentrations of hydrocarbons in the water column for continuous durations (e.g. >96 hours) that would lead to chronic toxicity effects (NRC, 2001). Of the BIAs overlapped by the Hydrocarbon Area, the overlap is either very small (e.g. Dugong BIAs) or the BIAs are very large (e.g. humpback whale migration corridor) therefore the overlap is small compared to the size of the BIA. The potential for environmental impacts would need to coincide with a migration or aggregation event to result in exposure to a large number of individuals. A proportion of a migrating population of cetaceans could be affected for a single migration event, which could result in temporary and localised consequences. However, given the wide distribution of marine mammal species in the region and the nature of the potential impacts, impacts to an entire population or the population's overall viability is not anticipated. Any impacts to marine mammals from exposure to hydrocarbons following an accidental release of Wandoo Crude are anticipated to be reversible, short-term, and not expected to affect species population functioning or general ecosystem functioning.	

Marine reptiles		
Exposure evaluation:		
Marine reptiles may be exposed to hydrocarbon when transiting through the in-water hydrocarbons, surfacing to breathe within the surface slick, or nesting on oiled shorelines. BIAs and habitat critical for the survival of marine turtles for four species of marine turtles intersect the Hydrocarbon Area (Section 3.4.3.6)., including: • Flatback turtle (EPBC Act listed as vulnerable) Inter-nesting buffer, Mating and Foraging BIAs (Figure 3-22). • Green turtle (EPBC Act listed as vulnerable) Inter-nesting buffer, Nesting, Mating and Foraging BIAs (Figure 3-23). • Hawksbill turtle (EPBC Act listed as vulnerable) Inter-nesting buffer, Nesting, Mating and Foraging BIAs (Figure 3-24). • Loggerhead turtles (EPBC Act listed as endangered) Inter-nesting buffer BIAs (Figure 3-25). Turtle nesting and inter-nesting areas and rookeries for sea turtles in the Hydrocarbon Area including the Montebello islands. The Recovery Plan for Marine Turtles in Australia: 2017–2027 (CoA, 2017) highlights acute chemical discharge as one of several threats to marine turtles. EPBC Act listed sea snakes that are known to occur within the Hydrocarbon Area include: • Short-nosed sea snake (EPBC Act listed as critically endangered) • Leaf-scaled sea snake (EPBC Act listed as critically endangered) There may be sea snakes present in the area predicted to be exposed to surface hydrocarbon within the Hydrocarbon Area; however, their presence is expected to be of a transitory nature only, and most species are not pelagic and therefore unlikely to be in high numbers within the Hydrocarbon Area. Probability of shoreline contact for Barrow Island and Montebello Islands reaching the moderate threshold is low and only expected during the summer season (4%), transitional (8%) and winter (14%). The maximum distance from the release location to floating oil exposure in moderate thresholds will be 56 km northeast during transitional season (Table 5-5).		
Predicted impact:		
Surface	**In-water**	**Shoreline**
<u>Marine Turtles</u> Marine turtles make large, rapid inhalations before they dive which may result in inhalation of toxic vapours from hydrocarbons in surface waters (Milton and Lutz, 2003). This can lead to respiratory irritation, inflammation, emphysema or pneumonia (NOAA, 2010). Ingested oil may cause harm to the internal organs of turtles. Visibly oiled turtles showed higher indicators of PAH in tissues, stomach content, colon	Some individual marine reptiles may come into contact with in-water hydrocarbon exposure while swimming or feeding. <u>Marine Turtles</u> Entrained hydrocarbons can adhere to body surfaces (Gagnon and Rawson, 2010) and can enter cavities such as the eyes, nostrils, or mouth. This can cause an elevated susceptibility to infections (NOAA, 2010).	Marine turtles may experience oiling impacts on nesting beaches when they come ashore to lay their eggs. There is potential for contamination of turtle eggs to result in toxic impacts, such as developmental defects in hatchlings, to developing embryos. Turtle hatchlings may be more vulnerable to smothering as they emerge from the nests and make their way over the intertidal area to the open water (AMSA, 2015). Hatchlings that contact oil residues while crossing a beach can exhibit a range of effects including impaired

content and faeces compared to non-visibly oiled turtles (Ylitalo et al., 2017). This exposure pathway may cause an increase in the production of white blood cells and may affect the functioning of their salt gland (Lutcavage et al., 1995). Oiling has the potential to cause mortality depending on the size of the individual and the extent of oiling (DWH Natural Resource Damage Assessment Trustees, 2016). <u>Sea Snakes</u> Foraging behaviours which occur near the water surface may increase the vulnerability of individuals to hydrocarbon exposure (Yaghmour et al., 2022).	Records of oiled wildlife during spills rarely include marine turtles, even from areas where they are known to be relatively abundant (Short, 2011). An exception to this was the large number of marine turtles collected (613 dead and 536 live) during the Macondo spill in the Gulf of Mexico, although many of these animals did not show any sign of oil exposure (NOAA, 2021). Of the dead turtles found, 3.4% were visibly oiled and 85% of the live turtles found were oiled (NOAA, 2021). Of the captured animals, 88% were later released, suggesting that oiling does not inevitably lead to mortality. <u>Sea Snakes</u> Sea snakes have the potential to be directly and indirectly impacted by hydrocarbons. In general, there is limited literature on the impacts of oil spills to sea snakes. A recent study by Yaghmour et al. (2022) is the only study to record lethal impacts to sea snakes following a crude oil spill in the Gulf of Oman. The study identified varying levels of smothering, including over their eyes, snout, mouth, and oesophagus. The number of sea snakes that may be exposed is expected to be low due to the offshore location, the lack of BIAs. Therefore, potential impact would be limited to individuals, with population impacts not anticipated.	movement and bodily functions (Shigenaka, 2011). Hatchlings sticky with oily residues may also have more difficulty crawling and swimming, rendering them more vulnerable to predation. Marine pollution is listed as a threat to marine turtle in the Recovery Plan for Marine Turtles in Australia, 2017–2027, particularly in relation to shoreline oiling of nesting beaches.
Predicted impact summary:		
Given the hydrocarbon characteristics of the Wandoo Crude, as a persistent heavy hydrocarbon, limited weathering is expected prior to shoreline impact, with the minimum time to shoreline accumulation predicted after ~3 days (Table 5-5).		

Shoreline accumulation at nesting beaches within the Hydrocarbon Area has the potential to cause impacts to nesting females and hatchlings. Impacts to individuals transiting through the area may also occur when individual surface to breed, or forage. Considering the wide distribution of marine reptile species in the region and the nature of the potential impacts, impacts to an entire population or the population's overall viability is, however, not anticipated.

Due to the low number of sea snakes anticipated within the Hydrocarbon Area, impacts to sea snakes at both an individual or population level is not anticipated.

Consequently, due to the volume predicted to accumulate on the shorelines, expected time to impact, the potential consequence to marine reptile is limited to impacts to individual species of recognized conservation value, including those undertaking foraging and breeding activities, however, only short-term impacts at a population level is expected.

Protected and Significant Areas

Protected and significant areas which have only ecological values have been assessed based on the hydrocarbon exposure based on the thresholds that have the potential to cause ecological impacts, defined as the Hydrocarbon Area.

Protected and significant areas which also include socio-economic value have been assessed based on the most conservative hydrocarbon exposure thresholds, such as those that have the potential to cause socio-economic effects, defined as the EMBA.

Table 5-9 evaluates the potential impact that hydrocarbon spills for this activity may have on protected and significant areas receptors found within either the Hydrocarbon Area or EMBA.

Table 5-9: Risk assessment for an accidental release of Wandoo Crude - Protected and significant areas

Marine parks
Exposure evaluation:
There are 7 Australian Marine Parks (AMPs) intersecting the EMBA, 4 of which also intersect the Hydrocarbon Area (Section 3.6.5): • Argo-Rowley Terrace AMP (EMBA) • Carnarvon Canyon AMP (EMBA) • Dampier AMP (Hydrocarbon Area and EMBA) • Gascoyne AMP (Hydrocarbon Area and EMBA) • Montebello AMP (Hydrocarbon Area and EMBA) • Ningaloo AMP (Hydrocarbon Area and EMBA) • Shark Bay AMP (EMBA). There are 7 WA State Marine Protected Areas (MPAs) intersecting the EMBA, of which 6 also intersect the Hydrocarbon Area (Section 3.6.6): • Montebello Islands and Barrow Islands (jointly managed) • Pilbara Islands Nature Reserve (Great Sandy Island, Thevenard Island). • Ningaloo and Muiron Islands Marine Management area (jointly managed) • Rowley Shoals. The major conservation values for the above AMPs and State MPAs have been identified in Section 3.6.5 and Section 3.6.6, respectively. In general the AMPs and State MPAs include examples of unique ecosystems with characteristics that support diverse benthic or intertidal habitats, and often a range of species listed under the EPBC Act, often including BIAs, such as breeding and foraging habitat for seabirds, inter-nesting, foraging, mating, and nesting habitat for marine turtles, breeding, calving, foraging and nursing habitat for dugongs, foraging habitats, and migratory pathway for certain marine species, such as humpback whales, pygmy blue whales, whale sharks. Mangrove thickets are found on some of the Montebello Islands and Barrow Islands which provide essential habitat for coastal species and shorebirds (Section 3.4.2.1). Sea Country which overlaps these AMPs and MPAs is valued for Indigenous cultural identity, health and wellbeing. A few AMPs contains known shipwrecks listed under the *Underwater Cultural Heritage Act 2018*. Tourism, commercial fishing, mining, port activities, and recreation are important activities in some of the AMPs and MPAs (DNP, 2018). These sites and associated receptors may be impacted by exposure to surface, in-water, and shoreline hydrocarbons.

The highest probability of floating hydrocarbons at the low (1 g/m^2) threshold was predicted at Montebello AMP at 5% with contact predicted in 41 hours (RPS, 2025). The floating probability results for other AMPs and MPs to be intersected by these levels included:

- 1% during winter months at Gascoyne AMP
- 1% during winter months at Ningaloo AMP.

No receptors were predicted to be exposed to dissolved hydrocarbons at, or above, the low (10 ppb) threshold.

The highest probability of entrained hydrocarbons at the low 10 ppb threshold was predicted at Montebello AMP at 63% with contact predicted in 18 hours (RPS, 2025). The in-water probability results for the other AMPs to be intersected by these threshold levels included:

- 17% entrained and no contact for dissolved at Gascoyne AMP.
- 2% entrained and no contact for dissolved at Dampier AMP.

The in-water probability results for the other MPs to be intersected by these threshold levels included:

- 31% entrained and no contact for dissolved at Montebello Island MP.
- 14% entrained and no contact for dissolved at Barrow Island MP.
- 19% entrained and no contact for dissolved at Ningaloo MP.
- 5% entrained and no contact for dissolved at Lowendal Islands Nature Reserve MP.

The spill modelling identified that the highest probability of hydrocarbon accumulation on a specific shoreline at or above the low threshold (10 g/m^2) was 37% at the Barrow Island and Montebello Islands (A) shoreline cell, which is a considered a part of the Pilbara Islands Nature Reserve MP.

The shoreline cells for Barrow Island and Montebello Islands recorded the minimum time to shore at 68 hours and the maximum total volume of hydrocarbon ashore for a single spill trajectory was 47 m^3.

Barrow Island and Montebello Islands recorded the maximum length of hydrocarbon ashore above the low threshold (32 km).

Predicted impact:

Surface	In-water	Shoreline
The values identified within these Protected Areas (AMPs and MPAs) have the potential to be exposed to entrained hydrocarbons at, or above, the relevant threshold in the event of a spill incident. Marine fauna, such as seabirds, fish and whales, found within the water column are values of the AMPs and State MPAs that may be impacted when exposed to entrained or dissolved hydrocarbons.	The values identified within these Protected Areas (AMPs and MPAs) have the potential to be exposed to entrained hydrocarbons at, or above, the relevant threshold in the event of a spill incident. Marine fauna, such as seabirds, fish and whales, found within the water column are values of the AMPs and State MPAs that may be impacted when exposed to entrained or dissolved hydrocarbons.	Hydrocarbons can become concentrated as it strands ashore. However, most of the oil is concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA, 1995). Coastal habitats, such as mangroves, and communities which utilise these habitats, such as shorelines and marine turtles, are important and sensitive values of the MPAs. These values can be directly impacted, or have important activities

The values identified within the Protected Areas have the potential to be exposed to surface hydrocarbons at, or above, the low threshold, in the event of a spill incident.
Impact to these receptors from direct or indirect exposure to surface hydrocarbons may cause a subsequent negative impact to the value of the Protected Areas.
Refer also to:
• Fish, sharks and rays
• Seabirds and shorebirds
• Marine reptiles
• Marine mammals
• Tourism.
	Exposure of in-water hydrocarbons will be greatest within the upper 10 m of the water column and areas close to the spill source, as such, values on the seafloor (i.e., benthic habitats, shipwrecks and cultural artefacts) are unlikely to be impacted.
	In-water exposure at relevant thresholds may impact culturally important significant values, such as Sea Country, and result in adverse impacts to activities such as fishing.
	Impact to these receptors from direct or indirect exposure to in-water hydrocarbons may cause a subsequent negative impact to the value of Protected Areas.
	The predicted impact to the individual values of the Protected Areas have been assessed separately.
	Refer also to:
	• Benthic habitats
	• Marine fauna:
	  ○ Plankton
	  ○ Benthic invertebrates
	  ○ Seabirds and shorebirds
	  ○ Fish, sharks and rays
	  ○ Marine reptiles
	  ○ Marine mammals.
	• Social and economic environment:
	  ○ Tourism and recreational fishing
	• Other marine users (underwater heritage)
	  ○ First Nations.
		disrupted, if exposed to shoreline hydrocarbons at the relevant thresholds.
		Visual surface hydrocarbons, or exclusion zones, have the potential to impact and/or displace certain values, such as tourism, recreational activities, and heritage values. Impact to these receptors from direct or indirect exposure to shoreline hydrocarbons may cause a subsequent negative impact to the value of the State MPAs.
		The predicted impact to the individual values of the Protected Areas have been assessed separately.
		Refer to:
		• Benthic habitats
		• Coastal communities
		• Marine fauna:
		  ○ Benthic invertebrates
		  ○ Seabirds and shorebirds
		  ○ Marine reptiles
		• Social and economic environment:
		  ○ Tourism and recreational activities.

Predicted impact summary:
Impacts to the value and associated sensitives of AMPs and MPs may occur given the extent of the Hydrocarbon Area and physical characteristics of the Wandoo Crude, as a persistent hydrocarbon, which is predicted to remain either floating at the sea surface, or persist as entrained droplets within the water column, depending on the weather conditions (Section 4.12.4.1), until it slowly decays or degrade over time following the release into the marine environment. Given the credible release duration (up to 1 hour), the potential consequence to the sensitive receptors of the AMPs and MPs, the oil spill response activities that would be implemented in the event of a release from the offtake export system, and the typically dispersive environment of the offshore environment, majority of the potential consequences to AMPs and State MPs will be reversible, short-term impacts on habitats and species of recognised conservation value or to local ecosystem functioning. However, given the presence of highly sensitive habitats, such as mangroves communities present on some of the islands within State MPs, and the potential recovery rates of mangroves to persistent hydrocarbons, such as Wandoo Crude, the potential consequence to MPs has been conservatively assessed as persistent but reversible, long-term impacts, to species or habitats of recognized conservation value or to local ecosystem function.
Key Ecological Features
Exposure evaluation:
The EMBA and Hydrocarbon Area intersects 6 KEFs. These include: • *Ancient coastline at 125 m depth contour* - defined as a key ecological feature as it is a unique seafloor feature with ecological properties of regional significance. • *Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula* - defined as a key ecological feature as they are unique seafloor features with ecological properties of regional significance, which apply to both the benthic and pelagic habitats. • *Commonwealth waters adjacent to Ningaloo Reef* - defined as a KEF for their high productivity and aggregations of marine life, which apply to both the benthic and pelagic habitats • *Continental Slope Demersal Fish Communities* - this species assemblage is recognised as a KEF because of its biodiversity values, including high levels of endemism • *Exmouth Plateau* - defined as KEF as it is a unique seafloor feature with ecological properties of regional significance, which apply to both the benthic and pelagic habitats • *Glomar Shoals* - defined as a KEF for their high productivity and aggregations of marine life The conservation values for these KEFs have been described in Section 3.6.9 and include unique seafloor environments that are considered to be of regional importance for a region's biodiversity or ecosystem function and integrity. The Glomar Shoals KEF is predicted to be exposed to floating hydrocarbons (3%) at, or above, the low threshold with the minimum time to contact predicted in 78 hours. All KEFs have the potential to be exposed to entrained hydrocarbons at, or above low threshold with 3 KEFs exposed at the high 100 ppb entrained thresholds: • Ancient coastline at 125 m depth contour KEF (2%) with contact predicted in 136 hours • Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula KEF (2%) with contact predicted in 148 hours

- Continental slope demersal fish communities KEF (2%) with contact predicted in 168 hours

No KEF's are predicted to be exposed to dissolved hydrocarbons at any threshold for any season.

Shoreline exposure is not relevant or predicted for KEF's (RPS, 2025).

Predicted impact:

Surface	**In-water**

The values identified within the KEFs are identified for their unique seafloor features with ecological properties of regional significance, which apply to both the benthic and pelagic habitats. Features include nutrient upwellings and hard substrates supporting sponges, corals, and other benthic invertebrates which support a diversity of species including threatened and migratory EPBC Act listed fauna including whales, whale sharks, marine turtles, sea snakes, and seabirds. The Glomar Shoals KEF has the potential to be exposed to surface hydrocarbons at, or above, the low threshold, in the event of a spill incident.
 	
Impact to this receptor from direct or indirect exposure to surface hydrocarbons may cause a subsequent negative impact to the value of the KEF.
 	
Refer to:
• Marine fauna:
  ○ Fish, sharks, and rays
  ○ Seabirds and shorebirds
  ○ Marine reptiles
  ○ Marine mammals.
	The values identified within these KEFs have the potential to be exposed to entrained hydrocarbons at, or above, the low threshold.
	
	However, the exposure of entrained hydrocarbons will be greatest within the upper 10 m of the water column and areas close to the spill source. Therefore, the spill is unlikely to intersect with majority of the seafloor values of the KEFs which are concentrated within the water column >10 m deep or along the seafloor at varying water depths.
	
	Hydrocarbon exposure to the key receptors of the KEFs (e.g. seabirds, pinnipeds and cetaceans) may cause a subsequent negative impact to the value of the KEFs, however, is expected to be limited to a small number of individuals, with no impacts to regional populations.
	
	Refer to:
	• Benthic habitats
	• Marine fauna:
	  ○ Plankton
	  ○ Fish, sharks, and rays
	  ○ Seabirds and shorebirds
	  ○ Marine reptiles
	  ○ Marine mammals.

Predicted impact summary:

Impacts to the value and associated sensitives of KEFs may occur given the extent of the Hydrocarbon Area and physical characteristics of the Wandoo Crude, as a persistent hydrocarbon, which is predicted to remain either floating at the sea surface, or persist as entrained droplets within the water column, depending on the weather conditions (4.12.4.1), until it slowly decays or degrade over time following the release into the marine environment.

Given the credible release duration (up to 1 hour), the potential consequence to the sensitive receptors of the KEFs, and the oil spill response activities that would be implemented in the event of a LOWC and the typically dispersive environment of the offshore environment, the potential consequences to KEFs will be reversible, short-term impacts on habitats and species of recognised conservation value or to local ecosystem functioning.

Social and Economic Environment

Social and economic receptors have been assessed based on the hydrocarbon exposure based on the thresholds that have the potential to cause socio-economic effects, defined as the EMBA. Table 5-10 evaluates the potential impact that hydrocarbon spills for this activity may have on social and economic receptors found within the EMBA.

Table 5-10: Risk assessment for an accidental release of Wandoo Crude - Social and Economic Environment

Commercial fisheries
Exposure evaluation:
Several State-managed fisheries were identified to have management areas that intersect the EMBA (see Section 3.5.1). The maximum distance for entrained hydrocarbons at a low threshold (100 ppb) from the source was predicted to be 326 km, respectively (RPS, 2025). The fisheries that have the potential to interact with the EMBA include 6 Commonwealth Fisheries: • North-West Slope Trawl Fishery • Southern Bluefin Tuna Fishery • Southern Tuna and Billfish Fishery • Western Deepwater Trawl • Western Skipjack Tuna Fishery • Western Tuna and Billfish Fishery. However, only one of these fisheries (North-West Slope Trawl Fishery) have recorded active fishing within the EMBA based on historical datasets. 23 WA State Fisheries intersect the EMBA. However, of these fisheries, 21 fisheries have recorded active fishing in the EMBA between 2018 and 2023 and have potential to interact with the EMBA, including: • Exmouth Gulf Prawn Managed Fishery • Exmouth Gulf Beach Seine and Mesh Net Managed Fishery • FBL Condition 74 Fish Trapping • Gascoyne Dermersal Scalefish Managed Fishery • Hermit Crab Fishery • Mackerel Managed Fishery • Marine Aquarium Fish Managed Fishery • Nickol Bay Prawn Fishery • Onslow Prawn Limited Entry Fishery • Open Access (North Coast, Gascoyne Coast and West Coast Bioregions) • Pilbara Crab Managed Fishery • Pilbara Fish Trawl Interim Managed Fishery

<table>
<tr><td colspan="2">

Pilbara Line Fishery (Condition)
Pilbara Trap Managed Fishery
Shark Bay Prawn Managed Fishery
Shark Bay Scallop Limited Entry Fishery
Specimen Shell Managed Fishery
Tour Operator
West Coast Deep Sea Crustacean Managed Fishery
West Coast Rock Lobster Managed Fishery
Western Australian Sea Cucumber Fishery

Refer to Section 3.5.1 for a further description on fisheries that intersect the EMBA.
</td></tr>
<tr><td colspan="2">Predicted impact:</td></tr>
<tr><td>Surface</td><td>In-water</td></tr>
<tr><td>Physical displacement of commercial fishers may occur due to the establishment of exclusion zones during the spill response.
Visible surface hydrocarbons (i.e. a rainbow sheen) may have the potential to cause impact public perception of the industry, potentially causing a negative economic impact.
Refer to:
Fish, sharks, and rays.</td><td>As discussed in the relevant sections above (i.e. fish and invertebrates) exposure to in-water hydrocarbons has the potential to impacts species. Due to the sensitivity, a small number of juvenile fish, larvae, and planktonic organisms, may be impacted. This could result in some component or all of a year class being impacted, given that most species have seasonal, pulsed recruitment. This has been identified to pose a significant risk for short-lived species and less for long-lived species (Young et al., 2011). However, despite the potential for localised impacts to population recruitment for commercially targeted species, impacts to an entire population or the population’s overall viability is not anticipated.
In-water hydrocarbon exposure may result in a reduction to individual commercially targeted marine species (i.e. fish and invertebrate species), subsequently having the potential to result in impacts to commercial fishing productivity. Contamination of target species can cause economic impacts to the industry.
Refer to:
Marine fauna:
Fish, sharks, and rays
Benthic invertebrates.</td></tr>
</table>

Predicted impact summary:		
Acute impacts to commercially fished species may occur, however are expected to be limited to a small number of juvenile fish, larvae, and/or planktonic organisms. Depending on the timing of the spill, in the event that it overlaps with the timing of a species reproduction event (i.e. a spawning event), there is potential for localised impacts to population recruitment for commercially targeted species. However, due to the wide distribution of fish species typical in the region and the typical timing of recruitment events, impacts to an entire population, or population's overall viability is not anticipated. Given the hydrocarbon characteristics of the Wandoo Crude, as a persistent heavy hydrocarbon, limited weathering is expected. Furthermore, potentially low to high levels entrainment rates were predicted, 0-93.9%, dependent on the weather conditions (Section 4.12.4.1). Therefore, any exclusion zones required to be established may cause impacts to the economic viability of the fishery, however impacts are expected to be limited to short-term exclusion from the area.		
Tourism and recreational fishing		
Exposure evaluation:		
The Ningaloo region is a major tourism area that is overlapped by the EMBA. The Ningaloo region includes Ningaloo AMP, Ningaloo World Heritage Area, Ningaloo and Muiron Islands State MP, and Coral Bay and Exmouth communities. These areas are popular for a diverse range of marine-based tourism and recreational activities, such as: whale watching, recreational boating and fishing, charter fishing, snorkelling/diving, and surfing. As noted in Section 3.5.1, DPIRD's FishCube fishing effort data between 2013–2023 notes that there were active fishing Tour Operators in the Operational Area, which correlates with the Wandoo platform being listed as a recreational fishing site by DPIRD (2023b) (Section 3.5.4.1) and correspondence with RecfishWest (refer Sensitive Information Report). The area is used for deepwater fishing by fishing charters and large private fishing boats. With the exception of offshore fishing charters and some offshore recreational fishers, most marine-based tourism occurs in shallower waters. See Section 3.5.4.1 for further details.		
Predicted impact:		
Surface	**In-Water**	**Shoreline**
Visible surface hydrocarbons (i.e. a rainbow sheen) have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities. Recreation is also linked to the presence of marine fauna and direct impacts to marine fauna such as whales, birds, and pinnipeds can result in indirect impacts to recreational values. It is important to note that the impact from a public perception perspective may be even more conservative. This may deter tourists and locals from undertaking recreational activities. If this occurs, the attraction is temporarily closed, economic losses to	The main source of recreational activities, such as marine-based tourism occur within nearshore waters, with the exception of offshore fishing charters and recreational fishers who visit the Wandoo platform (Section 3.5.4.1). Any impact to receptors that are associated with marine-based tourism (e.g. whales, and whale sharks) may cause a subsequent negative impact to recreation and tourism businesses in the locally affected area. Recreational fishing over the area and Wandoo platform is popular. Precautionary exclusion from impacted areas following a hydrocarbon spill may be implemented until water quality monitoring verifies	Visible hydrocarbons stranded on shorelines have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities. In general, recreational and tourism activities are restricted to shallower coastal waters and shorelines. Precautionary exclusion from shorelines may be implemented by local governments until water quality monitoring verifies the absence of residual hydrocarbons. This could cause disruption to some recreational and tourism activities within that area. Furthermore, visible hydrocarbons along shorelines may impact the aesthetic value for tourism and

the business are likely to eventuate. The extent of these losses would be dependent on how long the attraction remains closed.
Refer also to:
• Marine fauna:
  ○ Fish, sharks and rays
  ○ Seabirds and shorebirds
  ○ Marine mammals
  ○ Benthic invertebrates.
	the absence of residual hydrocarbons. This could result in a temporary disruption to some recreational and tourism activities within and area for the duration of the response (if applicable).	discourage recreational activities that may be operating within the area.

Predicted impact summary:		
Given the hydrocarbon characteristics of the Wandoo Crude, as a persistent heavy hydrocarbon, limited weathering is expected prior to shoreline impact, with the minimum time to shoreline accumulation predicted after ~3 days. Due to the extent of the EMBA, the volume predicted to accumulate on the shorelines, and the high presence of recreational activities within the area, the potential consequence to tourism and recreational activities has been assessed conservatively, on the potential for short-term impacts.		
Other marine users		
Exposure evaluation:		
Surface hydrocarbons may interact with other marine users, such as • Commercial shipping • Other oil and gas industry • Defence activities • Underwater heritage. The closest AMSA shipping fairway is ~9 km south of the Operational Area, which indicates high shipping use within the area and the potential to interact with the EMBA (Section 3.5.2). Several other offshore oil and gas industries and pipelines are located within the EMBA (Section 3.5.5). The EMBA encompasses defence activities including an Exmouth naval communication station and several offshore training areas including the North West Exercise Area (NWXA) and Learmonth Air Weapons Range in the EMBA. These areas are used for Defence Force training exercises, including live firing. Five UXO sites have been identified to overlap the EMBA (Section 3.5.3). There are 65 known historical shipwrecks and shipwreck artefacts located within the EMBA (see Table 3-13).		

Predicted impact:	
Surface	**In-water**
Physical displacement of other marine users may occur due to the establishment of exclusion zones during the spill response. However, due to the comparatively small area of exposure, and the fact that exclusion zones are not expected to be long-term, significant impacts are not anticipated.	In the event of a hydrocarbon spill, other marine users may be impacted by exclusion zones surrounding a spill. These users include: • Commercial shipping • Other oil and gas industry • Defence activities. Exclusion zones could reduce access for other marine users for the duration of the response undertaken for spill clean-up (if applicable) meaning vessels may have to take detours leading to potential delays and increased costs. Underwater Heritage In general, in-water exposure is limited to the upper 0 – 10 m of the water column, and not within the deeper areas of the water column where underwater heritage is located. Therefore, impacts are not expected.
Predicted impact summary:	
Given the hydrocarbon characteristics of the Wandoo Crude, as a persistent heavy hydrocarbon, limited weathering is expected (Section 4.12.4.1). Due to the extent of the EMBA, the volume predicted to be released, and the consequence of hydrocarbon spill on other marine users, the potential consequence to other marine users has been assessed as short-term impacts.	

First Nations

First Nations values and sensitivities have been assessed based on the hydrocarbon exposure based on the most conservative thresholds that have the potential to cause socio-economic effects (Section 3.1.1). Therefore, the extent of the hydrocarbon exposure has been defined by using low hydrocarbon exposure thresholds for surface, shoreline and in-water (dissolved and entrained) hydrocarbons. This is defined as the EMBA.

Table 5-11 evaluates the potential impact that hydrocarbon spills for this activity may have on First Nations values and sensitivities found within the EMBA.

Table 5-11: Risk assessment for an accidental release of Wandoo Crude – First Nations

First Nations heritage
Exposure evaluation:
The EMBA overlaps the following RATSIB Areas (Section 3.7): • Kimberley: Kimberley Land Council Aboriginal Corporation • Pilbara: Yamatji Marlpa Aboriginal Corporation • Gascoyne-Midwest: Yamatji Marlpa Aboriginal Corporation The EMBA overlaps 4 Native Title Determinations (Table 3-18 and Figure 3-56): • Gnulli, Gnulli #2 and Gnulli #3 - Yinggarda, Baiyungu and Thalanyji People (ID: WCD2019/016) • Ngarluma/Yindjibarndi (ID: WCD2005/001) • Ngarluma People (ID: WCD2015/007) • Yaburara & Mardudhunera People (ID: WCD2018/006) There are 98 Aboriginal Cultural Heritage registered sites present within the EMBA. The EMBA doesn't overlap any IPA's. First Nations people are intrinsically linked to Sea Country which encompasses lands, waterways, seas, cultural practices and values to which they are connected (AIATSIS 2025). Country is a cultural landscape which includes both tangible values (i.e. cultural heritage sites) and intangible values (i.e. creation stories and cultural practices). First Nations cultural concepts are directly connected with Country. Country describes all aspects of place, environment, spirituality, law and identity. Values of Country differ between First Nations groups, and not all First Nations groups and communities in Australia hold the same belief systems or spirituality. Sea Country is Country that extends into the ocean. Smyth and Isherwood (2016) describe Sea Country as all estuaries, beaches, bays, and marine areas collectively, within a traditional estate. Sea Country contains evidence of the ancient mystical events by which all geographic features, animals, plants and people were created. Sea Country contains sacred sites and tracks (or 'Songlines') along which mythological beings travelled during the creation period (or 'Dreamtime') (Smyth and Isherwood, 2016). The sea, like the land, is integral to the identity of First Nations groups. Connection to Sea Country is accompanied by a complexity of cultural rights and responsibilities. Coastal areas traditionally were amongst the most densely populated areas due to the abundance of resources available. Formal recognition of Sea Country rights is significantly slower compared to land rights. This could be for a range of reasons including conflicting perspectives and opinions on traditional custodianship of land and how far it extends (Smyth and Isherwood, 2016). An unplanned hydrocarbon spill will impact the waters within Sea Country for a period while the spill disperses and weathers and has the potential to disrupt cultural values of Sea Country. The likelihood of a hydrocarbon spill occurring is assessed as highly unlikely and the actual area that may be affected from any single spill event would be considerably smaller than represented by the EMBA. The sea component of these areas may be contacted from surface, in-water, and shoreline hydrocarbon exposure. Hydrocarbon exposure may have the potential to impact the aesthetic and cultural values of Sea Country by the presence of physical hydrocarbons or the presence of oil spill responders.

Predicted impact:		
Surface	**In-water**	**Shoreline**
Visible surface hydrocarbons have the potential to reduce the visual amenity of known culturally significant values identified within the marine environment, subsequently potentially impacting the value of the site to First Nations people. Refer also to: • Seabirds and shorebirds • Marine reptiles • Marine mammals.	First Nations people connection to Sea Country could potentially be impacted by exposure to hydrocarbons. See Section 3.7.6 for further details of the values. In-water exposure at relevant thresholds may impact culturally important significant coastal habitats such as mangroves, and species to First Nations peoples, such as cetaceans, marine reptiles, and fish which may impact the cultural value of the species and cultural obligation to care for Country. The Ngarluma Aboriginal Corporation, Wanparta Aboriginal Corporation and Buurabalayji Thalanyji Aboriginal Corporation identified marine species of cultural value during consultation (Table 3-19). Their groups' Native Title Areas sit outside the EMBA, however Sea Country species may be impacted. VOGA recognises that First Nations groups features, values and interests are rarely limited to their Native Title boundaries, particularly totemic and migratory species. The 10 ppb low entrained exposure threshold (used to define the extent of the EMBA) represents the very lowest concentration and corresponds generally with the lowest trigger levels for chronic exposure for entrained hydrocarbons in water quality guidelines, no ecological impacts are anticipated at this threshold. It is considered highly unlikely that there will be long-term impacts to First Nations activities from contact at the low entrained threshold. Refer also to: • Benthic habitats • Marine invertebrates • Mangroves • Marine mammals • Marine reptiles	Visible hydrocarbons along a shoreline have the potential to reduce the visual amenity of known heritage sites along the coastline, subsequently potentially impacting the value of the site to First Nations people. The Kariyarra Aboriginal Corporation, Ngarluma Aboriginal Corporation, Wanparta Aboriginal Corporation, Murujuga Aboriginal Corporation and Buurabalayji Thalanyji Aboriginal Corporation identified islands and coastlines of cultural value during consultation (Table 3-19) that maybe potentially impacted by a hydrocarbon spill. Some parts of the Murujuga landscape and seascape within the EMBA have strict gender restrictions and cultural safety restrictions that would need to be considered in the event of managing any unexpected environmental incident. This is also likely for a number of other First Nations groups and will be considered in the response to a spill. Refer also to: • Coastal communities • Seabirds and shorebirds • Marine reptiles • Protected and significant areas.

	• Seabirds and shorebirds • Protected and significant areas.	

Predicted impact summary:

First Nations people's connection to Sea Country could potentially be impacted by exposure to hydrocarbons, given the extent of the EMBA and the physical characteristics of the Wandoo Crude, as a persistent hydrocarbon, which is predicted to remain either floating at the sea surface, or persist as entrained droplets within the water column, depending on the weather conditions (Section 4.12.4.1), until it slowly decays or degrade over time following the release into the marine environment.

Impacts to the values of First Nations people such as a marine reptiles, shorebirds, and valuable coastal communities (i.e. mangroves), may occur given the extent of the EMBA and limited weathering expected prior to shoreline impact of Wandoo Crude, with the minimum time to shoreline accumulation predicted after ~3 days.

Given the credible release duration (up to 1 hour), the potential consequence to the sensitive receptors of First Nations people, the oil spill response activities that would be implemented in the event of an accidental release from the export offtake system, and the typically dispersive environment of the offshore environment, majority of the potential consequences to First Nations values will be reversible, short-term impacts on habitats and species of recognised conservation value or to local ecosystem functioning, and not widespread long-term impacts to Sea Country, ecosystem functions and integrity, or culturally significant species populations.

Aboriginal Corporations identified a number of values, features and interests of cultural value during consultation [Table 3-19]. These areas sit outside the Operational Area. However, given the high sensitivity of certain values, such as mangrove communities and culturally significant offshore islands, to hydrocarbons and the associated potential recovery rates, the potential consequence to First Nations people has been assessed conservatively as reversible, long-term impacts, to species or habitats of recognized conservation value or to local ecosystem function.

5.2.4 Risk Ranking

Offtake of crude via the offtake export system will occur as part of the activity, introducing the potential for varying volumes of Wandoo crude to be discharged to the marine environment. Wandoo crude is a persistent, Group IV oil, with variable wind speeds likely to result in predominantly entrainment (93.9%) with minimal evaporation (3.2%). This is reflected in the oil spill modelling, which shows entrained in-water exposure to have the most significant footprint. Given the known receptors within the hydrocarbon area, and the potential exposure, effects could be medium-term and have the potential to affect habitats and communities. Therefore:

- The consequence ranking of '4' (Major) was assigned to a change in water quality, coastal communities, benthic habitats, marine fauna, protected and significant area, social and economic environment, and First Nations values, and a likelihood of 'B' (Unlikely) was considered appropriate, resulting in a risk ranking of 'Medium' (RRIII).

5.2.5 ALARP Demonstration

Table 5-4 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with accidental release of Wandoo crude from the offtake export system. No additional controls were identified that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with an accidental release of Wandoo crude from the offtake export system are assessed as low as reasonably practicable.

5.2.6 Acceptability Demonstration

Table 5-12: Acceptability demonstration - Accidental release – Crude from offtake export system

ACCEPTABLE LEVEL OF IMPACT/RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant principles of ESD not compromised given proposed controls.
External context – objections or claims considered	N/A – no external objections or claims received.
Internal context – VOGA HSE policy/procedure met	Yes – Risk managed in accordance with VOGA HSE policy. Potential spills to be managed in accordance with the Wandoo Field OSCP [WAN-2000-RD-0001].
Other requirements met	Yes – including: • Notice to Mariners issued via AMSA in a timely manner. • Potential spills to be managed in accordance with SOPEP/SMPEP (equivalent to class) It is considered that the petroleum activity is consistent with the objectives and actions of the following EPBC management plans that identify marine pollution as a threat (Table 1-3):

	• National Recovery Plan for albatrosses and petrels (2022) (DCCEEW, 2022a) • National recovery plan for the red goshawk *Erythrotriorchis radiatus* (DCCEEW, 2012) • National Recovery Plan for the Australian Fairy Tern (*Sternula nereis nereis*) (DAWE, 2020a) • Approved Conservation Advice for *Sternula nereis nereis* (Fairy Tern) (TSSC, 2011) • Approved Conservation Advice for *Calidris canutus* (Red Knot) (DCCEEW, 2024k) • Approved Conservation Advice for *Calidris frruginea* (Curlew sandpiper) (DCCEEW, 2023a) • Approved Conservation Advice for *Papasula abbotti* (Abbott's booby) (TSSC, 2020a) • Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW, 2024o) • Conservation Advice for *Charadrius leschenaultii* (greater sand plover) (DCCEEW, 2023e) • Conservation Advice for *Limnodromus semipalmatus* (Asian dowitcher) (DCCEEW, 2024m) • Conservation Advice for *Numenius madagascariensis* (far eastern curlew) (DCCEEW, 2023g) • Conservation Advice *Phaethon lepturus fulvus* white-tailed tropicbird (Christmas Island) (DoE, 2014) • Conservation Advice for *Tringa nebularia* (common greenshank) (DCCEEW, 2024p) • Wildlife Conservation Plan for Migratory Shorebirds – 2015 (DoE, 2015b) • Approved Conservation Advice for *Pristis zijsron* (green sawfish) (DEWHA, 2008b) • Approved Conservation Advice for *Pristis clavata* (dwarf sawfish) (DEWHA, 2009) • Sawfish and River Sharks Multispecies Recovery Plan: (*Pristis, Pristis zijsron, Pristis clavata, Glyphis and Glyphis garricki*) (DoE, 2015c) • Recovery Plan for Marine Turtles in Australia, 2017-2027 (Commonwealth of Australia, 2017) • Approved Conservation Advice for short-nosed sea snake (*Aipysurus apraefrontalis*) (DSEWPC, 2011b) Approved Conservation Advice for *Aipysurus foliosquama* (Leaf-scaled Sea Snake) (DSEWPC, 2011c).
RR < High (RRII)	Yes – Medium (RRIII).
EPO(s) manage impacts to acceptable levels	Yes – The following relevant EPOs will be maintained: • EPO-OP-01 • EPO-OP-02 See Section 7 for further details.

Acceptability summary:

The impacts and potential risks of an accidental release of crude from the offtake export system have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-4), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.7).

5.3 Accidental Release – Concrete Gravity Structure

5.3.1 Hazard Report

Table 5-13: Hazard report – Spill from CGS

HAZARD	Spill from CGS
EP risk no.	EP-OP-R03
Activity cause	Degradation/collapse of CGS shaft due to fatigue, corrosion of steel reinforcement, extreme storm etc. Passing vessel collision with WNB. Attending vessel collision with WNB. Tanker station keeping failure.
Potential impacts	Potential release of up to 2,200 m^3 of diesel.
Extent and duration	Exposure up to 730 km. Transient short term impact.
CEE	CEE-03 – Loss of Containment (CGS).

PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Degradation/collapse of CGS shaft due to fatigue, corrosion of steel reinforcement, extreme storm etc.	Structural design of the CGS.	Engineering	Prevention	EPO-OP-01 No unplanned discharge of hydrocarbons or chemicals to the marine environment.	Performance criteria, as per WAN-WNAB-CE-PR-07-01 – All structures shall be designed to provide support to critical control measures.	Assurance records, as per WAN-WNAB-CE-PR-07-01 – All structures.
Passing vessel collision with Platform.	Emergency communications.	Engineering	Prevention		VHF and UHF radios shall be in good working order to ensure communication between CCR and external parties.	Records from inspection and maintenance tasks: • A0001000 • A0000987 • A0001003 • A0001004 • A0001005.
	Navigation aids.	Engineering	Reduction		Navigation Lights. To provide visual indication to marine vessels of the position of the installation (WNA & WNB) so that they may take timely action to avoid the area.	Nightshift check sheet includes check of Navigation lights- conducted when Wandoo B is staffed
					AIS: To provide marine vessels the position of Wandoo (WNB) so that they may take timely action to avoid the area.	Records of inspection and maintenance tasks: • A0002153:1010 to A0002153:1030.
	500 m PSZ surrounding the facility.	Administrative	Reduction		500 m PSZ surrounding the facility, as per the Wandoo Marine Operations Manual [WNB-1000-YV-0001].	Wandoo Marine Operations Checklist [WNB-1000-NV-0001].
Attending vessel collision with Platform.	Station keeping requirements for vessels.	Administrative	Reduction		Dynamic positioning requirements, as per Section 9 of the Wandoo Marine Operations Manual [WNB-1000-YV-0001].	Wandoo Marine Operations Checklist [WNB-1000-NV-0001].

PREVENTION						
	Vessel operations restricted in adverse weather.	Administrative	Reduction		Vessel operations restricted in adverse weather, as per the Wandoo Marine Operations Manual [WNB-1000-YV-0001].	Wandoo Marine Operations Checklist [WNB-1000-NV-0001].
	Permission required for field entry, CALM Buoy approach, mooring-up and departure.	Administrative	Reduction		Vessels shall comply with permissioning protocols for vessels entering the field, CALM Buoy approach, mooring-up and departure, as per the Wandoo Marine Operations Manual [WNB-1000-YV-0001].	Wandoo Marine Operations Checklist [WNB-1000-NV-0001].
Tanker station keeping failure.	CALM Buoy mooring system.	Engineering	Reduction		Physical condition and anomalous effects shall satisfy fitness for service.	Records of inspection and maintenance tasks: • A0002147 1010 • A0002145 1010 • A0002057 1010
	Hawser is fit for purpose.	Administrative	Reduction		Hawser, chains and shackles shall be visually inspected for mechanical damage and wear prior to offtake, as per the SPM Marine Facility Procedures [WPA-7000-YV-0002].	Offtake Maintenance Report.
	SPM Marine Facilities Procedures [WPA-7000-YV-0002].	Administrative	Reduction		Tankers and Offtake support vessel shall comply with the SPM Marine Facilities Procedures [WPA-7000-YV-0002]: • Offtake operations shall be restricted in adverse weather. • Wandoo Mooring Master meets minimum competency standard. • A support vessel shall be present to assist with each offtake operation and must remain connected to the Tanker, providing static tow, throughout the operation.	Offtake Maintenance Report completed for each offtake, confirming compliance with SPM procedures. SPM Terminal Questionnaire (VOG-7000-RV-0001) completed and accepted prior to tanker arrival. Safety Checklist completed and verified. Training records confirm the Mooring Master meets the competency requirements described in the manual. Marine assurance or internal audits confirm: • Offtake operations were restricted in adverse weather • A support vessel remained connected and providing static tow • All procedural steps in WPA-7000-YV-0002 were followed.

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Wandoo Emergency Response Plan [VOG-2000-RD-0017].	Administrative	Mitigation	EPO-OP-02 In the event of loss of hydrocarbons, implement NOPSEMA-accepted spill response documents.	Emergency response arrangements are adequate to manage identified oil spill emergency scenarios Emergency/oil spill response organisational arrangements shall allow effective response management regardless of the scale of the emergency Emergency/oil spill response personnel shall be competent for the ICT role to which they are assigned	Annual oil spill response capability review confirms following arrangements are in place: • Oil spill response testing as per VOGA Emergency Response Schedule [VOG-1100-YH-0001]. • Post exercise and incident review of emergency response arrangements. • Training and competency records are maintained for ICT members.

MITIGATION					
CGS Source Control Plan [VOG-3000-YH-0001].	Administrative	Mitigation		Source control plan is in place and resources are available to implement plan.	Annual oil spill response capability review confirms arrangements are in place.
The NOPSEMA-accepted Wandoo Field Oil Spill Contingency Plan Document 2: Oil Pollution Emergency Plan [WAN-2000-RD-0001.02] will be implemented.	Administrative	Mitigation		Oil spill response strategies shall be implemented in accordance with the Wandoo Field Oil Spill Contingency Plan Document 2: Oil Pollution Emergency Plan [WAN-2000-RD-0001.02].	IAP records.
The NOPSEMA-accepted VOGA Operational and Scientific Monitoring Bridging Implementation Plan [VOG-1100-RG-0002] will be implemented.	Administrative	Mitigation		Oil spill operational and scientific monitoring shall be implemented in accordance with the VOGA Operational and Scientific Monitoring Bridging Implementation Plan [VOG-1100-RG-0002].	IAP records.

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Moderate (3)	Unlikely (B)	Medium

ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
A medium risk is defined as tolerable on demonstration of ALARP under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		
Additional control considered	**Assessment of option**	**Adopted/not adopted**
Refer to Section 5.4 for source control and oil spill response ALARP evaluation tables.		
Limit crude oil inventory in CGS.	Limiting the inventory in the storage cells to reduce the potential impact in the event of a release from the CGS. If implemented, this measure would reduce the commercial viability of the operation as it would significantly reduce the production rates and may also increase the presence of a tanker in the field – with the associated risks which this would incur.	Not adopted
Standby vessel in situ 24 hrs/day: • To monitor the PSZ and be equipped with an automatic identification system to aid in its detection at sea, and radar to aid in the detection of approaching third-party vessels.	Reduces risk of vessel collision and subsequent unplanned release of hydrocarbons High cost associated with contracting standby vessel. Costs of operating navigational equipment. The costs associated with having a vessel on location 24/7 are considered disproportionate to the environmental benefit gained, particularly given the infrastructure are marked on charts and navigational aids are present.	Not adopted
Strengthening of CGS shafts to increase impact resistance.	Impact resistance of CGS shafts already meets relevant codes and standards. Upgrading CGS shafts to improve impact resistance was assessed as grossly disproportionate to risk benefit gained.	Not adopted

RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Moderate (3)	Unlikely (B)	Medium

5.3.2 Description of Hazard

As outlined in Section 2.4.2, the topside facility (at WNB) is supported on four concrete shafts that integrate into a concrete base (the CGS) comprising of ballast, product storage and water cells.

The storage of hydrocarbons within the CGS carries an inherent risk of spills that must be effectively managed. The hazard review considered all potential release pathways for both Wandoo crude and diesel from the CGS (Section 4.12.1). Based on engineering evidence, operational configuration, and the outcomes of the structural modelling studies, the review identified that the only credible spill scenario is a ship collision causing damage to Shaft 2, resulting in a loss of containment from the diesel storage cell.

The maximum credible release volume is the full Shaft 2 inventory of 2,200 m^3, discharged at the surface over a 12-hour duration.

5.3.2.1 Spill Modelling Results

Descriptions of the spill model used, modelling parameters, exposure thresholds and hydrocarbon characteristics are provided in Section 4.12.

Table 5-14 provides a summary of the results from the stochastic modelling report (RPS, 2025; Appendix B) for an accidental release of diesel from Shaft 2.

Table 5-14: Summary of the hydrocarbon modelling results for an accidental release of diesel from Shaft 2 (RPS, 2025)

Exposure values	Summary of worst-case predicted exposure
Surface exposure	
Low (1 g/m^2)	The maximum distance for floating surface hydrocarbon exposure at or above this threshold from the source was predicted to be 166 km. The highest probability of exposure is predicted at Montebello AMP (1%). The minimum time to shore at or above the low threshold was 2 days 3 hours (Montebello AMP).
Moderate (10 g/m^2)	The maximum distance for floating surface hydrocarbon exposure at or above this threshold from the source was predicted to be 33 km. No exposure was predicted to any receptor(s) at this threshold.
High (50 g/m^2)	The maximum distance for floating surface hydrocarbon exposure at or above this threshold from the source was predicted to be 24 km. No exposure was predicted to any receptor(s) at this threshold.
Shoreline exposure	
Low (10 g/m^2)	The highest probability of hydrocarbon accumulation on any shoreline at or above this threshold was 34%. The minimum time to shore at or above the low threshold was 3 days 22 hours (Barrow Island and Montebello Islands). The maximum total volume of hydrocarbon ashore for a single spill trajectory was 15.0 m^3. The maximum length of hydrocarbon ashore above the low threshold was 18 km (across Barrow Island and Montebello Islands).

Exposure values	Summary of worst-case predicted exposure
Moderate (100 g/m^2)	The highest probability of hydrocarbon accumulation on any shoreline at or above the moderate threshold was 9%. The minimum time to shore at or above the moderate threshold was 4 days 22 hours (Montebello Islands). The maximum total volume of hydrocarbon ashore for a single spill trajectory was 12.9 m^3. The maximum length of hydrocarbon ashore above the moderate threshold was 5 km (Montebello Islands).
High (500 g/m^2)	No exposure at this threshold was predicted.
In-water exposure – dissolved	
Low (10 ppb)	The maximum distance for dissolved hydrocarbons at or above this threshold from the source was predicted to be 307 km. The minimum time to dissolved hydrocarbon exposure at any given receptor(s) was 24 hours (Montebello AMP). The probability of intersect with the Montebello AMP is 15%.
Moderate (50 ppb)	The maximum distance for dissolved hydrocarbons at or above this threshold from the source was predicted to be 180 km. The minimum time to dissolved hydrocarbon exposure at any given receptor(s) was 25 hours (Montebello AMP). The probability of intersect with the Montebello AMP is 6%.
High (400 ppb)	The maximum distance for dissolved hydrocarbons at or above this threshold from the source was predicted to be 30 km. No contact with receptors is predicted.
In-water exposure – entrained	
Low (10 ppb)	The maximum distance for entrained hydrocarbons at or above this threshold from the source was predicted to be 729 km. The minimum time to dissolved hydrocarbon exposure at any given receptor(s) was 20 hours (Montebello AMP). The probability of intersect with the Montebello AMP is 72%.
High (100 ppb)	The maximum distance for entrained hydrocarbons at or above this threshold from the source was predicted to be 452 km. The minimum time to dissolved hydrocarbon exposure at any given receptor(s) was 21 hours (Montebello AMP). The probability of intersect with the Montebello AMP is 48%.

5.3.3 Impact and Risk Evaluation

The accidental release of diesel from Shaft 2 may result in:

- Change in water quality.

The potential risks from a change in water quality caused by the accidental release of diesel from Shaft 2 include:

- Disruption to marine fauna

- Injury/mortality to marine fauna
- Change in ecosystem dynamics and conservation values
- Changes to the functions, interests, or activities of other marine users
- Change in submerged cultural heritage.

The following receptors within the Operational Area may be impacted:

- Benthic habitats.
- Coastal communities.
- Marine fauna, such as:
  - plankton
  - benthic invertebrates
  - seabirds and shorebirds
  - fish, sharks and rays
  - marine mammals
  - marine reptiles
  - Protected and significant areas.
- Social and economic environment, such as:
  - recreational fishing, fisheries and aquaculture
  - other marine users.
- First Nations values.

5.3.3.1 Risk Assessment

MGO, like MDO, is a Group II oil (light-persistent). As shown in Section 4.12.4.2 the physical properties of MGO and MDO are similar, however MGO is typically lighter (density is lower), with lower viscosity. This allows it to flow and atomise more readily and makes it more susceptible to weather processes. Light distillates like MGO are also not prone to forming stable emulsions, so they remain more fluid and weather faster.

Section 5.5 of this EP provides a detailed assessment of potential environmental impacts to the receiving environment from a release of MDO. The volume of MDO assessed is smaller than the potential MGO release (300 m^3 MDO vs 2,200 m^3 MGO), however the exposure evaluation and description of predicted impacts is considered broadly relevant to the assessment of MGO. To avoid duplication, cross-referencing to the MDO assessment has been provided as appropriate.

Water Quality

The accidental release of MGO from Shaft 2 into the marine environment will result in a localised reduction in the water quality within the receiving marine environment. A visible oil sheen on the water surface may also occur in the event of a hydrocarbon spill.

Water quality in the Operational Area is described in Section 3.3.2.

The hydrocarbon modelling predicted that the maximum distance for floating surface hydrocarbon exposure at any threshold would extend out to 166 km, and 307 km and 729 km for dissolved and entrained hydrocarbons, respectively (RPS, 2025). Therefore, changes to water quality will occur outside of the Operational Area in the unlikely event of a LOC from Shaft 2.

Due to the highly dispersive environment typical of the offshore area, and the rapid weathering expected for the light non-persistent hydrocarbon, with approximately 39% evaporated within 24 hours depending on the conditions (Section 4.12.4.2), any change to water quality is expected to be short term and will recover to pre-spill state as the hydrocarbon weathers. The consequence ranking of '3' (Moderate) was assigned to a change in water quality due to the extent of the spill outside the Operational Area.

Benthic Habitats

Benthic habitats have been assessed based on the hydrocarbon exposure at the thresholds that have the potential to cause ecological impacts, which is defined as the Hydrocarbon Area (refer to Section 3.1.1). Table 5-15 evaluates the potential impact that hydrocarbon spills for this activity may have on benthic habitat receptors found within the Hydrocarbon Area.

Table 5-15: Risk assessment for an accidental release of diesel – benthic habitats

Benthic habitats
Exposure evaluation:
Refer to Section 5.5.3.1. The maximum distance for dissolved hydrocarbons at moderate exposure (50 ppb) from the source was predicted to be 180 km and 452 km for entrained hydrocarbons at the high threshold (100 ppb). Release of diesel will be at the surface, with the majority of hydrocarbon and weathered products remaining at or near the surface.
Predicted impact:
In-water
Refer to Section 5.5.3.1.
Predicted impact summary:
Given the restricted range of exposure for benthic communities; restricted to shallow nearshore and intertidal waters only, outside of the main exposure area predicted within 0–10 m of the sea surface, the rapid weathering of the hydrocarbon expected following a spill release (Section 4.12.4.2), and the predicted low concentrations of hydrocarbons expected to reach these waters, any impacts to benthic habitats and associated communities is anticipated to be localised and short-term, with rapid recovery expected.

Coastal Communities

Coastal communities have been assessed based on the hydrocarbon exposure based on the thresholds that have the potential to cause ecological impacts, defined as the Hydrocarbon Area. 5-16 evaluates the potential impact that hydrocarbon spills for this activity may have on coastal receptors found within the Hydrocarbon Area.

Table 5-16: Risk assessment for an accidental release of diesel - coastal communities

Mangroves
Exposure evaluation:
Refer to Section 5.5.3.1.

The spill modelling identified that the highest probability of hydrocarbon accumulation on any shoreline at or above the moderate threshold (100 g/m^2) was 9% at Montebello Islands. The minimum time to shore was 4 days and 22 hours and the maximum total volume of hydrocarbon ashore for a single spill trajectory was 12.9 m^3. Montebello Island also recorded the maximum length of hydrocarbon ashore above the moderate threshold (5 km).

No contact at threshold was predicted for Barrow Island where mangroves communities are also present (Figure 3-6).

Predicted impact:

Surface	In-water	Shoreline
Refer to Section 5.5.3.1.	Refer to Section 5.5.3.1.	Refer to Section 5.5.3.1.

Predicted impact summary:

Isolated coastal mangroves communities that may be exposed to hydrocarbons within the Hydrocarbon Area are located at Montebello Island.

Given the non-persistent nature of diesel, as a light non-persistent hydrocarbon, the distance to the nearest mangrove communities that may be exposed (~92 km southwest of the Operational Area), and the anticipated weathering that the hydrocarbon will undergo prior to impact with the minimum time to shoreline accumulation predicted after 4 days 22 hours, any impact to mangroves are anticipated to be highly localised, with hydrocarbons highly weathered prior to exposure.

Despite impacts predicted to be limited, given their sensitivity to hydrocarbons, the potential consequence to mangroves is assessed conservatively based on the potential for localised, medium-term impacts, to species or habitats of recognized conservation value or to local ecosystem function.

Saltmarsh

Exposure evaluation:

Refer to Section 5.5.3.1.

No shoreline contact with coastlines known to support saltmarsh habitats (e.g. Barrow Island) was predicted at or above moderate threshold.

Predicted impact:

Shoreline

Refer to Section 5.5.3.1.

Predicted impact summary:

Given that the modelling did not predict shoreline accumulation to occur at Barrow Island at the moderate hydrocarbon threshold, impacts to saltmarshes following the accidental release of diesel are expected to be negligible and have not been assessed further.

Rocky and sandy beaches

Exposure evaluation:

Refer to Section 5.5.3.1.

The highest probability of hydrocarbon accumulation on any shoreline within the Hydrocarbon Area at or above moderate threshold was predicted to occur at the Montebello Islands (9%) within 4 days and 22 hours. The maximum length of hydrocarbon ashore above the moderate threshold was 5 km at the Montebello Islands.

As discussed within Section 3.4.2, sandy beaches are a dominant coastal shoreline on the Montebello Islands, with patchy of rocky beaches and rocky limestone outcrops.

Predicted impact:

Shoreline

Refer to Section 5.5.3.1.

Predicted impact summary:

Given the low probability of the worst-case shoreline exposure (5%), the weathering expected for the light non-persistent hydrocarbon, and the tidal action and constant wave washing on this type of

shoreline which would contribute to further weathering of any hydrocarbons in the intertidal shoreline area, any impacts to shorelines from exposure to diesel are anticipated to be localised and short term.

Marine Fauna

Marine fauna has been assessed based on the hydrocarbon exposure based on the thresholds that have the potential to cause ecological impacts (Section 3.1.1), defined as the Hydrocarbon Area. Table 5-17 evaluates the potential impact that hydrocarbon spills for this activity may have on marine fauna receptors found within the Hydrocarbon Area.

Table 5-17: Risk assessment for an accidental release of diesel – marine fauna

Plankton		
Exposure evaluation:		
Refer to Section 5.5.3.1.		
Predicted impact:		
Surface	**In-water**	
Refer to Section 5.5.3.1.	Refer to Section 5.5.3.1.	
Predicted impact summary:		
Plankton populations are numerous and widespread and expected to rapidly recover following an accidental release of diesel. Due to the highly dispersive environment of the offshore environment, and the rapid weathering expected for the MDO, 39% within 24 hours, depending on weather conditions (Section 4.12.4.2), any impacts to plankton from exposure to diesel are anticipated to be localised and short term, with rapid recovery expected.		
Benthic invertebrates		
Exposure evaluation:		
Refer to Section 5.5.3.1.		
Predicted impact:		
In-water		
Refer to Section 5.5.3.1.		
Predicted impact summary:		
Due to the characteristics of the light, non-persistent hydrocarbons, surface release and associated water depths, coating of benthic assemblages and prolonged exposure to hydrocarbons is considered highly unlikely following a release of diesel. Furthermore, the highly dispersive environment of the offshore environment, and the rapid weathering expected for the diesel, with approximately 39% within 24 hours (Section 4.12.4.2), any impacts to benthic invertebrates from exposure to diesel are anticipated to be localised and short-term, with rapidly recovery expected.		
Seabirds and shorebirds		
Exposure evaluation:		
Refer to Section 5.5.3.1. The modelling predicted that the maximum distance for floating surface hydrocarbon exposure at the moderate threshold (10 g/m^2) from the source was predicted to be 33 km. The minimum time to shore at or above the low threshold as 4 days 22 hours (Montebello Island), with the minimum time to dissolved hydrocarbon exposure and entrained hydrocarbon exposure at any given receptor(s) was 25 hours and 21 hours respectively, both at Montebello AMP.		
Predicted impact:		
Surface	**In-water**	**Shoreline**
Refer to Section 5.5.3.1.	Refer to Section 5.5.3.1.	Refer to Section 5.5.3.1.

Predicted impact summary:	
Refer to Section 5.5.3.1. Consequently, the potential impacts and risks to seabirds from a release of diesel are expected to result in localised, short-term impacts to species of recognised conservation value, however not affecting population or ecosystem functioning.	
Fish, sharks and rays	
Exposure evaluation:	
Refer to Section 5.5.3.1. The maximum distance for dissolved hydrocarbons at moderate exposure (50 ppb) from the source was predicted to be 180 km. The maximum distance for entrained hydrocarbons at high exposure from the source was predicted to be 452 km.	
Predicted impact:	
In-water	
Refer to Section 5.5.3.1.	
Predicted impact summary:	
Refer to Section 5.5.3.1. As such, due to the highly dispersive environment of the offshore environment, and the rapid weathering expected for the diesel, 39% within 24 hours depending on the conditions (Section 4.12.4.2), any impacts to fish and shark populations from exposure to diesel are anticipated to be localised and short term, and not expected to affect species populations or general ecosystem functioning.	
Marine mammals	
Exposure evaluation:	
Refer to Section 5.5.3.1. The maximum distance for dissolved hydrocarbons at moderate exposure (50 ppb) and entrained hydrocarbons at the high exposure (100 ppb) was predicted to be 180 km and 452 km.	
Predicted impact:	
Surface	**In-water**
Refer to Section 5.5.3.1.	Refer to Section 5.5.3.1.
Predicted impact summary:	
Refer to Section 5.5.3.1. The modelling predicted that the hydrocarbons would weather rapidly if released to the environment Section 4.12.4.2). Relatively fresh hydrocarbons (closer to the release location) are considered to have the greatest potential for impact. Therefore, the potential for environmental impacts would be limited to a relatively short period following the release and would need to coincide with a migration or aggregation event to result in exposure to a large number of individuals. Regardless, such exposure is not anticipated to result in long-term population viability effects. A proportion of the migrating population of whales could be affected for a single migration event, which could result in temporary and localised consequences. Given the wide distribution of marine mammal species in the region and the nature of the potential impacts, impact to an entire population or the population's overall viability is not anticipated. Any impacts to marine mammals from exposure to diesel are anticipated to be localised and short term.	
Marine reptiles	
Exposure evaluation:	
Refer to Section 5.5.3.1. Probability of shoreline contact for Montebello Islands reaching the moderate threshold is low and only expected during the transitional season (1%) and winter (9%). The maximum distance from the release location to floating oil exposure in moderate thresholds will be 33 km west during transitional season.	

Predicted impact:		
Surface	**In-water**	**Shoreline**
Refer to Section 5.5.3.1.	Refer to Section 5.5.3.1.	Refer to Section 5.5.3.1.
Predicted impact summary:		
The number of marine turtles that may be exposed to hydrocarbons during a spill event is expected to be low due to the localised and temporary presence of surface hydrocarbons due to the rapid weathering anticipated (Section 4.12.4.2). Shoreline accumulation at nesting beaches within the Hydrocarbon Area was predicted as a very low probability. The activity will be conducted in a manner which is not inconsistent with the relevant management actions. Therefore, the potential impact would likely be limited to individual transiting marine turtles, with population impacts not anticipated. Due to the low number of sea snakes anticipated within the Hydrocarbon Area, impacts to sea snakes at both an individual or population level is not anticipated. Due to the highly dispersive environment of the offshore environment, and the rapid weathering expected for the MDO, with approximately 39% evaporated within 24 hours depending on the conditions. Therefore, any impacts to marine reptiles from exposure to diesel are anticipated to be localised and short term, with no impacts to population or ecosystem functioning.		

Protected and Significant Areas

Protected and significant areas which have only ecological values have been assessed based on the hydrocarbon exposure based on the thresholds that have the potential to cause ecological impacts, defined as the Hydrocarbon Area.

Protected and significant areas which also include socio-economic value have been assessed based on the most conservative hydrocarbon exposure thresholds, such as those that have the potential to cause socio-economic effects, defined as the EMBA.

Table 5-18 evaluates the potential impact that hydrocarbon spills for this activity may have on protected and significant areas receptors found within either the Hydrocarbon Area or EMBA.

Table 5-18: Risk assessment for an accidental release of diesel - protected and significant areas

Marine parks
Exposure evaluation:
Refer to Section 5.5.3.1. The only AMP predicted to be exposed to floating hydrocarbons is Montebello AMP at low threshold (1 g/m^2), with a 1% probability of contact. No contact at moderate or high thresholds is predicted. No State MPAs were exposed to floating hydrocarbon, at, or above, the low threshold for any season. The minimum time to dissolved hydrocarbon exposure at the low 10 ppb threshold at any given receptor(s) was 24 hours at the Montebello AMP, which also recorded the highest probability of intersect with at 15%. The highest probability of entrained hydrocarbons at the low 10 ppb threshold was predicted at Montebello AMP at 72% with contact predicted in 20 hours (RPS, 2025). The in-water probability results for the other AMPs to be intersected by these threshold levels included: • Argo-Rowley Terrace AMP - 2% entrained and no contact for dissolved. • Dampier AMP - 4% entrained and 1% for dissolved. • Gascoyne AMP - 37% entrained and no contact for dissolved. • Carnarvon Canyon AMP - 1% entrained and no contact for dissolved. The in-water probability results for the other MPs to be intersected by these threshold levels included:

- Muiron Islands MMA - 43% entrained and 1% dissolved.
- Barrow Island MP – 37% entrained and 3% dissolved
- Montebello Island MP – 67% entrained and 9% dissolved
- Ningaloo MP – 43% entrained 1% dissolved.
- Shark Bay MP – 1% entrained and no contact for dissolved.

The spill modelling identified that the highest probability of hydrocarbon accumulation on a specific shoreline at or above the low threshold (10 g/m^2) was 21% at the Barrow Island and Montebello Islands shoreline cell, which is a considered a part of the Pilbara Islands Nature Reserve MP. The shoreline cells for Barrow Island, Lowendal Islands and Montebello Islands recorded the minimum time to shore at 3 days 22 hours and the maximum total volume of hydrocarbon ashore for a single spill trajectory was 15 m^3. Barrow Island and Montebello Islands recorded the maximum length of hydrocarbon ashore above the low threshold (14 km) (Section 5.5.2.1).

Predicted impact:

In-water	**Shoreline**
Refer to Section 5.5.3.1.	Refer to Section 5.5.3.1.

Predicted impact summary:

Given the highly dispersive environment of the offshore environment, the weathering expected for the light non-persistent hydrocarbon (Section 4.12.4.2), and the tidal action and constant wave washing on this type of shoreline which would contribute to further weathering of any hydrocarbons in the intertidal shoreline area, the potential consequences to AMPs and State Marine Parks from exposure to hydrocarbons following a worst-case release of diesel has the potential for localised and short-term impacts on habitats and species of recognised conservation value or to local ecosystem functioning.

Heritage Properties and Places

Exposure evaluation:

Refer to Section 5.5.3.1.

The worst-case results identified for the Heritage Properties and Places to be intersected by in-water (entrained) at the low threshold (RPS, 2024), include:

- 14% probability of entrained hydrocarbons at the Ningaloo Coast World Heritage Properties within 204 hours (8.5 days).
- 13% probability of entrained hydrocarbons at the Ningaloo Coast National Heritage Place within 226 hours (9.4 days).
- 1% probability of entrained hydrocarbons at the Dampier Archipelago (at the WAOMPRMA shoreline segment: WA11.East (317) - West Intercourse Island - Dolphin Island N point (G)) within 162 hours (6.75 days).
- 1% probability of entrained hydrocarbons at the Murujuga Cultural Landscape (at the WAOMPRMA shoreline segment: WA11.East (317) - West Intercourse Island - Dolphin Island N point (G)) within 162 hours (6.75 days).

No Heritage Properties and Places were exposed to floating hydrocarbons, in-water (dissolved), or shoreline hydrocarbons, at, or above, the low threshold for any season (Table 5-14; RPS, 2025); therefore, no impacts to the surface, shoreline or terrestrial values are predicted to occur.

Importantly, no impact to any of the culturally significant terrestrial sites are expected, such as the ancient rocks encompassing the Burrup Peninsula, Dampier Archipelago Islands and nearby marine areas and the associated petroglyphs, middens, or artefacts.

The predicted impact to the individual values of the Heritage Properties and Places have been assessed separately. Refer to:

- Benthic habitats
- Marine fauna:

○ Plankton ○ Benthic invertebrates ○ Seabirds and shorebirds ○ Fish, sharks and rays ○ Marine reptiles ○ Marine mammals. • Social and economic environment: ○ Tourism and recreational fishing • First Nations.
Predicted impact:
In-water
Refer to Section 5.5.3.1. Given the hydrocarbon characteristics of the MDO, as a light, non-persistent hydrocarbon, that rapidly weathers (21% expected decay after 7 days), a large proportion of the hydrocarbon is expected to have weathered prior to contact (RPS, 2024), with the spill scenario expected to be short-term and localised.
Predicted impact summary:
The spill modelling predicted no shoreline accumulation to occur at any threshold for any Heritage Properties or Places. As such, no impact to the terrestrial culturally significant values of Murujuga Cultural Landscape or Dampier Archipelago are expected (i.e. rock art, middens or artefacts), or any other terrestrial values, such as the diverse habitats found along the Ningaloo Coast (i.e., sandy and rocky beaches). Given the highly dispersive environment of the offshore environment, the low probability of contact, the minimum times to contact, and the weathering expected for the light non-persistent hydrocarbon (Section 4.12.4.2), the potential consequences to Heritage Properties and Places will be limited to the short-term exposure of entrained hydrocarbons within the water column. As such, following a worst-case release of diesel there is the potential for localised and short-term impacts on habitats and species of recognised conservation value or to local ecosystem functioning.
Key Ecological Features
Exposure evaluation:
Refer to Section 5.5.3.1.
Predicted impact:
In-water
Refer to Section 5.5.3.1.
Predicted impact summary:
Given the highly dispersive environment of the offshore environment, the weathering expected for the light non-persistent hydrocarbon (Section 4.12.4.2), and the tidal action and constant wave washing on this type of shoreline which would contribute to further weathering of any hydrocarbons in the intertidal shoreline area, the potential consequences to KEFs from exposure to hydrocarbons following a worst-case release of diesel has the potential for localised and short-term impacts on habitats and species of recognised conservation value or to local ecosystem functioning.

Social and Economic Environment

Social and economic receptors have been assessed based on the hydrocarbon exposure based on the thresholds that have the potential to cause socio-economic effects, defined as the EMBA. Table 5-19 evaluates the potential impact that hydrocarbon spills for this activity may have on social and economic receptors found within the EMBA.

Table 5-19: Risk assessment for an accidental release of diesel – social and economic environment

Commercial fisheries		
Exposure evaluation:		
Refer to Section 5.5.3.1. Several State-managed fisheries were identified to have management areas that intersect the EMBA. The maximum distance for dissolved and entrained hydrocarbons at a low threshold (10 ppb) from the source was predicted to be 307 km and 729 km, respectively (RPS, 2025).		
Predicted impact:		
Surface	**In-water**	
Refer to Section 5.5.3.1.	Refer to Section 5.5.3.1.	
Predicted impact summary:		
Acute impacts to commercially fished species are expected to be limited to a small number of juvenile fish, larvae, and/or planktonic organisms. Depending on the timing of the spill, in the event it overlaps with the timing of a species reproduction event (i.e. a spawning event), there is potential for localised impacts to population recruitment for a commercially targeted species for a year class. However, due to the wide distribution of fish species typical in the region, the typical timing of recruitment events, and the nature of potential impacts from a spill of diesel, impacts to an entire population, or population's overall viability is not anticipated. Due to the highly dispersive environment of the offshore environment, and the rapid weathering expected for the diesel, as a light, non-persistent hydrocarbon, 39.3% evaporated within 24 hours (Section 4.12.4.2), and high anticipated entrainment rates, any exclusion zones are not expected to be long-term and not cause significant impacts to the economic viability of the fishery. Impacts are expected to be limited to localised and short-term exclusion from the area affected.		
Tourism and recreational fishing		
Exposure evaluation:		
Refer to Section 5.5.3.1.		
Predicted impact:		
Surface	**In-Water**	**Shoreline**
Refer to Section 5.5.3.1.	Refer to Section 5.5.3.1.	Refer to Section 5.5.3.1.
Predicted impact summary:		
Given the nature of the hydrocarbon, being a light and non-persistent, the low probability of shoreline impacts, and high anticipated evaporation and entrainment rates (Section 4.12.4.2), any impacts to recreation and tourism are expected to be localised and short term.		
Other marine users		
Exposure evaluation:		
Refer to Section 5.5.3.1.		
Predicted impact:		
Surface	**In-water**	
Refer to Section 5.5.3.1.	Refer to Section 5.5.3.1.	
Predicted impact summary:		
Given the nature of the hydrocarbon, being a light and non-persistent, the low probability of shoreline impacts, and high anticipated evaporation and entrainment rates (Section 4.12.4.2), any impacts to other marine users are expected to be localised and short term.		

First Nations

First Nations values and sensitivities have been assessed based on the hydrocarbon exposure based on the most conservative thresholds that have the potential to cause socio-economic effects (Section 3.1.1). Therefore, the extent of the hydrocarbon exposure has been defined by using low hydrocarbon exposure thresholds for surface, shoreline and in-water (dissolved and entrained) hydrocarbons. This is defined as the EMBA.

Table 5-20 evaluates the potential impact that hydrocarbon spills for this activity may have on First Nations values and sensitivities found within the EMBA.

Table 5-20: Risk Assessment for an accidental release of diesel – First Nations heritage

First Nations heritage		
Exposure evaluation:		
Refer to Section 5.5.3.1.		
Predicted impact:		
Surface	**In-water**	**Shoreline**
Refer to Section 5.5.3.1.	Refer to Section 5.5.3.1.	Refer to Section 5.5.3.1.
Predicted impact summary:		
First Nations people's connection to Sea Country could potentially be impacted by exposure to hydrocarbons. However, due to the characteristics of the spill scenario, and the open water conditions of the Operational Area, the diesel is anticipated to rapidly disperse through the mixing of surface waters and near surface waters, driven by tidal current and wave action. Aboriginal Corporations identified a number of values, features and interests of cultural value during consultation (Table 3-19). These areas sit outside the Operational Area, however some of these are located within the EMBA and may be exposed to hydrocarbons in the event of a spill. Consequently, the potential impacts and risks to cultural heritage receptors from an accidental of diesel are expected to result in localised medium-term impacts to socio-economic activities.		

5.3.4 Risk Ranking

Given the characteristics of diesel as a light non-persistent hydrocarbon, the anticipated rapid weathering, and minimal shoreline accumulation, any impact is anticipated to be predominantly highly localised, with short-medium term impacts to individuals, not affecting species populations or general ecosystem functioning. Therefore:

- The consequence ranking of '3' (Moderate) was assigned to a change in water quality, coastal communities, and First Nations values, and a likelihood of 'B' (Unlikely) was considered appropriate, resulting in a risk ranking of 'Medium' (RRIII).
- The consequence ranking of '2' (Minor) was assigned to benthic habitats, marine fauna, protected and significant area, and social and economic environment, and a likelihood of 'B' (Unlikely) was considered appropriate, resulting in a risk ranking of 'Low' (RRIV).

5.3.5 ALARP Demonstration

Table 5-13 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and

the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with accidental release of Wandoo crude from the CGS. No additional controls were identified that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with an accidental release of Wandoo crude from the CGS are assessed as low as reasonably practicable.

5.3.6 Acceptability Demonstration

Table 5-21: Acceptability demonstration - Accidental release – diesel from shaft 2

ACCEPTABLE LEVEL OF IMPACT/RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant principles of ESD not compromised given proposed controls.
External context – objections or claims considered	N/A – no external objections or claims received.
Internal context – VOGA HSE policy/procedure met	Yes – Risk managed in accordance with VOGA HSE policy. Potential spills to be managed in accordance with the Wandoo Field OSCP [WAN-2000-RD-0001].
Other requirements met	Yes – including: • Notice to Mariners issued via AMSA in a timely manner. • Potential spills to be managed in accordance with SOPEP/SMPEP (equivalent to class) It is considered that the petroleum activity is consistent with the objectives and actions of the following EPBC management plans that identify marine pollution as a threat (Table 1-3): • National Recovery Plan for albatrosses and petrels (2022) (DCCEEW, 2022a) • National recovery plan for the red goshawk *Erythrotriorchis radiatus* (DCCEEW, 2012) • National Recovery Plan for the Australian Fairy Tern (*Sternula nereis nereis*) (DAWE, 2020a) • Approved Conservation Advice for *Sternula nereis nereis* (Fairy Tern) (TSSC, 2011) • Approved Conservation Advice for *Calidris canutus* (Red Knot) (DCCEEW, 2024k) • Approved Conservation Advice for *Calidris frruginea* (Curlew sandpiper) (DCCEEW, 2023a) • Approved Conservation Advice for *Papasula abbotti* (Abbott's booby) (TSSC, 2020a) • Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW, 2024o) • Conservation Advice for *Charadrius leschenaultii* (greater sand plover) (DCCEEW, 2023e) • Conservation Advice for *Limnodromus semipalmatus* (Asian dowitcher) (DCCEEW, 2024m)

	• Conservation Advice for *Numenius madagascariensis* (far eastern curlew) (DCCEEW, 2023g) • Conservation Advice *Phaethon lepturus fulvus* white-tailed tropicbird (Christmas Island) (DoE, 2014) • Conservation Advice for *Tringa nebularia* (common greenshank) (DCCEEW, 2024p) • Wildlife Conservation Plan for Migratory Shorebirds – 2015 (DoE, 2015b) • Approved Conservation Advice for *Pristis zijsron* (green sawfish) (DEWHA, 2008b) • Approved Conservation Advice for *Pristis clavata* (dwarf sawfish) (DEWHA, 2009) • Sawfish and River Sharks Multispecies Recovery Plan: (*Pristis, Pristis zijsron, Pristis clavata, Glyphis and Glyphis garricki*) (DoE, 2015c) • Recovery Plan for Marine Turtles in Australia, 2017-2027 (Commonwealth of Australia, 2017) • Approved Conservation Advice for short-nosed sea snake (*Aipysurus apraefrontalis*) (DSEWPC, 2011b) • Approved Conservation Advice for *Aipysurus foliosquama* (Leaf-scaled Sea Snake) (DSEWPC, 2011c).
RR < High (RRII)	Yes – Medium (RRIII).
EPO(s) manage impacts to acceptable levels	Yes – The following relevant EPOs will be maintained: • EPO-OP-01 • EPO-OP-02 See Section 7 for further details.
Acceptability summary: The impacts and potential risks of an accidental release of diesel from Shaft 2 have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-13), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.7).	

5.4 Environmental Impacts of Oil Spill Response

5.4.1 Hazard Report

Table 5-22: Hazard report – Environmental impacts of oil spill response

HAZARD	Environmental impact from oil spill response activities
EP risk no.	EP-OP-R04
Activity cause	Hydrocarbon spill
Potential impacts	Increased entrained fraction of hydrocarbons in the water column after adding dispersants. Toxicity effects on marine fauna from dispersant. Disturbance to benthic habitat, adjacent vegetation and other environmentally sensitive areas. Scouring of sediments. Waste generation, disposal and management.
Extent and duration	Not Applicable-

PREVENTION						
Activity/cause	**Existing control measures**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Source control for a Well release.	Implementation of Source Control Contingency Plan [WNB-3000-PD-0007].	Administrative	Mitigation	EPO-OP-02 In the event of loss of hydrocarbons, implement NOPSEMA-accepted spill response documents.	If Source control plan is implement the activity will be managed in accordance with EPOs and EPS outlined in the accepted Well Construction EP [WPA-7000-YH-0001]	End of campaign report following completion of source control activity.
CGS source control activities	Implementation of CGS Source Control Plan [VOG-3000-YH-0001].	Administrative	Mitigation		If CGS Source control plan is implement the activity will be managed in accordance with EPOs and EPS outlined in this accepted EP [WPA-7000-YH-0007]	End of campaign report following completion of source control activity.
Oil spill response planning.	NOPSEMA-accepted OPEP will be implemented.	Administrative	Prevention		Oil spill response strategies shall be implemented in accordance with the Wandoo Field Oil Spill Contingency Plan Document 2: Oil Pollution Emergency Plan [WAN-2000-RD-0001.02].	IAP records.
	NOPSEMA-accepted OSMP will be implemented.	Administrative	Prevention		Oil spill operational and scientific monitoring shall be implemented in accordance with the Operational and Scientific Monitoring Bridging Implementation Plan (OSM-BIP) [VOG-1100-RG-0002].	IAP records.
	Oil spill response personnel understand and competently perform their response roles.	Administrative	Reduction		• Drills and exercises shall be carried out to review the effectiveness of the plan. • Oil spill response personnel are competent in their required emergency response roles. • All personnel with roles within the Corporate Command Team, ICT and On-Site Command Team have training appropriate to their roles.	Exercise records. Personnel training records.

PREVENTION						
	Response strategies provided in the OPPs are appropriate to: • The nature and scale and associated environmental impact of the potential spill hazards • The nature and scale and associated environmental impact of the potential spill response strategies.	Administrative	Reduction		Response strategies described in the OPPs shall take into consideration the range of potential impacts from the spill events including: • Minimum time to contact • Maximum length of shoreline contacted • Maximum volume of oil ashore • Geographical range of the trajectory of oil • Environmental sensitivities as outlined within the respective Environment Plans and their prioritisation based on recovery rates and uniqueness.	Accepted Wandoo Field Oil Spill Contingency Plan Document 2: Oil Pollution Emergency Plan [WAN-2000-RD-0001.02].
					The OPPs shall take into consideration the range of potential impacts from the identified response strategies including: • The range of potential impact and recovery time for the environmental sensitivities. • Measures to reduce, manage or monitor environmental impact from the response as outlined within the respective Environment Plans. • Event/scenario specific environmental impact assessment of the spill and response activities prior to site implementation via Spill Impact Mitigation Assessment.	Accepted Wandoo Field Oil Spill Contingency Plan Document 2: Oil Pollution Emergency Plan [WAN-2000-RD-0001.02].
	Third party contracts.	Administrative	Reduction		Maintain contracts with third-party providers to provide access to suitably qualified and competent personnel and equipment to assist in the implementation of response activities.	Annual oil spill response capability review confirms arrangements are in place, including: • Services Agreement with oil spill response organisations • Contract in place with Waste Management Provider • Vessel contracts in place for the duration of the activity • Well control specialists.
	Current oil spill response arrangements are accessible to all personnel in the event of an oil spill.	Administrative	Reduction		Oil spill response documentation is up to date, maintained and readily available within VOGA Information Systems.	Annual oil spill response capability review confirms arrangements are in place.
Operational and scientific monitoring planning.	Maintenance of OSM Services Provider contract.	Administrative	Reduction		Maintain contracts with third-party provider/s to provide access to suitably qualified and competent personnel and equipment to assist in the implementation of monitoring.	Contract with Monitoring Service Provider/s.
	OSM Services Provider capability verified through regular capability reporting.	Administrative	Reduction		Obtain monthly capability reports from Monitoring Service Provider to demonstrate suitable resources are available throughout the activity.	Routine capability reports from Monitoring Service Provider as per contract.

PREVENTION						
	OSM Services Provider testing and exercising.	Administrative	Reduction		Annual testing of OSM Monitoring Service Provider standby arrangements and activation process.	Exercise records.
	Adequacy of existing baseline data sources across the OSM Planning Area reviewed periodically.	Administrative	Reduction		Periodical review of existing baseline data.	Adequacy of existing baseline data reviewed periodically for locations within the Operational and Scientific Monitoring Bridging Implementation Plan (OSM-BIP) [VOG-1100-RG-0002] identified as requiring a baseline review.
	Activate operational and scientific monitoring plans.	Administrative	Reduction		OMPs and SMPs will be activated in accordance with the initiation criteria provided in Table 9-1 of the Joint Industry OSM Framework (APPEA, 2021).	Incident Action Plan and Incident Log confirm OMPs and SMPs are activated in accordance with the initiation criteria provided in Table 9-1 of the Joint Industry OSM Framework (APPEA, 2021).
	Activation of OSM plans according to OMPs and SMPs initiation criteria.	Administrative	Reduction		Initiation criteria of OMPs and SMPs will be reviewed during the preparation of the initial IAPs and subsequent IAPs; and if any criteria are met, relevant OMPs and SMPs will be activated.	IAP records.
	Mobilisation and implementation of OMPs and SMPs.	Administrative	Reduction		Mobilisation and implementation of OMPs and SMPs will be undertaken in accordance with the indicative timeframes and sequencing described in Part B of the Operational and Scientific Monitoring Bridging Implementation Plan (OSM-BIP) [VOG-1100-RG-0002].	Incident log and monitoring records.
	OSM implementation of the Minimum Standards.	Administrative	Reduction		Implementation of operational and scientific monitoring will comply with the Minimum Standards listed in Appendix A of the Joint Industry OSM Framework (APPEA, 2021).	Incident log and monitoring records.
	Stand-down, termination and post-spill activities.	Administrative	Reduction		Once post-spill SMP monitoring reports are drafted they will be peer reviewed by an expert panel.	Monitoring records.
					OMPs and SMPs will be terminated in accordance with the termination criteria provided in WAN-2000-RD-0001.02 Wandoo Field OSCP Oil Pollution Emergency Plan.	IAP and Incident Log confirm OMPs and SMPs are terminated in accordance with the termination criteria provided in WAN-2000-RD-0001.02 Wandoo Field OSCP Oil Pollution Emergency Plan.
Stakeholder engagement.	Notification of relevant persons.	Administrative	Reduction		Relevant persons to be identified and notified, as appropriate to the spill response, in accordance with Section 10.4.10.	Record of relevant person assessment and correspondence.

MITIGATION					
Existing control measures	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Oil spill response monitoring, evaluation and surveillance.	Administrative	Reduction	EPO-OP-02 In the event of loss of hydrocarbons, implement	Provide available data from monitor and evaluate activities to oil spill trajectory modelling provider within 3 hours to help improve spill model accuracy.	IAP records.

MITIGATION					
Oil spill response monitoring, evaluation and surveillance.	Administrative	Reduction	NOPSEMA-accepted spill response documents.	OSTM is updated every 48 hours using latest observational data.	IAP records.
Oil spill response monitoring, evaluation and surveillance.	Administrative	Reduction		Completed Visual Surveillance Observation Logs to be sent to IMT within one hour of observations being recorded.	Completed Visual Surveillance Observation Logs.
Oil spill response monitoring, evaluation and surveillance.	Administrative	Reduction		Available monitoring data incorporated into the Common Operating Picture and Operational NEBA at the end of each operational period to aid in response decision making.	IAP records.
Oil spill response monitoring, evaluation and surveillance.	Administrative	Reduction		Response operations conducted during daylight hours only.	IAP records.
Oil spill response monitoring, evaluation and surveillance.	Administrative	Reduction		Response vessels stand-off at night with lighting required for safety only.	IAP records.
Oil spill response monitoring, evaluation and surveillance.	Administrative	Reduction		Deploy tracking buoy close to leading edge of spill (providing it is safe to do so) within 3 hours of being made aware of the spill from the MODU.	IAP records.
Oil spill response monitoring, evaluation and surveillance.	Administrative	Reduction		Satellite imagery requested within 3 hours.	IAP records.
Oil spill response monitoring, evaluation and surveillance.	Administrative	Reduction		Operational monitoring shall be available to inform IAP process prior to implementation of strategies that have an environmental impact (e.g. dispersant application).	IAP records.
Oiled wildlife response.	Administrative	Reduction		First strike response kits are activated within 24 hours.	IAP records.
Oiled wildlife response.	Administrative	Reduction		Two OWR containers are mobilised to an OWR facility location in Dampier within 24 hours.	IAP records.
Oiled wildlife response.	Administrative	Reduction		An Oiled Wildlife Advisor and Wildlife Division Coordinator are activated and assigned to the ICT once the Western Australian Oiled Wildlife Response Plan is activated.	IAP records.
Oiled wildlife response.	Administrative	Reduction		Information contained in Pilbara Region Oiled Wildlife Response Plan and Spill Impact Mitigation Assessment is ground truthed.	IAP records.
Oiled wildlife response.	Administrative	Reduction		IAP wildlife sub-plan developed within 48 hours.	IAP records.
Oiled wildlife response.	Administrative	Reduction		Wildlife rescue and staging site establishment is activated within 72 hours.	IAP records.
Oiled wildlife response.	Administrative	Reduction		In liaison with DBCA, initiate a wildlife first strike response within a minimum of 24 hours (if required) of a confirmed or imminent wildlife contact as reported by OM5: Rapid Marine Fauna Assessment.	IAP records.

MITIGATION					
Oiled wildlife response.	Administrative	Reduction		Induction and training shall cover any special handling requirements to minimise further detrimental impacts to flora and fauna.	Induction material and records.
Oiled wildlife response.	Administrative	Reduction		Wildlife strategy including hazing, if required, shall be developed in consultation with the Department of Transport and Major Infrastructure.	Consultation records with DoT.
Oil spill response dispersant application.	Administrative	Reduction		Dispersant application (aerial and marine) shall be available to be deployed when Wandoo Crude is most amenable to dispersant for the most effective results.	IAP records.
Oil spill response dispersant application.	Administrative	Reduction		Establish an aerial and marine operating base and within 24 hours.	IAP records.
Oil spill response dispersant application.	Administrative	Reduction		Aerial dispersant will be available to be applied within 30 hours.	IAP records.
Oil spill response dispersant application.	Administrative	Reduction		Marine dispersant will be available to be applied within 30 hours.	IAP records.
Oil spill response dispersant application.	Administrative	Reduction		Sufficient dispersant available to be applied within the dispersant application zone.	IAP records.
Oil spill response dispersant application.	Administrative	Reduction		Use of Oil Spill Control Register (OSCA) approved dispersants only.	IAP records.
Oil spill response dispersant application.	Administrative	Reduction		No dispersant applied within the vicinity of protected marine fauna (based on fauna observations)	IAP records.
Oil spill response dispersant application.	Administrative	Reduction		Dispersant Application Zone in place that excludes the following areas from the spraying of dispersant: • Waters shallower than 20 m (lowest astronomical tide) • Within 4 km of Coastal Waters maritime boundary • Within 10 km of Australian Marine Parks (excluding Multiple Use Zones) • Within 10 km of State Marine Protected Areas • Within 10 km of World National and Commonwealth Heritage List areas Within 10 km of sensitive receptors (e.g. Glomar Shoals and Rankin Bank).	IAP records.
Oil spill response dispersant application.	Administrative	Reduction		Conduct surface dispersant efficacy monitoring in accordance with the Operational and Scientific Monitoring – Bridging Implementation Plan [VOG-1100-RG-0002] and OM4a: Surface Dispersant Effectiveness Monitoring (APPEA, 2021).	IAP records

MITIGATION					
Oil spill response mechanical dispersion.	Administrative	Reduction		Mechanical dispersion is a secondary strategy that will be used opportunistically based on IAP outcomes.	IAP records.
Oil spill response mechanical dispersion.	Administrative	Reduction		Mechanical dispersion shall only be undertaken in water deeper than 20 m.	IAP records.
Oil spill response containment and recovery.	Administrative	Reduction		Containment and recovery booming and high-capacity skimmer systems will be available to be deployed within 48 hours.	IAP records.
Oil spill response containment and recovery.	Administrative	Reduction		Equipment available for containment and recovery will be suitable for the hydrocarbon type, and access to equipment will be maintained.	Oil spill equipment maintenance records.
Oil spill response containment and recovery.	Administrative	Reduction		Waste storage and transport plan will be developed within 72 hours of the spill event.	Approved waste storage and transport plan.
Oil spill response containment and recovery.	Administrative	Reduction		Deployments shall be undertaken by trained incident response personnel.	Response personnel training records.
Oil spill response protection and deflection.	Administrative	Reduction		Protection and deflection equipment and resources required to be deployed to protection priorities on-site within 48 hours of the spill event.	IAP records.
Oil spill response protection and deflection.	Administrative	Reduction		Equipment available for protection and deflection will be suitable for the hydrocarbon type, and access to equipment will be maintained.	Maintenance records.
Oil spill response protection and deflection.	Administrative	Reduction		Deployments shall be undertaken by trained incident response personnel.	Response personnel training records.
Oil spill response protection and deflection.	Administrative	Reduction		Tactical response plans will be available for VOGA priority shorelines.	Tactical response plans.
Oil spill response protection and deflection.	Administrative	Reduction		Establish demarcation zones for vehicle and personnel movement considering sensitive vegetation, bird nesting and roosting areas, and turtle nesting habitat.	IAP records.
Oil spill response protection and deflection.	Administrative	Reduction		Protection and deflection booms shall only be installed after consultation with the DTMI and consideration of the sensitive receptors outlined in the Environment Plans.	Consultation records with DTMI.
Oil spill response protection and deflection.	Administrative	Reduction		In consultation with DTMI, engage with First Nation groups to facilitate site surveys and tagging out and protection of identified areas or importance.	Consultation records.
Oil spill response shoreline cleanup.	Administrative	Reduction		Equipment for shoreline clean-up tasks that are suitable for environment and hydrocarbon type are available.	IAP records.

MITIGATION					
Oil spill response shoreline cleanup.	Administrative	Reduction		Shoreline clean-up resources can be deployed to protection priorities within 72 hours.	IAP records.
Oil spill response shoreline cleanup.	Administrative	Reduction		Shoreline clean-up resources will be available within the first 3 days, consisting of 3 teams made up of one shoreline team leader and ten shoreline workers.	IAP records.
Oil spill response shoreline cleanup.	Administrative	Reduction		Shoreline teams will be informed of how to minimise damage to flora and avoid encounters with fauna.	Response personnel training records.
Oil spill response shoreline cleanup.	Administrative	Reduction		SCAT teams will complete surveys before clean-up team complete assignments so that priority locations are worked on and suitable techniques are used.	Completed SCAT survey records.
Oil spill response shoreline cleanup.	Administrative	Reduction		Shoreline clean-up will implement a three-stage methodology: • Emergency phase – collection of oil floating close to the shore and pooled bulk oil removal. • Project phase – removal of stranded oil and oiled shoreline material that cannot be cleaned in-situ. Polishing phase – final clean-up of light oil contamination and removal of oil stains, where the incident NEBA demonstrates this is necessary.	IAP records.
Oil spill response shoreline cleanup.	Administrative	Reduction		Waste storage and transport plan will be developed within 72 hours of the spill event.	IAP records.
Oil spill response shoreline cleanup.	Administrative	Reduction		Methods and techniques employed for shoreline clean-up operations will be based on the information provided by the SCAT teams and in consultation with DTMI representatives.	Shoreline assessment form. Consultation records with relevant persons.
Oil spill response shoreline cleanup.	Administrative	Reduction		Sorbents shall not be used for shoreline clean-up on high energy shorelines.	IAP records.
Oil spill response shoreline cleanup.	Administrative	Reduction		Mechanical removal and high-pressure flushing shall not be undertaken in mangrove areas.	Restriction noted in tactical response plans.
Oil spill response shoreline cleanup.	Administrative	Reduction		Water from high pressure flushing shall not be directed in between rocks and onto sediment.	Restriction noted in tactical response plans.
Oil spill response shoreline cleanup.	Administrative	Reduction		All shoreline clean-up sites will be zoned and marked before clean-up operations commence to minimise secondary contamination and minimise the mixing of clean and oiled sediment and shoreline substrates	Restrictions noted in tactical response plans.

MITIGATION					
Oil spill response shoreline cleanup.	Administrative	Reduction		Steam cleaning shall not be undertaken on surfaces that support living plants or animals. Tactical response plans will be available for VOGA priority shorelines outlining potential clean-up and waste collection methodologies.	Tactical response plans.
Oil spill response shoreline cleanup.	Administrative	Reduction		Establish demarcation zones for vehicle and personnel movement considering sensitive vegetation, bird nesting and roosting areas, and turtle nesting habitat.	Restrictions noted in tactical response plans.
Oil spill response shoreline cleanup.	Administrative	Reduction		In consultation with DTMI, engage with First Nation groups to facilitate site surveys and tagging out and protection of identified areas or importance.	Consultation records.
Oil spill response strategy termination criteria.	Administrative	Reduction		OPPs will be terminated in accordance with the termination criteria provided in WAN-2000-RD-0001.02 Wandoo Field OSCP Oil Pollution Emergency Plan.	IAP and Incident Log confirm OPPs are terminated in accordance with the termination criteria provided in WAN-2000-RD-0001.02 Wandoo Field OSCP Oil Pollution Emergency Plan.
Oil spill response ICT and field personnel.	Administrative	Reduction		ICT planning meeting is convened within 3 hours to confirm and document incident response aim; priorities and objectives; response strategies and priority resources required to be requested.	IAP records.
Oil spill response ICT and field personnel.	Administrative	Reduction		Capability for resources are maintained for the duration of a response through the IAP process. Forecast resource requirements are based on real time incident data. Capability assurance will be monitored and adjusted if required to suit to the particular situation.	IAP records. Shift logs.
Oil spill response ICT and field personnel.	Administrative	Reduction		Contracts, MOUs and industry arrangements are activated to support implementation of response strategies.	IAP records.
Oil spill response ICT and field personnel.	Administrative	Reduction		Capability for resources are maintained for the duration of a response through the IAP process. Forecast resource requirements are based on real time incident data. Capability assurance will be monitored and adjusted if required to suit to the particular situation.	IAP records. Training records.

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Moderate (3)	Unlikely (B)	Medium

ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP
A medium risk is defined as tolerable on demonstration of ALARP under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.

ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
Additional control considered	**Assessment of option**	**Adopted/not adopted**
Refer to Section 5.4 for source control and oil spill response ALARP evaluation tables.		
RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Moderate (3)	Unlikely (B)	Medium

5.4.2 Description of Hazard

In the event of an accidental release of hydrocarbons, response strategies will be implemented where possible to reduce environmental impacts to ALARP. The selection of strategies will be undertaken through the Net Environmental Benefit Analysis (NEBA) process.

The acceptability of the potential environmental impacts and risks associated with the following oil spill response strategies have been evaluated in accordance with VOGA's management systems and sub-regulations 13(5) and 13(6) of the OPGGS(E)R.

While spill response activities are intended to reduce the potential environmental consequences of a hydrocarbon spill, response activities could potentially exacerbate or cause further environmental harm. Decisions regarding spill response activities need to consider both the potential environmental impacts associated with taking no action and the potential environmental impacts associated with a response activity or combination of spill response activities. Poorly planned and coordinated response activities can result in a lack of, or inadequate information and poor decisions being made during incident response.

This section assesses the available spill response strategies to determine which strategies will be implemented in response to a spill.

The assessment of each response strategy was based on a NEBA approach which considered the advantages and disadvantages of the different spill response options to determine if there would be a net environmental benefit resulting from the implementation of a particular response. This strategic NEBA considers the hydrocarbon type, threshold levels and sensitivity of the area potentially affected by the spill, and the potential outcomes (positive and negative) of the proposed response strategy. This assessment is summarised in the Wandoo Field OSCP [WAN-2000-RD-0001.01] and Wandoo Field OSCP Document 2 Oil Pollution Emergency Plan [WAN-2000-RD-0001.02].

The NEBA has been undertaken based on predicted information to determine the level of spill response required. In the actual event of a spill, the NEBA is revisited regularly as more information becomes available on actual conditions, spill trajectory path and locations of sensitive receptors. This review process allows response strategies to be adjusted to provide optimal results.

The following spill response activities have been identified that may be considered for an accidental release of hydrocarbons, under the direction of the appropriate Control Agency:

- Source control
- Monitor, evaluation and surveillance (MES)
- Chemical dispersant application
- Mechanical dispersion
- Containment and recovery
- Protection and deflection
- Shoreline clean-up

- Oiled wildlife response
- Operational and scientific monitoring.

Response strategies which may be appropriate for each spill category have been identified using the systematic approach to planning and the anticipated net environmental benefit of each. These response options are summarised in Table 5-23.

It is important to note that the description of these strategies and application to each scenario does not mean that they will definitely be implemented during a response. They are not certain to occur except for monitoring, evaluation and surveillance, which applies to all spill incidents.

Table 5-23: Summary of likely response options and environmental impact considerations for each spill category

Response consideration	Marine Diesel – Vessel Collision	Marine Diesel – Wandoo B Shaft 2	Wandoo Crude - Export System
Upper credible scenario	Instantaneous surface release over 6 hours of 300 m^3	Instantaneous surface release over 12 hours of 2,200 m^3	Instantaneous surface release over 1 hour of 300 m^3
Predicted outcomes based on Vermilion Wandoo EP Renewal OSM Report (2025)	Floating oil concentrations ≥1 g/m^2 could extend up to 31 km from the release location. The maximum distances reduced to 18 km and 6 km as the threshold increases to ≥10 g/m^2 and ≥50 g/m^2 respectively.	Is expected to evaporate rapidly with a moderate probability of shoreline impact at or above 10 g/m^2, of 34% during winter. The earliest shoreline impact is at 3 days and 22 hours and the greatest volume ashore is predicted to be 15 m^3.	Modelling suggests 66% contact to shorelines in Winter at 10 g/m^2 threshold 27% in Summer and 37% in Transitional season. The earliest shoreline impact is at 2 days, 20 hours and greatest volume ashore is predicted to be 62.8 m^3.
Source control			
Identified as suitable?	Yes	No	Yes
NEBA considerations	Source control activities include, shutting off pumps and transferring fuel to another fuel tank. Could be effective in minimising the amount of hydrocarbons lost to the environment and would reduce the area of potential exposure.	There are no meaningful source control options for this scenario that could be applied within the 12 hr release period.	CGS Source control activities may involve: • Containing crude by ballast pump operation to create negative pressure differential; • Remove crude by transfer between compartments using interface pumps; • Contain crude by ballast operations using submersible pumps in Shaft 4; • Remove crude by discharge using submersible pumps through export/interface cell; and • Contain crude by temporary subsea repair of damaged section.

Response consideration	Marine Diesel – Vessel Collision	Marine Diesel – Wandoo B Shaft 2	Wandoo Crude - Export System
Monitoring, evaluation and surveillance (MES)			
Identified as suitable?	Yes		Yes
NEBA considerations	All spills will have monitoring, evaluation and surveillance tasks activated. Monitoring and surveillance tasks are used to evaluate the natural degradation and dispersion of the released hydrocarbon, and to identify and report on any potential impacts to flora and fauna that may occur while the spill disperses. This strategy has several tactics (e.g. tracking buoys, aerial surveillance, satellite surveillance) and is scalable according to the nature and scale of a spill. There are clear benefits in maintaining situational awareness throughout the duration of a spill event and little or no environmental impact associated with its implementation. MES is used to assist in escalating or de-escalating response strategies as required. These tactics and actions are separate to the Operational Monitoring plans described in the OSM-BIP.		All spills will have monitoring, evaluation and surveillance tasks activated. Monitoring and surveillance tasks are used to evaluate the natural degradation and dispersion of the released hydrocarbon, and to identify and report on any potential impacts to flora and fauna that may occur while the spill disperses. This strategy has several tactics (e.g. tracking buoys, aerial surveillance, satellite surveillance) and is scalable according to the nature and scale of a spill. There are clear benefits in maintaining situational awareness throughout the duration of a spill event and little or no environmental impact associated with its implementation. MES is used to assist in escalating or de-escalating response strategies as required. These tactics and actions are separate to the Operational Monitoring plans described in the OSM-BIP.
Chemical dispersion			

Response consideration	Marine Diesel – Vessel Collision	Marine Diesel – Wandoo B Shaft 2	Wandoo Crude - Export System
Identified as suitable?	No		Yes
NEBA considerations	Marine diesel is not a persistent hydrocarbon; it has a high natural dispersion and evaporation rate due to the high percentage of volatile components within the oil. A small increase in sea state (wave and wind action) can assist natural biodegradation through entraining diesel in the water column. Shoreline impact is not anticipated.		Dispersants will be assessed as a response option to increase the rate of biodegradation and minimise and the impacts of oil on the environmental sensitivities in the EMBA. Dispersant use could potentially result in an increase in environmental benefit for mangroves, mudflats, marshland, sandy beaches and rocky shores; as well as turtle nesting sites, migratory birds, seabirds and shorebirds. A dispersant test spray run will be undertaken prior to moving to full dispersant application operations to verify its effectiveness. OSTM outputs suggest that floating oil exposure at or greater than 50 g/m^2 of Wandoo crude will spread approximately 33 km NW from the facility. Dispersant efficacy trials have been conducted on fresh and weathered Wandoo crude oil. These trials demonstrate high levels of efficacy resulting in dispersion rates over 80% for fresh and weathered oil. Dispersant response planning in this OPEP uses the assumption that at least 50% of spilled Wandoo crude will be dispersed through effective

Response consideration	Marine Diesel – Vessel Collision	Marine Diesel – Wandoo B Shaft 2	Wandoo Crude - Export System
			application of chemical dispersant. This could potentially reduce floating oil concentrations and volume of oil ashore. From a social, cultural and economic impact point of view, chemical dispersant application can be seen as a negative response action and clear communications around the benefits and environmental safeguards in place need to be undertaken.
Mechanical dispersion			
Identified as suitable?	No		Yes
NEBA considerations	Diesel spreads and evaporates rapidly. Mechanical dispersion may inhibit the rate of evaporation and could cause the oil to emulsify.		Mechanical dispersion will be assessed as a response option to enhance dispersion and dilution of oil into the water column which then leads to biodegradation of the oil. Mechanical dispersion can result in an increase in environmental benefit for all ecological sensitivities and for mangroves, marshlands, mudflats, sandy beaches, rocky shores and open waters. Consideration of spreading oil from the spill site to clean areas on the hulls of vessels used to undertake mechanical dispersion activities needs to be evaluated before this strategy is approved in the IAP.

Response consideration	Marine Diesel – Vessel Collision	Marine Diesel – Wandoo B Shaft 2	Wandoo Crude - Export System
Containment and recovery			
Identified as suitable?	No		Yes
NEBA considerations	An instantaneous spill of diesel will spread and evaporate rapidly due to the high proportion of volatile components within the oil and will not be of a sufficient thickness to provide for effective containment and recovery operations.		Containment and recovery can be used to recover oil to prevent it impacting on environmental, social and cultural sensitivities. Containment and recovery may be effective on Wandoo Crude as it is a persistent crude oil with a high specific gravity and viscosity. Depending on metocean conditions, containment and recovery is expected to have an efficacy rate of 5-10% because of the limitations of this activity in open ocean conditions. Metocean conditions and oil thickness are the two main limitations for this strategy. Efficacy can be improved nearshore and in sheltered embayment's. Consideration on waste oily water collection, storage and disposal must be considered and planned for before implementing this strategy. Containment and recovery from a social impact point of view can provide a means to demonstrate a proactive response to protect significant cultural or social assets.
Protection and deflection			

Response consideration	Marine Diesel – Vessel Collision	Marine Diesel – Wandoo B Shaft 2	Wandoo Crude - Export System
Identified as suitable?	No	Yes	Yes
NEBA considerations	An instantaneous spill of diesel will spread and evaporate rapidly due to the high proportion of volatile components within the oil. In this scenario the slick is not expected to come into contact with shorelines.	Although diesel spreads and evaporates rapidly there is the potential in this scenario for shoreline accumulation of oil at or above 10 g/m^2. Protection and deflection may result in an environmental benefit for turtle nesting sites, migratory birds, shorebirds, mangroves, marshland, mudflats, sandy beaches and rocky shores. Consideration of benthic habitat needs to be made before positioning of anchors for booms as well as the impact corralled oil may have on shorelines. Cultural sensitivities will need to be identified and considered before positioning booms adjacent to or along shorelines. Protection and deflection through booming can be seen as a proactive protection measure.	Where the EMBA indicates impact to shoreline sensitivities, protection and deflection will be assessed as a response strategy. OSTM for this scenario shows that there is a probability sensitive marine resources will be impacted by oil at a thickness greater than 10 g/m^2, hence protection and deflection may result in an environmental benefit for turtle nesting sites, migratory birds, shorebirds, mangroves, marshland, mudflats, sandy beaches and rocky shores. Consideration of benthic habitat needs to be made before positioning of anchors for booms as well as the impact corralled oil may have on shorelines. Cultural sensitivities will need to be identified and considered before positioning booms adjacent to or along shorelines. Protection and deflection through booming can be seen as a proactive protection measure.
Shoreline cleanup			
Identified as suitable?	No	Yes	Yes

Response consideration	Marine Diesel – Vessel Collision	Marine Diesel – Wandoo B Shaft 2	Wandoo Crude - Export System
NEBA considerations	An instantaneous spill of diesel will spread and evaporate rapidly due to the high proportion of volatile components within the oil. In this scenario the slick is not expected to come into contact with shorelines.	Shoreline clean-up activities will be assessed as a response where impact is predicted to occur in areas of highest sensitivity. OSTM for this scenario suggests the maximum volume of oil ashore from a single spill simulation is 15 m^3 at a probability of 21%. Shoreline clean-up activities have the potential to cause more harm than good and as such require careful planning and execution. An evaluation of the extent and potential impact of the oil weathering naturally over time versus the impact of the oil on habitats and fauna is required before deciding on the best shoreline cleanup option. An increase in environmental benefit can generally be achieved when clean-up activities are undertaken on sandy beaches and areas where there are high protection priorities such as turtle nesting sites, migratory birds and shorebirds. Waste generation, storage and transport for disposal for each shoreline cleanup option needs to be considered and planned for. Shoreline cleanup can have a positive impact on oiled wildlife management and needs to be implemented in parallel with	Shoreline clean-up activities will be assessed as a response where impact is predicted to occur in areas of highest sensitivity. OSTM for this scenario suggests a minimum time to shore of approximately 2 days and 20 hours at an accumulation threshold of 10 g/m^2. Shoreline clean-up activities have the potential to cause more harm than good and as such require careful planning and execution. An evaluation of the extent and potential impact of the oil weathering naturally over time versus the impact of the oil on habitats and fauna is required before deciding on the best shoreline cleanup option. An increase in environmental benefit can generally be achieved when clean-up activities are undertaken on sandy beaches and areas where there are high protection priorities such as turtle nesting sites, migratory birds and shorebirds. Waste generation, storage and transport for disposal for each shoreline cleanup option needs to be considered and planned for.

Response consideration	Marine Diesel – Vessel Collision	Marine Diesel – Wandoo B Shaft 2	Wandoo Crude - Export System
		oiled wildlife and operational and scientific monitoring activities. Social, cultural and economic interests need to be considered and included in shoreline cleanup plans. Shorelines response on Barrow Island will require consultation and cooperation with Chevron to identify access points, protection priorities, waste removal and logistics for moving people and equipment.	Shoreline cleanup can have a positive impact on oiled wildlife management and needs to be implemented in parallel with oiled wildlife and operational and scientific monitoring activities. Social, cultural and economic interests need to be considered and included in shoreline cleanup plans. Shorelines response on Barrow Island will require consultation and cooperation with Chevron to identify access points, protection priorities, waste removal and logistics for moving people and equipment.
Oiled wildlife response			
Identified as suitable?	Yes		Yes
NEBA considerations	Surveillance for oiled wildlife will be conducted as per the VOGA Operational and Scientific Monitoring Bridging Implementation Plan. Oiled wildlife response (OWR) will be undertaken for all categories if required. Socially oiled wildlife response is a significant activity and requires consistent regular communication to avoid spontaneous volunteerism and manage any impacted wildlife and habitats appropriately. Consideration of State and Commonwealth jurisdictions will be required to ensure all requirements are met (i.e.. State and Commonwealth marine parks). Oiled wildlife response on Barrow Island will require consultation and cooperation with Chevron to identify access points, protection priorities, waste removal and logistics for moving people and equipment.		
In-situ burning			
Identified as suitable?	No		No
NEBA considerations	Diesel evaporates rapidly and is not suitable for in-situ burning.		Wandoo Crude is not amenable to in-situ burning (flash point of 144°C), and

Response consideration	Marine Diesel – Vessel Collision	Marine Diesel – Wandoo B Shaft 2	Wandoo Crude - Export System
			the required equipment, technology, approved accelerant, and training is not readily available in Australia.

5.4.3 Impact and Risk Evaluation

The potential additional impacts that may be caused by certain spill response activities include:

- Change to water quality
- Change to benthic habitats
- Change coastal habitats and communities
- Change in marine fauna behaviour
- Injury/mortality to marine fauna
- Changes to functions, interests, and activities of other marine users.

The following receptors within the Hydrocarbon Area may be impacted by oil spill response activities:

- Water quality
- Benthic habitats
- Coastal communities
- Marine fauna, such as:
  - plankton
  - benthic invertebrates
  - seabirds and shorebirds
  - fish, sharks and rays
  - marine reptiles
  - marine mammals.
- Other marine users, such as:
  - commercial fisheries.

5.4.3.1 Source Control

Source control activities are effective in minimising the quantity of hydrocarbons lost to the environment and reducing the area of potential exposure.

Potential source control activities for a vessel collision include:

- Contain oil onboard
- Isolating tanks
- Tank lightening (transfer to another tank)
- Vessel separation.

Potential LOWC source control activities include:

- Emergency shutdown
- Isolation of equipment

- Surface well intervention
- Drilling a relief well (however as the Wandoo Field reservoir is sub-hydrostatic, no hydrocarbons will freely flow to the seabed surface).

Potential source control activities for a loss of oil from the CGS include:

- Containing crude by ballast pump operation to create negative pressure differential;
- Remove crude by transfer between compartments using interface pumps;
- Contain crude by ballast operations using submersible pumps in Shaft 4;
- Remove crude by discharge using submersible pumps through export/interface cell; and
- Contain crude by temporary subsea repair of damaged section.

Impact Assessment

The source control activities for a vessel collision will not create any additional impacts on the environment that have not been assessed within Sections 5.1 to 5.3 and 5.5 to 5.21 of this EP.

Source control activities such as emergency shut down, isolation of equipment and surface well intervention will reduce the volume of oil released to the marine environment. Consequently, these response strategies will not create additional impacts on the marine environment over and above the spill itself.

Drilling a relief well may be required if there is a total LOWC incident. The response process to be followed in the event of a LOWC incident will be outlined in the Wandoo Field Source Control Contingency Plan [WNB-3000-PD-0007].. As per VOGA's standard response to a LOWC, the mobilisation process for a jack-up MODU would be commenced and progressed until proven that it is not required based on event outcomes.

The drilling of a relief well will not create any additional impacts on the environment that have not been assessed for drilling activities within the Well Construction EP [WPA-7000-YH-0001]. As such, the impact assessments that have been conducted for the impacts and risks associated with vessels and MODU, and drilling activities are considered conservative and sufficient for any source controls. As such, this has not been assessed further.

CGS Source control activities are consistent with the environmental risks and impacts within this EP. The activities outlined are consistent with normal crude transfer between storage cells, export operations and vessel based maintenance activities.

5.4.3.2 Monitoring, Evaluation and Surveillance (MES)

Several methods can be used for MES, including:

- Vessel and aerial surveillance
- Remote (satellite) sensing
- Satellite tracking buoy deployment
- Drone imagery
- Oil Spill Trajectory Modelling (OSTM).

Impact Assessment

The MES methods will predominantly not create any additional impacts on the environment that have not already been assessed within Sections 5.1, 5.2, 5.3, 5.5, 5.6 and 5.7 of this EP. The surveillance of the spill size and tracking of its movement using an aircraft will, however, have an additional impact that has not been previously assessed.

Marine Fauna

Change in Behaviour

Noise emissions generated from an aircraft will be affected by both in-air and underwater propagation processes, in addition to factors such as wind and waves. The level of noise received underwater depends on source altitude and lateral distance, receiver depth, water depth and other variables. Under calm sea conditions, airborne noise is totally reflected and does not enter the water; however, rough seas may provide suitable angles for airborne sound to penetrate the water surface (Richardson et al., 1985).

Simmonds et al. (2004) measured a helicopter flyover at 305 m at 108 dB re 1 µPa, with a frequency of 45–70,000 Hz, and Richardson et al. (1995) identified that aircraft operations typically produce noise emissions below 500 Hz, which diminishes with increasing altitude and water depth. Studies on a helicopter which was audible in the air for 4 minutes, was detectable underwater for only 38 seconds at 3 m depth, and 11 seconds at 18 m depth.

Due to the expected noise source levels being lower than those assessed within Section 5.12, the risk evaluation that was conducted for the noise emissions produced from vessel operations, is considered appropriate and conservative for aircraft operations.

Injury/Mortality

The movement and operation of any aircrafts undertaking spill response activities has the potential to cause injury or death to fauna in the unlikely event of a collision. This is particularly a concern for seabird that may be present within the area. However, due to the offshore location of the activity and the lack of habitats critical to the survival of seabirds, it is considered unlikely that a collision between an aircraft and seabird will occur. Therefore, the risk evaluation that was conducted for the physical presence of the vessel operations resulting in an interaction with marine fauna, as assessed in Section 5.18, is considered appropriate and conservative for aircraft operations.

5.4.3.3 Chemical Dispersion

The application of chemical dispersant has been identified as a possible key response strategy for Wandoo Crude spills, dependant on the scenario. Chemical dispersant can be applied by:

- Vessel application
- Aerial application.

Dispersion Application Zone

Due to potential sensitivities of some species to chemical dispersant, the dispersant will only be applied when the IAP decision-making process has determined that its application will have a net

environmental benefit, as supported by the NEBA process, directed by the Control Agency. Furthermore, the chemical dispersant will only be applied within the 'Dispersant Application Zone' which specifically excludes:

- Waters shallower than 20 m
- 4 km from Coastal Waters maritime boundary
- 10 km from Australian Marine Parks (excluding multiple use zones)
- 10 km from State Marine Protected Areas
- 10 km from World National and Commonwealth Heritage List areas
- 10 km from sensitive receptors (e.g. Glomar Shoals and Rankin Bank).

Figure 5-2 details the chemical dispersant application zone.

Dispersant Efficacy Testing

Dispersant efficacy testing was undertaken by ChemCentre (2015) to determine the efficacy profile of dispersants. Test were conducted on fresh and weathered Wandoo Crude for their dispersibility with five different dispersants, including:

- Ardrox
- Corexit 9500A
- Dasic Slickgone EW
- Dasic Slickgone NS
- Finasol OSR 52.

Weathering of Wandoo Crude was tested under both summer and winter weather conditions. As summer exhibited greater weathering, crude weathered in these conditions were used for the dispersant efficacy laboratory tests.

Results from this study informed of the efficacy of a larger range of dispersants and if prolonged chemical dispersant application is viable on the Wandoo Crude.

All the dispersants tested were effective at dispersing a large percentage of the oil on the water up to three days after the spill (Table 5-24). For each dispersant, '10A' represents the percentage of the weathered oil that has dispersed through the water column after ten minutes of agitation and considered to be an effective measure of dispersibility.

Figure 5-2: Chemical dispersant application zone

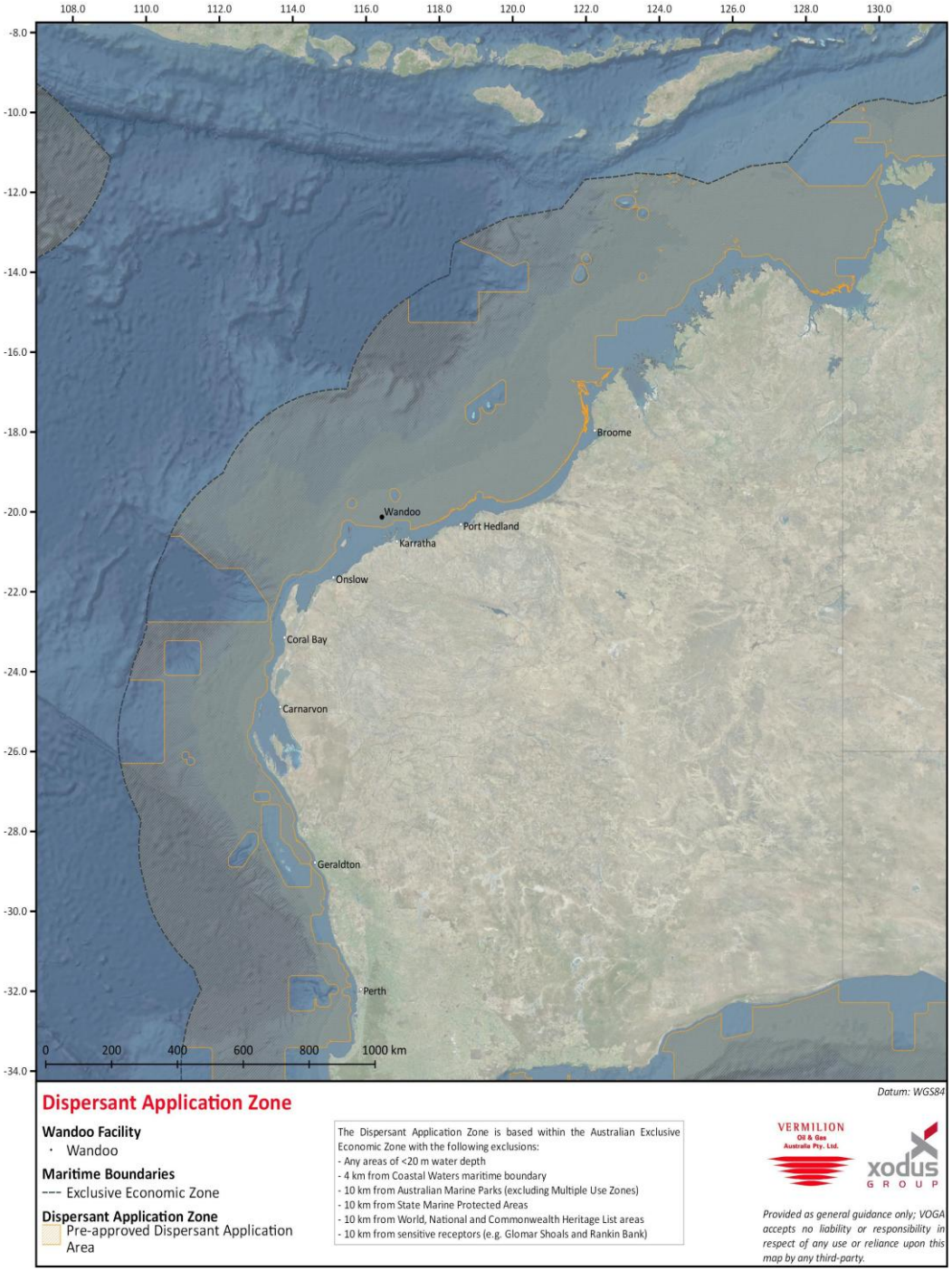


Table 5-24: Dispersant trial against the Wandoo Crude, ChemCentre (2015)

Dispersant	Ardrox	Corexit 9500A	Finasol OSR 52	Slickgone EW	Slickgone NS
Oil	**10A**	**10A**	**10A**	**10A**	**10A**
Fresh	86%	100%	100%	100%	100%
1 day weathered	72%	79%	78%	100%	100%
2 day weathered	82%	84%	63%	100%	100%
3 day weathered	89%	100%	100%	100%	100%
4 day weathered	49%	66%	78%	100%	93%
5 day weathered	25%	54%	98%	39%	5%
10 day weathered	13%	35%	31%	23%	-

Note: AMSA accepts a dispersant on to the Oil Spill Control Register (OSCA) if it has a dispersant efficacy of 70%. VOGA modelled a conservative oil spill dispersant efficacy of 50%.

The dispersant trials gave particularly good results for all dispersants if used in the first three days. Of note was the increase in efficacy observed in most samples on a 3-day weathered sample over a 2-day weathered sample. While some variability in results might be expected, three of the dispersants had increased efficacy after three days, while the remaining two (Slickgone NS and Slickgone EW) were already giving 100% dispersant efficacy. While this result might suggest that spill responders dealing with a 2-day old slick might choose to wait a day to improve their response, this is not recommended due to the difficulty in ensuring that lab trials match the exact weathering conditions of a real spill.

Impact Assessment

The use of vessels to apply the dispersant will not create any additional impacts on the environment that have not already been assessed within Sections 5.12, 5.14, 5.18 and 5.20 of this EP.

The use of an aircraft to apply the dispersant will not create any additional impacts on the environment that have not already been assessed within Sections 5.12 and 5.18.

The application of chemical dispersant is highly effective in assisting the natural process of biodegradation and minimising the risk of oil impacts to vulnerable coastal receptors, such as on the Dampier Archipelago and the Barrow and Montebello Islands, as well as the mainland of the WA coastline. However, the application of chemical dispersant into the marine environment may have an additional impact that has not been previously assessed, which are associated with its inherent toxicity.

Dispersants currently in use however are much less toxic than early-generation dispersants, with acute toxicity values (measured in standard 96 hr LC50 tests) typically in the range of 190 to 500 mg/L (Fingas, 2008). In comparison, toxicity of the Water Accommodated Fraction (WAF) for

samples of Wandoo Crude was in a similar range of values as typical dispersants (140 to 400 mg/L) (Ecotox, 2012). This was supported in recent studies of a range of dispersants, completed for the USEPA during the Macondo spill response. These studies showed that dispersants alone have only low toxicity, while dispersant-oil mixtures generally have similar toxicity to crude oil alone (Hemmer et al., 2011).

A review of oil spill dispersants by Fingas (2008) confirmed that dispersant toxicity is consistently less than the toxicity of dispersed oil. Dispersant acute toxicity values are typically in the range of 190 to 500 mg/l (NAS, 2005). In comparison, toxicity of the WAF for samples of Wandoo Crude was in a similar range of values (140 to 400 mg/l) (Ecotox, 2012). About half of these found that the cause for this was the increased PAHs, typically about 5 to 10 times, in the water column. PAHs are of particular environmental concern since they are carcinogenic and mutagenic to marine organisms and can persist in the environment for long periods (as opposed to more volatile aromatic hydrocarbons such as BTEX). There is a low risk of toxicity to marine organisms from direct contact or ingestion of entrained Wandoo Crude, due to the low proportion of aromatic hydrocarbons present (APASA, 2013).

The decision to use chemical dispersants, as with all response strategies, is governed by the outcomes of a NEBA. In this case, a NEBA will consider the benefit of reducing the volume of floating oil against the potential impacts of increasing the volume of subsurface oil and the introduction of the chemical dispersant itself. Any dispersant used would be selected from the AMSA OSCA Register prior to use. Criteria for inclusion on the OSCA Register includes a ban on toxic components including benzene, carbon tetrachloride or other chlorinated hydrocarbons, phenols, cresols, caustic alkali, or free mineral acid.

Water Quality

Change to Water Quality

The application of chemical dispersant will result in a localised reduction in the water quality within the receiving marine environment. However, due to the potential negative impacts associated with chemical dispersants, the dispersant will only be applied when the IAP decision-making process has determined that it will have a net environmental benefit, as supported by the NEBA process, directed by the Control Agency. Furthermore, the chemical dispersant will only be applied within the 'Dispersant Application Zone' (Figure 5-2).

Given the extent of the Hydrocarbon Areas and wider EMBAs expected for the spill scenarios, any changes to water quality from the application of chemical dispersant within the restricted 'Dispersant Application Area' are anticipated to be less than the extent of change to water quality that would result from the hydrocarbon spill itself.

As such, any impacts to water quality due to chemical dispersant application are anticipated to be highly localised and short-term, with rapid recovery expected following the cessation of the oil spill response.

Marine Fauna

The application of chemical dispersant into the marine environment has the potential to result in injury/mortality to marine species due the potential toxicity effects of the chemical dispersant. In general, the sensitivity of species to chemical dispersants depends on the species type and life-stage, the dispersant type, volume and exposure duration.

For some species, the use of chemical dispersants can effectively reduce the severity of hydrocarbon impact. Dispersing oil into the water column reduces the quantity of oil on the surface, subsequently reducing the amount of oil that can strand and smother any resource which it comes into contact with species such as turtles, migratory birds, seabirds and shorebirds. However, species present within the water column such as whales, dugongs, dolphins and sharks could be negatively affected by the increased concentration of dispersed oil and associated chemicals in the water column.

Potential impacts from the use of chemical dispersants include:

- Increased toxicity to marine fauna due, to the addition of dispersant chemicals to the marine environment.
- Increased toxicity to marine fauna due to dispersed oil in the water column in the form of entrained oil and dissolved oil.

The decision to use chemical dispersants, as with all response strategies, is governed by the outcomes of a NEBA. In this case, a NEBA will consider the benefit of reducing the volume of floating oil against the potential impacts of increasing the volume of subsurface oil and the introduction of the chemical dispersant itself. Also any dispersant used would be selected from the AMSA OSCA Register prior to use. Criteria for inclusion on the OSCA Register includes a ban on toxic components including benzene, carbon tetrachloride or other chlorinated hydrocarbons, phenols, cresols, caustic alkali, or free mineral acid. Table 5-25 summarises the potential impacts and risks to marine fauna from the application of dispersant.

Table 5-25: Risk assessment for the application of chemical dispersant on marine fauna

Marine fauna	Exposure evaluation	Predicted impact of dispersant application
Plankton	Plankton has been identified as a receptor that may be present within the Hydrocarbon Area with the potential to be exposed to concentrations of dispersant if applied. As discussed in Section 3.4.3.1, plankton are found in nearshore and open waters beneath the surface.	Planktonic organisms could be impacted by dispersant via a number of pathways. Previous studies have shown that cell membranes of single celled plankton can be damaged, ultimately impacting the survivability of the individual (Hook & Osbourne 2012). Plankton are numerous and widespread. Plankton distribution and composition is also not uniform and is influenced by natural variations in the oceans such as salinity, temperature, nutrient availability and currents. Any direct effects on plankton communities are likely to rapidly replenish any losses from reproduction by survivors or migration from unaffected areas (Volkman et al., 1994). The proximity of nutrient-rich seasonal upwelling events which occur within the vicinity will further assist recovery rates. As such, any impact to plankton from the application of chemical dispersant will be localised, short-term impacts, with recovery expected following the cessation of the oil spill response. As such, a consequence ranking of '2' (Minor) was assigned.
Benthic invertebrates	Benthic invertebrates may be present within the Hydrocarbon Area with the potential to be exposed to concentrations of dispersant if applied. Benthic invertebrate are typically restricted to shallow nearshore and intertidal waters (Section 3.4.3.2).	Previous studies have demonstrated that benthic invertebrates are the most sensitive to chemical dispersants, with some results indicating the potential for lethal impacts following exposure (Wise et al., 2019). Sub-lethal impacts to benthic invertebrates include tissue decomposition, gene-expression changes, and physical stress (Wise et al., 2019). Embryonic and larval stages appear to be more sensitive than adults to both dispersants and dispersed oil with LC50s reported to be as low as 3 mg/L for dispersant alone in a study on oyster larvae (Clark et al., 2001). Dispersed oil is typically rapidly entrained within the top 1 m of the water column and within 24 hours the dispersed oil is likely to mix within the top 10 m of the water column (Lee et al., 2013). Benthic invertebrates are typically restricted to shallow nearshore and intertidal waters, outside of the main exposure area predicted within 0–10 m of the sea surface, indicating that exposure to chemical dispersant may be unlikely following application within the Dispersant Application Zone. As such, any impact to benthic invertebrates from the application of chemical dispersant may result in be localised, short-term impacts, with recovery expected following the cessation of the oil spill response. As such, a consequence ranking of '2' (Minor) was assigned.

Marine fauna	Exposure evaluation	Predicted impact of dispersant application
Fish, including sharks and rays	Various fish and shark species may be present within the Hydrocarbon Area (Section 3.4.3.4). A foraging BIA for the whale shark was identified within the Hydrocarbon Area (Section 3.4.3.4). Therefore fish and sharks have the potential to be exposed to concentrations of dispersant if applied.	There is a lack of data on the toxicity of dispersants to large predatory fish, such as sharks and rays. Impacts are likely to be similar to those described for fish as they are predominantly pelagic species. As chemically dispersed oil moves away from the spray zone, the dissolution of dispersant results in lower potential toxicity to species exposed to the dispersed oil. Dispersant application results in an increase in oil becoming entrained in the water column this significantly increased the potential for exposure of sharks throughout the water column (Gulf Coast Research Laboratory, 2013). A study conducted by Fuller et al. (2004) indicated that the toxicity of chemically dispersed oil preparations on two fish species, *Cyprinodon variegatus* and *Menidia beryllina* was equal or less toxic than that of the oil alone. The potential for impact is highest at the point of application, where the concentration of dissolved hydrocarbons and/or dispersant chemicals is greatest. Exposure to dispersed oil is concentrated in the top portion of the water column and decreases fairly rapidly over time in areas with depths over 9 m and good circulation (NRC, 1989). Spill modelling results predict that the use of dispersants will increase the potential zones of low and moderate concentration of entrained hydrocarbons. Entrained oil is unlikely to affect species that exist in the water column due to its low toxicity, the low periods of exposure that could occur and the low dosage of oil that may be received. Therefore, elevated concentrations of dispersant could result in acute toxicity to marine biota such as juvenile fish, larvae, and planktonic organisms, although impacts are expected to be close to the application location. As such, any impacts to adult and juvenile fish, including sharks and rays, will be localised, short-term impacts, with recovery expected following the cessation of the oil spill response. As such, a consequence ranking of ‘2’ (Minor) was assigned.
Seabirds	Several species of seabirds have the potential to be rafting, resting, diving and feeding within the area predicted to be contacted by surface hydrocarbons, and diving or	Seabirds could be impacted by in-water dispersant exposure directly (i.e. whilst diving through the water column foraging) or indirectly (i.e. by consuming dispersant-tainted fish, resulting in sub-lethal or toxic impacts). Application of dispersant or dispersed oil in the water column presents much lesser risk to seabirds and waders than leaving an oil spill untreated, as it reduces their exposure to hydrocarbons (French-McCay, 2004).

Marine fauna	Exposure evaluation	Predicted impact of dispersant application
	foraging within in-water hydrocarbons. Four breeding BIAs for seabirds intersect the Hydrocarbon Area (Section 3.4.3.3), including: • Fairy tern (EPBC Act listing as vulnerable) • Lesser crested tern (EPBC Act listing as migratory) • Roseate tern (EPBC Act listing as migratory) • Wedge-tailed shearwater (EPBC Act listing as migratory).	Dispersants may remove the natural water repellent oils from bird feathers (Boyd et al., 2001) making them less buoyant and more vulnerable to hypothermia. Higher metabolic rates were also found in birds exposed to dispersant, presumably due to the increased energy suspended to maintain a normal body temperature (Lambert et al., 1982). The use of dispersants increases the amount of oil that physically mixes into the water column, thus reducing the potential for a surface slick to come into contact with seabirds that frequent the air water interface. Peakall et al. (1987) concluded that, from the toxicological perspective, the effects of oil and chemically dispersed oil on seabirds were similar, based on sub-lethal responses at the biochemical and physiological level. Similarly, studies on the effects of oil on the hatching success of bird eggs (NRC, 1989 and 2005) also indicated that toxicities of oil and dispersed oil were similar. As such, any impact to seabirds from the application of chemical dispersant is expected to be reversible and short-term. As such, a consequence ranking of '1' (Incidental) was assigned.
Marine reptiles	Marine reptiles, such as marine turtles and sea snakes, may be present within the Hydrocarbon Area and have the potential to be exposed to dispersant concentrations when transiting through or when surfacing to breathe within the Dispersant Application Zone. BIAs and habitat critical for the survival of marine turtles for 4 species of marine turtles intersect the Hydrocarbon Area (Section 3.4.3.6 and Section 3.4.4), including: • Flatback turtle (EPBC Act listed as vulnerable)	**Marine turtles** The application of dispersant reduces the oil level on the surface thus reducing the level of exposure to the oil of marine reptiles that return to the sea surface to breathe. Sea turtles may be exposed to dispersants either internally (eating or swallowing oil, or inhaling of volatile oil related compounds) or externally (swimming in oil or dispersants, or oil or dispersants on skin and body) (NOAA, 2012). Direct contact of skin with petroleum compounds or dispersants may cause skin irritation, chemical burns, and infections. Inhalation of dispersants may irritate or injure the respiratory tract which may lead to inflammation or pneumonia. Ingestion of petroleum compounds or dispersants may cause injury to the gastrointestinal tract, which may affect the animals' ability to absorb or digest foods. Absorption of petroleum compounds or dispersants may damage liver, kidney, and brain function as well as causing anaemia and immune suppression. As chemically dispersed oil moves away from the spray zone, the dissolution of dispersant results in lower potential toxicity to species exposed to the dispersed oil.

Marine fauna	Exposure evaluation	Predicted impact of dispersant application
	• Green turtle (EPBC Act listed as vulnerable) • Hawksbill turtle (EPBC Act listed as vulnerable) • Loggerhead turtles (EPBC Act listed as endangered). EPBC Act listed sea snakes that are found within the Hydrocarbon Area include: • Short-nosed sea snake (EPBC Act listed as critically endangered) • Leaf-scaled sea snake (EPBC Act listed as critically endangered) • Dubois' sea snake (EPBC Act listed as marine).	The use of dispersants increases the amount of oil that physically mixes into the water column thus reducing the potential for a surface slick to come into contact with marine reptiles such as turtles that surface to breathe. The use of dispersants may also reduce the volume of oil that ends up on shorelines and the probability of oil reaching shorelines, thus reducing the impact to hatchling and turtles using nesting beaches. Sea snakes There are no specific studies on sea snakes reported in the scientific literature, but impacts are likely to be similar to those described for turtles as they are often seen at the sea surface. Dispersed oil is unlikely to affect marine reptiles due to its low toxicity, the low periods of exposure that could occur and the low dosage of oil that may be received. As such, any impact to marine reptiles from the application of chemical dispersant is expected to be reversible and short-term. As such, a consequence ranking of '1' (Incidental) was assigned.

Marine fauna	Exposure evaluation	Predicted impact of dispersant application
Marine mammals	Several marine mammal species were identified by the EPBC Protected Matters Search for the Hydrocarbon Area (Section 3.4.3.5) including: • Sei whale (EPBC Act listing as vulnerable) • Blue whale (EPBC Act Listing as endangered) • Fin whale (EPBC Act listing as vulnerable) • Southern right whale (EPBC Act listing as endangered). A Migration BIA for the humpback whale intersects the Hydrocarbon Area. These marine mammals have the potential to be exposed to dispersant concentrations when transiting through or when surfacing to breathe within the Dispersant Application Zone.	In general, the impacts of the dispersants themselves are considered to be less than that of entrained oil, given the toxicity values for the dispersant, and Wandoo Crude. A potential impact of dispersants is the removal of natural water repellent oils from marine mammal fur (sea lion), making them less buoyant and susceptible to hypothermia (Kucklick et al., 1997). However, this is unlikely to occur given that dispersant application is not proposed in known sea lion habitat, and concentrations of dispersant will reduce outside of the application area. Generally, the use of dispersant will increase the amount of oil that physically mixes into the water column thus reducing the potential for a surface slick to come into contact with marine mammals that surface to breathe. The application of dispersant reduces the oil level on the surface in most cases thus reducing the level of exposure to the oil of surface dwelling organisms such as marine mammals. Dispersed oil is unlikely to affect marine mammals due to the low toxicity of dispersed oils, low period of exposure that could occur and the low dosage of oil that may be received. As such, any impact to marine mammals from the application of chemical dispersant is expected to be reversible and short-term. As such, a consequence ranking of ‘1’ (Incidental) was assigned.

Benthic and Coastal Habitats

The application of chemical dispersant into the marine environment has the potential to result in changes to benthic and coastal habitats and assemblages due the potential toxicity effects of the chemical dispersant. In general, the sensitivity of habitats to chemical dispersants depends on the species type and life-stage, the dispersant type, volume, and exposure duration.

For some species, the use of chemical dispersants can effectively reduce the severity of hydrocarbon impact. However, species present within the water column such as coral reef and biological processes such as coral spawning, could be negatively affected by the increased concentration of dispersed oil and associated chemicals in the water column.

Potential impacts from the use of chemical dispersants include:

- Increased toxicity to marine habitats due, to the addition of dispersant chemicals to the marine environment.
- Increased toxicity to marine habitats due to dispersed oil in the water column in the form of entrained oil and dissolved oil.

During testing for the Montara spill, APASA (2010) found that effects associated with dispersed oil were mostly contained within the top metre of the water column, with the concentration quickly reducing with time, depth and distance from the application site. PTTEP (2013) further concluded that the concentration of hydrocarbons within the water column, due to dispersed oil, was low relative to the amount that was already in the water column from the release. Lee et al. (2013) also found that dispersed oil is rapidly entrained within the top 1 m of the water column and within 24 hours the dispersed oil is likely to mix within the top 10 m of the water column and be rapidly diluted.

The decision to use chemical dispersants, as with all response strategies, is governed by the outcomes of a NEBA. In this case, a NEBA will consider the benefit of reducing the volume of floating oil against the potential impacts of increasing the volume of subsurface oil and the introduction of the chemical dispersant itself. Also any dispersant used would be selected from the AMSA OSCA Register prior to use. Criteria for inclusion on the OSCA Register includes a ban on toxic components including benzene, carbon tetrachloride or other chlorinated hydrocarbons, phenols, cresols, caustic alkali, or free mineral acid.

Table 5-26 summarises the potential impacts and risks to benthic and coastal habitats from the application of dispersant.

Table 5-26: Risk assessment for the application of chemical dispersant on benthic and coastal habitats

Habitat	Exposure evaluation	Predicted impact of dispersant
Corals	Biologically significant coral reef formations are found within the nearshore shallow areas of islands within the Hydrocarbon Area (i.e. Montebello Islands), and therefore, has the potential to be exposed to concentrations of chemical dispersant if applied. However, predominantly the seafloor in the Hydrocarbon Area is comprised of fine silt/sand substrates with low densities of benthic communities (Section 3.4.1.1).	Coral species are expected to be especially susceptible due to the life history and habitat characteristics (NAP, 2005). However, coral sensitivity to dispersed oil depends on the concentration and the length of exposure. Very high dispersed oil concentrations and long exposures can kill coral, whereas lower doses and short-term exposure show few, if any, impacts, many of which are reversible (Shingenaka et al., 2010). Studies of coral larvae clearly demonstrate impacts of dispersants and dispersed oil on corals. A study of the settlement of *P. astreoides* larvae, in particular, demonstrated significant decreases after exposure to all concentrations of dispersant (25 ppm, 50 ppm, 100 ppm), with no settlement occurring at the highest concentration (100 ppm). This study also demonstrated that constant exposure to certain dispersants (Corexit 9500) resulted in dramatic declines in larval survivorship, with complete larval mortality (100%) occurring after exposure to both medium (50 ppm) and high (100 ppm) concentrations (Goodbody Grinley et al., 2013). The application of dispersant will, typically, increase oil exposure for water column and bottom dwelling organisms such as hard coral (Boyd, et al., 2001). As discussed above, the dispersed oil is typically rapidly entrained within the top 1 m of the water column and within 24 hours the dispersed oil is likely to mix within the top 10 m of the water column (Lee et al., 2013). Therefore, exposure to benthic habitats is unlikely to occur. Furthermore, chemical dispersant will only be applied within the 'Dispersant Application Zone'. This indicates the following: • No dispersant will be sprayed in areas with water depth of less than 20 m depth. • Dispersant use should be considered to treat oil over reefs in water depths greater than 20 m if the alternative is to allow the oil to impact other sensitive habitats on shore.

Habitat	Exposure evaluation	Predicted impact of dispersant
		• Dispersion is not recommended to treat oil already in reef habitats having low-water exchange rates (e.g., lagoons and atolls) if mechanical clean-up methods are possible. • Dispersant-use decisions to treat oil already over a reef should consider the type of oil and location of the reef. Given corals are typically found within the nearshore shallow areas of islands it is unlikely that corals will be impacted by chemical dispersant as the concentration of dispersant reduces rapidly outside the application zone. As such, any impact to corals from the application of chemical dispersant will be localised, short-term impacts, with recovery expected following the cessation of the oil spill response. As such, a consequence ranking of '2' (Minor) was assigned.
Coral spawning	Significant coral spawning occurs in autumn for a number of species, although some taxa such as Porites and Acropora spp. may spawn in spring and summer (Section 3.4.1.2). Spawning events have been observed throughout the Dampier Archipelago in March and April and along the Ningaloo Coast during March (Section 3.4.1.2). Therefore exposure to concentrations of chemical dispersant may occur depending on the timing of the dispersant application.	Chemically dispersed oil exposures has been shown to result in a dramatic increase in acute toxicity to coral species larvae. In addition, dispersants and dispersed oil treatments have been shown to cause larval morphological deformations, loss of normal swimming behaviour, and rapid tissue degeneration (Epstein et al., 2000). Dispersants have been shown to result in significant inhibition to Acropora sperm and eggs (Negri and Heyward, 2000). Given the sensitivity of embryo and larval stages to the impacts of toxicity, there is a particular risk if the timing of a spill, and subsequently the timing of the response (chemical application into the marine environment), overlaps with the timing of a species reproduction event (i.e. a spawning event). This could lead to some component, or all of a year class, to be impacted. As such, any impact to coral spawning from the application of chemical dispersant will be localised, short-term impacts, with recovery expected following the cessation of the oil spill response. As such, a consequence ranking of '2' (Minor) was assigned.

Habitat	Exposure evaluation	Predicted impact of dispersant
Macroalgae	Macroalgae is widespread within shallower hard substrate areas within the Hydrocarbon Area (Section 3.4.1.4), and therefore, has the potential to be exposed to concentrations of chemical dispersant if applied.	Virtually all macroalgae, in particular rhodophyte species are more susceptible to dispersants than to oil (Edgar & Barrett, 1995). Complete or partial mortality of kelps is possible at exposure concentrations (>10 ppm) of TPH as chemically dispersed oil (Ross, 2002). Entrained oil at these thresholds is unlikely to cause mortality to sea kelp. However, as discussed above, dispersed oil will typically rapidly entrain within the top 1 m of the water column and within 24 hours the dispersed oil is likely to mix within the top 10 m of the water column (Lee et al., 2013). Furthermore, chemical dispersant will only be applied within the 'Dispersant Application Zone'. This indicates the following: • No dispersant will be sprayed in areas with water depth of less than 20 m depth. As such, exposure to benthic habitats, such as macroalgae typically found within shallow water environments is unlikely to occur. As such, any impact to macroalgae from the application of chemical dispersant is expected to be reversible and short-term. As such, a consequence ranking of '1' (Incidental) was assigned.

Habitat	Exposure evaluation	Predicted impact of dispersant
Seagrass	Key areas of seagrass habitats are found within the nearshore shallow areas of the Hydrocarbon Area (i.e. the Ningaloo Reef area) (Section 3.4.1.3), and therefore, has the potential to be exposed to concentrations of chemical dispersant if applied.	Chemically dispersed oil exposure to seagrass communities has been shown to result to adversely affect seagrass species. Most dispersant alone treatments caused photosynthetic stress to the seagrass, and in some cases, this was greater than the dispersed oil and the oil alone treatments (Wilson and Ralph, 2008). Ralph and Burchett (1998) found that laboratory-cultured Halophila ovalis was reasonably tolerant of petrochemical exposure and there was little difference between exposure to oil, oil + dispersant and dispersant alone. Seagrasses have been shown to absorb more aliphatic and aromatic oil fractions when the oil is dispersed, therefore increasing the toxicity (den Hartog, 1984). Non-dispersed oil, in general, leads to less photosynthetic stress to *Zostera capricorni* and *Halophila ovalis* compared with the addition of a chemical dispersant (Wilson and Ralph, 2008). However, as discussed above, dispersed oil will typically rapidly entrain within the top 1 m of the water column and within 24 hours the dispersed oil is likely to mix within the top 10 m of the water column (Lee et al., 2013). Furthermore, chemical dispersant will only be applied within the 'Dispersant Application Zone'. This indicates the following: • No dispersant will be sprayed in areas with water depth of less than 20 m depth. As such, exposure to benthic habitats, such as seagrass typically found within shallow nearshore water environments, is unlikely to occur. As such, any impact to seagrass from the application of chemical dispersant is expected to be reversible and short-term. As such, a consequence ranking of '1' (Incidental) was assigned.

Protected and Significant Areas

The application of chemical dispersant into the marine environment has the potential to result in a change in ecosystem dynamics and conservation values pf protected and significant areas due to impacts to sensitive values.

Potential impacts from the use of chemical dispersants include:

- Increased toxicity to marine fauna and habitats due, to the addition of dispersant chemicals to the marine environment.
- Increased toxicity to marine fauna and habitats due to dispersed oil in the water column in the form of entrained oil and dissolved oil.

As discussed above, the decision to use chemical dispersants, as with all response strategies, is governed by the outcomes of a NEBA. In this case, a NEBA will consider the benefit of reducing the volume of floating oil against the potential impacts of increasing the volume of subsurface oil and the introduction of the chemical dispersant itself. Also any dispersant used would be selected from the AMSA OSCA Register prior to use.

Table 5-27 summarises the potential impacts and risks to marine fauna from the application of dispersant.

Table 5-27: Risk assessment for the application of chemical dispersant on protected and significant areas

Habitat	Exposure evaluation	Predicted impact of dispersant
Marine Parks	The Hydrocarbon Area intersects a number of Australian Marine Parks (AMPs) and State Parks as outlined in Sections 3.6.5 and 3.6.6. These sections also identify the major conservation values for relevant AMPs and State Marine Parks. In general the AMPs include examples of unique ecosystems with characteristics that support diverse benthic or intertidal habitats, and often a range of species listed under the EPBC Act, often including BIAs, such as breeding and foraging habitat for seabirds, internesting, foraging, mating, and nesting habitat for marine turtles, breeding, calving, foraging and nursing habitat for dugongs, foraging habitats, and migratory pathway for certain marine species, such as humpback whales, pygmy blue whales, whale sharks.	The impact of dispersant and dispersed oil on the values associated with Marine Protected Areas has already been assessed above in terms of the key ecological values. As discussed above, chemical dispersant will only be applied within the 'Dispersant Application Zone'. This ensures that dispersant application will not be applied within: • 10 km Australian Marine Parks (excluding multiple use zones) • 10 km from State Marine Protected Areas • 10 km from sensitive receptors (e.g. Glomar Shoals and Rankin Bank). Given the extent of the Hydrocarbon Areas and wider EMBAs expected for the two credible spill scenarios, any impacts to Marine Parks from the application of chemical dispersant within the restricted 'Dispersant Application Area' are anticipated to be less than the extent of impacts that would result from the hydrocarbon spill itself. Therefore, the risk evaluation that was conducted for the risks to Marine Parks following the release of MDO and a LOWC, within Sections 5.5 and 5.1, respectively, is considered appropriate and conservative here.
Key Ecological Features	The Hydrocarbon Area intersects various KEFs as described in Table 3-17. The conservation values for these KEFs have been described in Section 3.6.9 and may include unique seafloor environments, and sensitive reefs and shoals that are considered to be of regional importance for a region's biodiversity or ecosystem function and integrity. Some of the KEFs, such as the Glomar shoals, are areas of high productivity and aggregations of marine life and known to be an important area for a number of commercial and recreational fish species and consist of a high	The impact of dispersant and dispersed oil on the values associated with KEFs has already been assessed above in terms of the key ecological values. As discussed above, chemical dispersant will only be applied within the 'Dispersant Application Zone'. This ensures that dispersant application will not be applied within: • Waters shallower than 20 m • 4 km from Coastal Waters maritime boundary • 10 km from sensitive receptors (e.g. Glomar Shoals and Rankin Bank). Given the extent of the Hydrocarbon Areas and wider EMBAs expected for the two credible spill scenarios, any impacts to KEFs from the application of chemical

Habitat	Exposure evaluation	Predicted impact of dispersant
	percentage of marine-derived sediments with high carbonate content and gravels of weathered coralline algae and shells (DCCEEW, 2024j).	dispersant within the restricted 'Dispersant Application Area' are anticipated to be less than the extent of impacts that would result from the hydrocarbon spill itself. Therefore, the risk evaluation that was conducted for the risks to KEFs following the release of MDO and a LOWC, within Sections 5.5 and 5.1, respectively, is considered appropriate and conservative here.

Other Marine Users

Changes to Functions, Interests and Activities of Other Marine Users

Other marine users, such as commercial fisheries, which are active within the region have the potential to be impacted by the application of chemical dispersants into the marine environment.

The physical displacement of commercial fishers from the area due to the establishment of exclusion zones during the spill response has the potential to cause a negative economic impact. However, any exclusion zone that will be established for the application of chemical dispersant will ultimately be spatially smaller than the extent of the hydrocarbon spill itself. As such, the risk evaluation that was conducted for the impact to other marine users within Section 5.20, is considered appropriate and conservative for the risk of changes to functions, interests, and activities of other marine users from the application of chemical dispersant.

As discussed above on the assessment of chemical dispersant to marine fauna, benthic invertebrates are the most sensitive to chemical dispersants, with some results indicating the potential for lethal impacts following exposure (Wise et al., 2019). Toxicity exposure may result in a reduction in commercially targeted marine species (i.e. fish and invertebrate species), subsequently resulting in impacts to commercial fishing productivity.

Furthermore, any contamination of target species can also result in economic impacts to the industry. Given that embryos, larvae and juvenile fish are the most sensitive to toxicity, there is a particular risk if the timing of a spill, and subsequently the timing of the response (chemical application into the marine environment), overlaps with the timing of a species reproduction event (i.e. a spawning event). This could lead to some component, or all of a year class, given that most species have seasonal pulsed recruitment, of commercially targeted marine species (i.e. fish and invertebrate species) to be impacted.

Due to potential sensitivities of some species to chemical dispersant, the dispersant will only be applied when the IAP decision-making process has determined that its application will have a net environmental benefit, as supported by the NEBA process as directed by the Control Agency. Furthermore, the chemical dispersant will only be applied within the 'Dispersant Application Zone'.

As such, given the extent of the Hydrocarbon Areas and wider EMBAs expected for the two credible spill scenarios, any impacts to marine fauna from the application of chemical dispersant within the restricted 'Dispersant Application Area' are anticipated to be less than the extent of impacts to marine fauna that would result from the hydrocarbon spill itself. Therefore, the risk evaluation that was conducted for the risks to marine fauna following the release of MDO and Wandoo crude, within Sections 5.2, 5.3 and 5.5, respectively, is considered appropriate and conservative for the risk of injury/mortality to marine fauna from the application of chemical dispersant.

5.4.3.4 Mechanical Dispersion

Mechanical dispersion is the use of fire monitors, engine wash, or other means to mechanically/ physically disperse oils into the water column, thereby increasing the speed with which

weathering and biodegradation occurs. This strategy is a secondary strategy that may be considered for Wandoo crude spills that result from activities within the Wandoo Field.

Impact Assessment

In general, the use of vessels to accelerate the dispersion of the hydrocarbons will not create any additional impacts on the environment that have not already been assessed within Section 5.1 to 5.21 of this EP. The potential use of vessels for propeller-washing to mechanically disperse spilt oil in shallow coastal waters may introduce the potential for impacts to benthic habitats.

Benthic Habitats and Assemblages

Change to Benthic Habitat and Assemblages

The use of propeller-washing to mechanically disperse spilt oil in shallow coastal waters may result in damage to sensitive seabed habitats such as coral reefs, macro-algae beds and seagrasses. Potential damage could occur from accidental vessel grounding or propeller-wash (turbulence) in shallow water. These impacts could include scouring of sediments and physically damaging/removing subtidal habitat, together with any supported invertebrate communities. Mechanical dispersion will only be carried out in waters deeper than 20 m; therefore, any impacts to benthic habitats, sediments and subtidal habitats are unlikely.

5.4.3.5 Containment and Recovery

Containment and recovery operations use booms to create physical barriers on the water surface to contain the oil spill. Once contained, the operation uses skimming equipment to recover the hydrocarbons from the surface waters. This strategy is typically only used in the offshore environment in close proximity to the hydrocarbon source.

The response strategy primary relies on the use of suitable vessels, experienced crew, booms, skimmers, pumps, on-board storage for recovered oil and aircrafts to direct the vessel(s) undertaking the operation.

Impact Assessment

The use of vessels to undertake containment and recovery operations will not create any additional impacts on the environment that have not already been assessed within Sections 5.12, 5.14, 5.18 and 5.20 of this EP.

The use of an aircraft to direct the containment and recovery operations may have additional impacts that has not been previously assessed. This has been assessed within Sections 5.12 and 5.18.

Other Marine Users

Changes to functions, interests, and activities of other marine users

The presence of spill responders, vessel, and the associated clean-up operations may lead displacement or an exclusion of other marine users, such as commercial fishers and shipping, operating within affected areas. The physical displacement other marine users from the area due has the potential to cause a negative economic impact. However, any exclusion zone that will be

established for the containment and recovery operations will ultimately be spatially smaller than the extent of the hydrocarbon spill itself. As such, the risk evaluation that was conducted for the impact to other marine users within Sections 5.2, 5.3 and 5.5, is considered appropriate and conservative for the risk of changes to functions, interests, and activities of other marine users from implementation of containment and recovery operations.

5.4.3.6 Protection and Deflection

Protection and deflection is the use of physical barriers to separate oil from environmental sensitivities, or to deflect the oil to other areas where it may be naturally collected, or to other areas where the oil will do less harm. This involves the establishment of a nearshore boom across the shoreline interface, typically involving the anchoring/attachment of one end of a nearshore boom in the nearshore environment and the other end within the supratidal shoreline habitat.

The tactics of protection and deflection predominantly include nearshore-booming operations, which include:

- Vessel operations
- Shallow water operation-vessel boom nearshore booming including anchoring and retrieval
- Shore-based booming (i.e. personnel)
- Use of barriers.

Impact Assessment

In general the use of vessels to undertake protection and deflection operations will not create any additional impacts on the environment that have not already been assessed within Sections 5.12, 5.14, 5.18 and 5.20 of this EP.

The anchoring/attachment of the nearshore boom within the nearshore water and on the shoreline, including shoreline response workers deployed to the shorelines may have an additional impact that has not been previously assessed.

Benthic Habitats

Change to Benthic Habitats

Shoreline response activities, such as strategies that used during protection and deflection, have the potential to impact shallow coastal areas or benthic habitats where sensitive habitats and aggregations of wildlife may be present. In particular, the use of vessels and the anchoring of nearshore booms within nearshore environments has the potential to disturb sensitive near-shore benthic habitats, such as corals, seagrass, macroalgae and mangroves. Any impacts to benthic ecosystems from seafloor abrasion, dislodgement, and increased sedimentation from vessel and nearshore booms, is anticipated to be highly localised. As such, a consequence ranking of ‘1’ (Incidental) was assigned.

Coastal Communities

Change to Coastal Communities

Shoreline response activities, such as strategies that used during protection and deflection, have the potential to impact coastal habitats. The potential impacts of protection and deflection response will vary, depending on the method used and the nearshore/shoreline habitat. For example, a loss of vegetation may occur depending on the placement of the protection booms and poorly placed deflection booms could potentially direct floating oil to shoreline areas where impacts could be more severe (e.g. mangrove areas) and exacerbate the level of impact and recovery time for the ecosystem.

As with all spill response activities, this disturbance will only occur if a net benefit to accessing and protecting shoreline areas have been established via the completion of a NEBA process. Control measures and response plans will be established prior to the commencement of any shoreline response actives to provide guidance and instruction to responders on how to reduce impacts to sensitive receptors, as outlined in the Wandoo Field OSCP [WAN-2000-RD-0001.01].

Sensitive receptors identified in this EP will be avoided when placing protection and deflection booms. As such, impacts to benthic habitats and communities and coastal habitats has been anticipated to potentially result in localised, short-term, impacts to habitats with recovery expected following the cessation of the oil spill response. No impacts to local ecosystem or population functioning is expected. As such, a consequence ranking of '2' (Minor) was assigned.

5.4.3.7 Shoreline Clean-up

Shoreline clean-up involves monitoring shorelines and/or the removal of hydrocarbons that have accumulated on the shorelines. In general shoreline clean-up tactics include:

- Physical cleaning - removal/disposal:
  - natural recovery
  - manual clean-up (i.e. use of shovel, rakes, sieves)
  - mechanical clean-up (i.e. use of machinery)
  - vacuum systems
  - use of sorbents.
- Physical cleaning - washing:
  - low and high pressure flushing
  - steam cleaning
  - sand blasting.
- Physical cleaning – in-situ:
  - surf washing/sediment reworking.
- Treatment:
  - bioremediation.

Impact Assessment

Shoreline clean-up operations, including the removal of hydrocarbons, the tactic used, and the presence of shoreline response workers and equipment deployed to the shorelines, will have an additional impact that has not been previously assessed.

Coastal Communities

Change in Coastal Communities

The potential impacts of shoreline response activities will vary, depending on the nature and scale of the spill, the method used, and the nearshore/shoreline habitat impacted. MDO and diesel will weather rapidly, with often only a small fraction comprising persistent residuals. Under low energy conditions, the residual components may form a thin liquid sheer on the coast and may persist in the environment; this may allow them to be physically removed. Shoreline response will be considered as a primary response strategy in the event of that crude spill from the offtake results in shoreline accumulation. Due the hydrocarbon characteristics of Wandoo crude (see Section 4.12.4.1), physical removal will be required if a net environmental benefit is determined.

Shoreline type plays an important role in determining the most suitable clean-up techniques that might be most suitable for removing the oil (ITOPF, 2014). In general natural recovery methods are the most effective for sensitive shorelines, such as mangroves and saltmarshes, or inaccessible rocky shore platforms found within the Hydrocarbon Area. Shoreline clean-up is typically only considered for sandy beaches affected by hydrocarbons. Accessing shorelines for clean-up will have associated ecological constraints, especially if accessing uninhabited, sensitive coastal areas. Physical clean-up methods can alter the elevation or profile of beaches, which may lead to erosion of beaches following the clean-up process, particularly if heavy machinery is used. Table 5-28 summarises the sensitivity and potential impact of shoreline clean-up techniques on various habitat types.

Environmentally intrusive or potentially damaging activities should only be considered if there is a positive net environmental benefit. A NEBA will need to be carried out before shoreline clean-up operations commence to ensure that attempts to remove weathered oil result in a net benefit, as outlined in the Wandoo Field OSCP [WAN-2000-RD-0001.01] . A range of control measures will be established prior to the commencement of shoreline response actives, as detailed within the OSCP and Wandoo Field OPEP [WAN-2000-RD-0001.02]. As such, any change to coastal communities from shoreline response activities will be managed so that any impacts are reduced to localised, short-term impacts, with recovery expected following the cessation of the oil spill response activity. As such, a consequence ranking of ‘2’ (Minor) was assigned.

Table 5-28: Potential impacts of shoreline clean-up activities

Habitat type	Potential impacts of activities	Priority/action
Mangroves	Mangroves are amongst the hardest to clean as they are sensitive to physical damage by clean-up operations and often have high environmental sensitivity (ITOPF, 2014). The damage cause by the physical disturbance of clean-up operations has the potential to cause more damage to the mangrove communities than the oil itself. Mechanical removal and high-pressure flushing has the potential to cause damage to mangroves and should not be attempted. Trampling associated with manual clean-up also has the potential to cause damage to mangroves. Sorbents may be used, as they eliminate the requirement for foot traffic and mechanical equipment. However, this technique is not recommended for high energy shorelines, as sorbents may be lost during periods of high wave action or tidal movement. It may also generate large volumes of waste. Low pressure flushing with seawater may be used for thick films only. It has the potential to cause removal or mortality of surface organisms and surface and near surface habitat disturbance.	High As certain methods of shoreline clean-up have the potential to cause damage to mangrove habitats, focus should be on prevention of further hydrocarbon entry by using protection and deflection. If oil ends up in mangrove habitats, leaving residual oil to weather and degrade naturally is usually recommended, as mangroves have been shown to be more easily damaged by the physical disturbance caused by clean-up teams and vehicles, than by the oil itself.
Saltmarsh	Saltmarsh habitats, like mangrove habitats, are difficult to clean as they are sensitive to physical damage by clean-up operations and often have high environmental sensitivity (ITOPF, 2014). The use of heavy equipment, poorly supervised manpower and the removal of oiled sediment have led to long-term damage due to trampling, damage to root systems and consequent erosion (IPIECA, 2015). In general, cutting vegetation has not been found to improve recovery rates except for spills of heavy fuel oil or heavy crude oils. Wherever possible, it is preferable to allow oil that arrives on this type of shoreline to whether naturally. Where the removal of oil is essential, low pressure flushing and manual cleaning are typically the best options.	High As certain methods of shoreline clean-up have the potential to cause damage to saltmarsh habitats, focus should be on prevention of further hydrocarbon entry by using protection and deflection.

Habitat type	Potential impacts of activities	Priority/action
Beach and Mudflats		
Intertidal beaches/ mudflats	Natural recovery is the preferable clean-up method for this type of shoreline, particularly where oil has been washed up on vegetation. On many occasions activities such as mechanical or manual clean-up have resulted in more damage than allowing natural recovery to take place due to trampling and substrate erosion. Where removal of oil is essential to prevent its remobilisation and spreading along the shoreline, low pressure flushing can be used. Potential impacts include removal or mortality of surface organisms and surface and near-surface habitat disruption. Oil can be transported to lower intertidal or previously clean areas, and subtidal organisms may be buried by downslope sediment transport. Most organisms living in these sediments are highly sensitive to the components of oil. Polychaete worms and other soft-bodied organisms are particularly susceptible to oil contamination. Recovery periods will be determined to a large extent by the degree of penetration and persistence of oil in the sediment. Experimental work has indicated two to four years for recovery (O'Sullivan et al., 2001).	High-medium Some mudflats also support diverse biological communities that are allocated a high priority for protection and cleaning.
Rocky shorelines/ intertidal reef platforms	Rocky cliffs Manual clean-up of rocky cliffs may be difficult due to: • absence of access • high sea states • dangerous working conditions. Typically, cliffs and inaccessible rocky coves are highly exposed and are best left to clean naturally unless there are overriding reasons to do otherwise (IPIECA, 2015). Intertidal reef platforms Vacuum systems can be used to collect heavy (thick) or pooled deposits of oil where access is possible. Vacuum equipment also has the potential to cause damage to sensitive habitats and should not be used where foot traffic and equipment operation is restricted.	Low Rocky cliffs often do not require cleaning as: • oil has been held off the coast by wave reflection • self-cleaning is rapid due to exposure to high wave energies. Platforms, which lie in the lower intertidal zone, are generally afforded a low priority, because oil tends not to adhere to the wet surfaces (i.e. wave exposed surface) and is rapidly removed. Platforms in the mid to upper intertidal zone are also

Habitat type	Potential impacts of activities	Priority/action
	Sorbents may be used as they eliminate the requirement for foot traffic and mechanical equipment. However, this technique is not recommended for high energy shorelines, as they may be lost during periods of high wave action. It may also generate large volumes of waste. Low pressure washing with hot or cold seawater may be used, as this is effective to flush floating or loose oil out of tidal pools, depressions, crevices, etc. and remove oil from vegetation. Potential impacts of low pressure washing includes removal or mortality of surface organisms and surface and near-surface habitat disruption. Oil can be transported to lower inter tidal or previously clean areas and subtidal organisms may be buried by downslope sediment transport (Owens, 1998). Boulder beaches Manual removal may not be suitable as access to rocky shore is difficult and particular attention needs to be given to safety of workers on particular surfaces in addition to hazards of waves and tides (ITOPF, 2011). Low pressure washing with hot or cold seawater may be used, as this is effective in flushing floating or loose oil out of tidal pools, depressions, crevices, etc. and in removing oil from vegetation. Potential impacts include removal or mortality of surface organisms and surface and near-surface habitat disruption. Oil can be transported to lower intertidal or previously clean areas, and subtidal organisms may be buried by downslope sediment transport. In areas of high concentrations of wildlife, where significant amounts of oil have stranded, loose sorbent material can be spread over oiled rocks to reduce contamination of fur or feathers (ITOPF, 2011). However, there is a potential that secondary contamination may result from drifting mats of the oil sorbent mixture. Cobble beaches/pebble beaches Mechanical or manual clean-up techniques may not be suitable on this type of shoreline, as the movement of both vehicles and personnel have the potential to cause oil to penetrate into the spaces between stones and deep into the beach. Low pressure washing with hot or cold seawater may be used, as this is effective in flushing floating or loose oil out of tide pools, depressions, crevices, etc. and removing oil from vegetation (ITOPF, 2014).	generally self-cleaning and therefore oil does not persist. Natural recovery is effective on weathered and heavy crude in most situations for both boulder and cobble/pebble beaches and causes the least environmental impact.

Habitat type	Potential impacts of activities	Priority/action
	Potential impacts include removal or mortality of surface organisms and surface and near-surface habitat disruption. Oil can be transported to lower inter tidal or previously clean areas, and subtidal organisms may be buried by downslope sediment transport. Surf washing may be suitable on moderate to high energy shorelines where moderately oiled sediments are located in the higher portions of the upper intertidal or supratidal zone. Potential impacts include: • oil and/or sediments could damage healthy biological communities in the lower intertidal zone • oil that is released is rarely fully contained and could impact adjacent areas, and • sediment loss resulting from alongshore suspension and movement of sediment in the water on fine-grained sediment beaches.	
Sandy beaches	Mechanical clean-up may be suitable for sandy beaches, provided the beach can support heavy machinery. This method can result in shoreline erosion if excessive material is removed without replacement. However, for most exposed beaches, the seasonal cycles of erosion and accretion are so large that the amount of material removed during clean-up operations is usually insignificant in comparison and will normally be replaced naturally (ITOPF, 2014). Temporary roadways may be constructed to allow heavy equipment onto the beach to avoid damage to fragile dune habitats (ITOPF, 2014). Manual clean-up may be used where access is restricted, if oiling is light, or if the beach cannot support heavy vehicles. Surf washing may be suitable on moderate to high energy shorelines where moderately oiled sediments are located in the higher portions of the upper intertidal or supratidal zone. Buried oil might be mobilised through harrowing or ploughing, or by using flushing lances to release the oil and flush it to the water's edge where it can be recovered with skimmers or sorbents. Re-floated oil can be collected using booms and skimmers. Vacuum trucks or systems may be used on pooled oil, or where oil is very thick. Typically sandy beaches have a low biological activity, and generally sparse fauna compared to other shoreline types.	High Beaches used by nesting turtles and/or seabirds are given a high priority for protection and clean-up. A high protection priority will also be given to recreational beaches or those of high economic value.

Marine Fauna

Change in Behaviour

The use and movement of vehicles, equipment and personnel during shoreline response activities can directly disturb marine fauna individual and important habitats of threatened and migratory fauna, including nests of turtles and birds and bird roosting areas. Furthermore, shoreline clean-up may require strategies which physically remove of substrates, which could directly impact marine faun and their habitats. As with all spill response activities, this disturbance will only occur if a net benefit to accessing and cleaning shoreline areas have been established via the completion of a NEBA process.

a range of control measures will be established prior to the commencement of shoreline response actives. For example, operational restrictions on equipment and vehicle use will be implemented to limit impact to sensitive or important areas for marine and terrestrial fauna. The establishment of any shoreline forward operating base, and the shoreline response activities themselves will be done under the under direction of the relevant Control Agency, DTMI and DBCA, with suitable advice sought if access is needed to culturally significant areas. Shoreline teams will also be informed of how to avoid encounters with marine fauna.

The main direct disturbance to fauna would be the hazing, capture, handling, transportation, cleaning and release of wildlife susceptible to oiling impacts, discussed below.

As such, disruption to marine fauna may result from shoreline response activities, however, the impacts are anticipated to be localised, short-term, with recovery expected following the cessation of the oil spill response. As such, a consequence ranking of ‘2’ (Minor) was assigned.

Other Marine Users

Changes to functions, interests, and activities of other marine users

The presence of hydrocarbons on shorelines, and the associated clean-up operations, depending on location, may lead to temporary beach closures. Any recreational activities present in affected areas will be excluded until access is again granted by local authorities. MDO is expected to weather rapidly with clean-up operations expected to take days-weeks following source control, whereas a release from the offtake export system that results in shoreline accumulation of Wandoo crude may persistent and require moderate to high clean-up operations.

Precautionary exclusion from impacted areas following a hydrocarbon spill may be implemented until spill operations cease. The could result in a temporary disruption to some recreational and tourism activities within and area for the duration of the response. Closure of a certain area or attraction, resulting in economic losses to the business are likely to eventuate. The presence of shoreline clean-up operations along a shoreline have the potential to reduce the visual amenity of known heritage sites along the coastline, subsequently potentially impacting the value of the site to First Nations people. These impacts would likely result temporary exclusion from a medium to large proportion of commercial or recreational enterprise depending on the hydrocarbon accumulation where recovery is expected to occur within 1 year of the activity stopping. As such, a conservative consequence ranking of ‘3’ (Moderate) was assigned.

5.4.3.8 Oiled Wildlife Response

Oiled wildlife response has the potential to cause impacts to marine fauna. Activities associated with oiled wildlife response that can cause impacts to marine fauna include:

- Hazing
- Pre-emptive capture
- Search and capture
- Field stabilisation
- Cleaning and rehabilitation
- Termination.

Impact Assessment

Marine Fauna

Change in Behaviour

Oiled wildlife response activities have the potential to disrupt marine fauna. Activities such as hazing involves the use of visual, auditory or sensory deterrents to keep healthy marine fauna away from the hydrocarbon spill. This can lead to disturbance of marine fauna, such as the separation of groups or adults/juveniles, collisions with marine fauna, inadvertent movement of animals into the oiled area, or scattering of oiled animals.

Pre-emptive capture involves the capture and relocation of marine fauna before they become oiled. Potential impacts include relocation to inappropriate areas that will not support the animal's requirements (e.g. habitat, food sources).

Despite there being the potential of impacts to marina fauna from oiled wildlife response, these impacts are likely to be less than the potential impacts and risks posed to marine fauna from the hydrocarbon spill itself, as discussed in Sections 5.1 to 5.7. Therefore, risk evaluation that was conducted for the accidental release of hydrocarbons is considered conservative for oiled wildlife response activities.

Injury/Mortality

Marine fauna have the potential to be injured during search and capture. In the event their physical condition is already poor due to the indirect or direct exposure to hydrocarbons, inexperienced handling can rapidly exacerbate their condition. The goal of search and capture is to collect as many live oiled animals as quickly as possible and in the best possible condition to maximise survival. Prompt initialisation of an oiled wildlife response that quickly and effectively collects wildlife and provides a means for humane euthanasia, or rehabilitation and release, will minimise suffering.

Field stabilisation is required prior to further treatment of oiled animals, to ensure they can cope with the cleaning and rehabilitation process that will follow. Effective field stabilisation requires deployment of adequate handlers to appropriate locations in a timely manner.

Despite there being the potential of impacts to marina fauna from oiled wildlife response, these impacts are likely to be less than the potential impacts and risks posed to marine fauna from the hydrocarbon spill itself, as discussed in Sections 5.1 to 5.7. In the unlikely event of a vessel spill, there is a chance that some marine fauna will experience lethal impacts from hydrocarbons. The risk evaluation that was conducted for the accidental release of hydrocarbons is considered conservative for oiled wildlife response activities.

5.4.3.9 Scientific Monitoring

Scientific monitoring is used to quantify the impact of associated response strategies, such as the use of chemical dispersants and shoreline clean-up. Various scientific monitoring sampling plans may be implemented, depending on the nature and scale of the spill, and the associated implemented response strategies.

Scientific monitoring strategies that may be activated include:

- Water quality impact assessment (SM1)
- Sediment quality impact assessment (SMP)
- Intertidal and coastal habitat assessment (SM3)
- Seabirds and shorebirds (SM4)
- Marine megafauna reptiles, whale sharks, dugongs and cetaceans (SM5)
- Benthic habitat assessment (SM6)
- Marine fish and elasmobranch assemblages assessment (SM7)
- Fisheries impact assessment (SM8)
- Heritage features assessment (SM9)
- Social impact assessment (SM10).

See the Operational and Scientific Monitoring Bridging Implementation Plan (OSM-BIP) OG-1100-YH-0019] (contained within Appendix C of the Wandoo Field OSCP [WAN-2000-RD-0001.01]) for the mobilisation and activation criteria(s) for the selected monitoring plans.

See the VOGA Operational and Scientific Monitoring Bridging Implementation Plan [VOG-1100-RG-0002] for the mobilisation and activation criteria(s) for the selected monitoring plans (contained within Appendix C of the Wandoo Field OSCP [WAN-2000-RD-0001.01]).

Impact Assessment

In general, majority of the scientific monitoring strategies (i.e. study scopes) will not create any additional impacts on the environment that have not already been assessed within Section 5.10of this EP, such as associated with vessel operations, and seabed disturbances.

The presence of scientific monitoring SMEs and equipment deployed to the shorelines, use of shallow vessels, aircraft operations, and any additional impacts to oiled marine fauna, may have an additional impact that has not been previously assessed. These have already been assessed as a part of the other oil spill response activities above in Sections 5.4.3.1 to 5.4.3.8.

5.4.4 Risk Ranking

In the event of an accidental release of hydrocarbons, response strategies may be implemented that have the potential to impact receptors and other marine users.

Given the nature and scale, and purpose of the response activities discussed in Section 5.4.2, the potential impacts and risks will be less than the impacts of the spills themselves, as assessed within Section 0.

Chemical dispersion:

- The consequence ranking of '2' (Minor) was assigned to water quality, plankton, benthic invertebrates, fish, including sharks and rays and corals, and a likelihood of 'B' (Unlikely) was considered appropriate, resulting in a risk ranking of 'RRIV' (Low).
- The consequence ranking of '1' (Incidental) was assigned to seabirds and shorebirds, marine reptiles, marine mammals, macroalgae, and seagrass, and a likelihood of 'B' (Unlikely) was considered appropriate, resulting in a risk ranking of 'RRIV' (Low).

Shoreline response:

- The consequence ranking of '3' (Moderate) was assigned to coastal communities and marine fauna and a likelihood of 'B' (Unlikely) was considered appropriate, resulting in a risk ranking of 'RRII' (Medium).
- The consequence ranking of '2' (Minor) was assigned to coastal communities and marine fauna and a likelihood of 'B' (Unlikely) was considered appropriate, resulting in a risk ranking of 'RRIV' (Low).
- The consequence ranking of '1' (Incidental) was assigned to benthic habitats, and a likelihood of 'B' (Unlikely) was considered appropriate, resulting in a risk ranking of 'RRIV' (Low).

5.4.5 ALARP Demonstration

5.4.5.1 Source Control

Loss of Well Control

To assess whether the relief well option results in the risks and impacts being managed to ALARP, the plan was subject to an evaluation to determine if more could be done sooner and identify what the environmental benefit and associated cost would be.

The assessment of a worst-case loss of well control discharge identifies a release commencing 64 days after an incident, with a relief well estimated to take 78 days. In order to reduce impact of the spill relief well timing is would need to be reduced by at least 14 days.

The relief well drilling operation involves a range of defined steps that are similar to general well construction activities and requires time to be conducted safely. VOGA utilise similar

assumptions in timing of the relief well as we use in well construction project planning. On this basis we have excluded the operational scope as a source of reducing the response duration.

An option identified to reduce the critical path stage for the relief well plan was regulatory approvals. To reduce this time, a dedicated MODU, suitable for drilling a relief well with an approved Safety Case Revision would need to be available on standby.

If such a MODU with necessary approvals was available and located in Dampier it could reduce the mobilisation time from 21 to 7 days.

Based on the estimated standby rig costs (at least ~A$200k-250k day rate), this would result in an additional 25% overhead for the drilling campaign which would make any campaign uneconomical for no or minimal reduction in environmental impact.

Improvement to standby documentation to potentially reduce the time for regulatory approvals has been implemented. Relief well activities are covered in this EP and a MODU Safety Case Revision template will be developed prior to exploration activities.

Relief well timing considers the availability of suitable MODUs in the North West Shelf, Victoria and Southeast Asia, as well as Regulatory approvals. VOGA has confidence that there is relief well rig supply to meet the timelines for relief well drilling operations.

The relief well response strategy is provided in Table 5-29. The ALARP review of the relief well response strategy is provided in Table 5-30.

Whilst the current response arrangement has been assessed as ALARP, based on the current controls in place, VOGA is actively working with industry to evaluate measures to improve on the ALARP response time model through the APPEA DISC Source Control Response Industry (SCRI) Working Group. The SCRI working group is an APPEA DISC initiative which has been established to drive collaboration and continuous improvement in source control emergency response planning. The Working Group will explore and act on opportunities to align and strengthen the Titleholders' source control emergency response capability though "mutual aid" initiatives and drive continuous improvement by implementing fit-for-purpose and effective source control emergency response strategies.

Table 5-29: Source control resource requirements

Tactic	Applicability	Resource requirements
Establish initial Technical Support Teams within 4 days and full teams within 9 days.	The Incident Commander, will authorise the assembly of the following dedicated technical teams to undertake the well kill and relief well planning, and execution activities: • Well Control Response Team • Subsurface Team • Relief Well Planning Team.	• 6 x Technical Support Teams Personnel (Initial – 4 days) • 15 x Technical Support Teams Personnel (Full – 9 days) VOGA has 2 subsurface team members during operations, and a consultant based (in Perth office) offshore drilling team (8-10 ppl) available during well construction and intervention programs that would be utilised for a relief well. Current contract with Wild Well Control that can provide an initial 2 personnel for the Relief Well Planning Team, and 6 people within one week. VOGA also has the option, with its international offices, to call on additional internal technical support. In addition, VOGA's Perth office has contracts in place with major Service Companies during well construction and intervention programs for specialised personnel to assist in blowout response.
Relief well planning tasks completed prior to spud (within 30 days).	The following key planning tasks are required prior to relief well drilling operations: • Identify well kill options • Determine site survey requirements • Review relief well strategy and basis of design • Well kill and flow modelling • Well programs • Internal HSE and risk assessments/ documentation.	Technical Support Teams Personnel (same as above) plus: • 2 x Modelling personnel within 4 days • 4 x Modelling personnel within 7 days • 2 x VOGA HSE personnel Contract with Add Energy to mobilise personnel for dynamic well kill and flow modelling.

Tactic	Applicability	Resource requirements
Undertake Site Survey prior to spud (within 22 days).	Dependant on the type of MODU to be utilised, different levels of site survey may be required. • Drilling contractors require site survey data to establish the sea-bed conditions and stability and shallow gas risk. • The site survey must be designed to identify any sea-bed or near sea-bed obstructions or anomalies.	• 1 x Site Survey Vessel + Crew Survey contractor (i.e. Fugro or Neptune) would be able to be engaged within the timeframe required.
Regulatory approvals completed prior to spud (within 50 days).	Following approval documents required to be reviewed and accepted by NOPSEMA prior to relief well drilling: • Environment Plan • MODU Safety Case (by MODU contractor) • WOMP (new one required).	• 2 x VOGA HSE Personnel (Safety Case and Environment Plan) • 2 x Technical Support Teams Personnel (WOMP)
Drill rig, equipment and logistics onsite and drilling within 50 days. Relief well completed within an additional 27 days once on site.	In the event of a surface blowout necessitating rig and/or platform abandonment, the drilling of a relief well is most likely required in order to dynamically kill the blow out well.	• 1 x MODU • Based on a rig being available in Australian or South East Asian waters.
		• 2 x Vessels (Workboats) – use of vessels contracted for drilling program
		Equipment • MSAs in place with wide range of oil field equipment and service providers as part of drilling program requirements – this includes for Casing and Wellhead (this includes Cameron, Weatherford, Halliburton, Schlumberger, Drillquip).

Table 5-30: Relief well ALARP review

Improvements considered	Assessment of option	Adopted/not adopted
Standby MODU for VOGA drilling.	A standby MODU is not reasonable given the costs of standby arrangements (effectively doubling the costs of the drilling program) making drilling an unviable activity.	Not adopted.
Standby MODU shared across AEP MOU Titleholders.	A standby MODU shared across all titleholders who are signatories to the AEP MOU is likely to provide a minor environmental benefit as it may reduce the sourcing, contracting and mobilisation time.	Not adopted.

Improvements considered	Assessment of option	Adopted/not adopted
	This option is not considered feasible for a number of Titleholders due to the remote distances in Australia as well as a substantial range of well depths, types, complexities, geologies and geophysical properties across a range of Titleholders. As the environmental benefit is only considered minor and the reduction in timing would only be for the mobilisation period, the costs are considered disproportionate to the minor benefit gained. The costs and complexity of having a MODU and maintaining a shared arrangement for the duration of the exploration drilling are disproportionate to the environmental benefit gained. A standby MODU also introduces additional environmental and safety risks. The wells are currently not predicted to flow due to low reservoir pressure, so the potential benefits of this option are limited.	
Pre-accepted safety case revision for possible relief well MODUs.	Time saving and may assist in developing relationship with MODU operator. Multiple variables mean a particular MODU may not be available on the day, hence safety case revision of no benefit but significant effort and cost. MODU's for which safety cases were developed may not be available at the time, hence industry has utilised the MoU model which generally allows access to a range of MODUs and well site services. There is a significant risk of wasted planning effort where directed at a single facility. There is also a risk of obscuring optimal (most expedient) options to drill a relief well where plans become tailored to a particular option. Costs are considered to be grossly disproportionate to the potential reduction in environmental risks.	Not adopted.
Pre-drilling top holes.	This option is not considered feasible due to the uncertainties related to the location and trajectory of the intervention well, which may vary according to the actual conditions at the time the loss of containment event occurs. Additionally, there is only expected to be a minor reduction in timing for this option and it represents additional environmental impacts and costs.	Not adopted.
Use of relief well injection spool.	The surface wellheads utilised already include side outlets to enable the connection of more surface pumping resources. These additional resources can deliver greater kill fluid rates to the relief well. As all Wandoo wells covered by this EP can be killed with a single relief well using mud pumping resources available on standard MODUs, the use of the relief well injection spool would not be required.	Not applicable.

Improvements considered	Assessment of option	Adopted/not adopted
Maintaining relief well drilling supplies.	There is not predicted to be any reduction in relief well timing or spill duration from VOGA maintaining stocks of drilling supplies (mud, casing, cement, etc.) Contingency stocks for the drilling program would be available in addition to supplies from vendors and NWS supplies of other operators. It would be feasible to source some relief well drilling supplies, such as casing, but the actual composition of the cement and mud required will need to be specific to the well. Due to the long lead times associated with procuring well construction equipment through manufacturing, it is necessary to design the relief well utilising sufficiently generic equipment such that equipment could either be purchased from vendor's "limited off the shelf" inventory or procured from other operators within the region utilising similar equipment. VOGA have MSAs in place with most major local oilfield service and equipment providers. The preliminary design work has been carried out on conceptual well trajectories to allow confirmation of basic relief well plans to enable detailed directional work to commence. The preliminary casing design has been conducted to confirm the ability to construct the well utilising readily available "generic" casing grades and sizes while adhering to VOGA's well construction standards for well integrity.	Not adopted.
Investigate the inclusion of relief well activities within Exploration Drilling EP and MODU Safety Case Revision template to enable more rapid regulatory approvals.	Improvement to standby documentation to potentially reduce the time for regulatory approvals. Relief well activities are covered in the Exploration Drilling Environment Plan and a MODU Safety Case Revision template will be developed prior to spudding wells capable of sustaining natural flow.	Adopted.
Process to track available relief well rigs.	On a monthly basis during drilling operations, VOGA tracks and assesses the suitability of available MODUs, plus MODU activities of registered operators and MODUs with approved safety cases.	Adopted.

CGS Source Control

Independent structural assessment studies undertaken by Spire Engineering Services (Spire, 2024a and b), and independently reviewed by City, University of London (Ayoub, 2023), confirm no credible initiating event that could result in a breach of the CGS and a release of stored oil.

Accordingly, the CGS Source Control Plan is not predicated on a known or credible failure mechanism, but is maintained as a contingency framework to ensure preparedness should post-event degradation or secondary damage result in a loss of containment.

Source Control Objectives and Decision Basis

Eight source control objectives have been identified through a structured decision-tree process. The decision logic is informed by the following primary considerations:

- Whether WNB remains staffed and key services are operational
- Whether WNB personnel can be re-mobilised and returned to operation, including availability of power, export pumps, ballast pumps, and interface pumps
- Whether temporary access to Shaft 4 can be safely achieved by responders
- Whether the downstream export system (export flowlines, PLEM, SHA, CALM buoy, mooring chains, and FHA) is fit for service
- Whether the WNB can be accessed via subsea intervention.

Secondary Considerations

Access to CGS compartments is limited to:

- Export caisson
- Interface pumps caisson
- Buffer tanks via Shaft 4
- Five (5) access hatches.

Source Control Assumptions

The following assumptions underpin source control planning:

- There are no proven methods or equipment currently available to enter submerged CGS compartments to recover crude oil directly.
- External access by cutting through approximately 1 m of reinforced concrete is considered technically impractical.
- External recovery using submersible pumps would most likely utilise the export system or interface pump caissons within Shaft 4.
- Temporary storage of up to 3,577 kL may be achievable within the buffer cell.
- Containment through temporary repair would require diver and/or ROV operations, supported by an initial subsea survey to confirm feasible repair options.

Source Control Strategies

The following source control strategies have been identified, recognising that activation is dependent on site conditions, access availability, and system operability:

- Contain crude through ballast pump operations to establish a negative pressure differential.
- Remove crude via export through the export system.
- Transfer crude between compartments using interface pumps.
- Reinject crude into WNB wells using export pumps.

- Contain crude via ballast operations using submersible pumps deployed in Shaft 4.
- Remove crude using submersible pumps via export or interface caissons.
- Remove crude using subsea-installed submersible pumps through a damaged section into a cell.
- Contain crude through temporary or permanent subsea repair of a damaged section.

Source Control Objectives and Activation Timeframes

Source control objectives and timeframes to achieve are presented in Table 5-31.

Table 5-31: Source control objectives and activation timeframes

Objective No.	Objectives	Earliest Activation (Days)	Latest Activation (Days)
1	Contain crude by ballast pump operation to create negative pressure differential	1	3
2	Remove crude by export to tanker using export system	2	10
3	Remove crude by transfer between compartments using interface pump	1	3
4	Remove crude by reinjection into Wandoo B wells using export pumps	2	5
5	Contain crude by ballast operation using submersible pumps in Shaft 4	5	10
6	Remove crude by discharge using submersible pumps through export/interface caissons	2	5
7	Remove crude by submersible pumps installed subsea through damaged section into cell	5	10
8	Contain crude by temporary subsea repair of damaged section.	10	30

Indicative Mobilisation Durations

Table 5-32: Indicative mobilisation durations (planning purposes only)

Activity	Earliest Activation (Days)	Latest Activation (Days)
Mobilise suitcase ROV	2	3
Mobilise Air Diving – WA Based DSV	45	60
Mobilise SAT Diving – Singapore Based DSV	45	60

Temporary Repair Operations (Indicative)

Table 5-33: Temporary repair operations

Activity	Earliest Activation (Days)	Latest Activation (Days)
Design	5	30
Fabricate/procure	10	100

5.4.5.2 Monitor, Evaluation and Surveillance

MES of a spill will be initiated in the event of any spill to the marine environment from the time of spill detection. The tactics and resources employed will be commensurate with the size and type of the spill to ensure the objectives of the resource strategy is being achieved and supporting the Incident Action Plan (IAP) decision-making process.

The ALARP review of the proposed response strategy is provided in Table 5-34.

Table 5-34: MES ALARP review

Improvements considered	Assessment of option	Adopted/not adopted
Earlier initiation of monitoring activities.	Pre-spill modelling and impact assessment is sufficient to inform initial response planning and resource requirements. OPPs inform the proposed response strategy and equipment items, the information from initial monitoring data helps confirm implementation of response strategies and location of response. This is sufficient time as it would take at least at least six hours to implement the other oil spill response strategies onsite.	Not adopted.
Ongoing real time collection of data prior to any spill event.	Ongoing collection of real time environmental data would provide immediate inputs into decision making however this would require the use of aerial resources, satellite resources, ground surveys and marine surveys. The existing contracts in place for aerial surveillance, satellite imagery, trajectory modelling, marine and shoreline surveys can be activated in a timeframe that provides short, medium, and long-term access to data. An ongoing surveillance program would be at considerable cost to the project. Depending on the measured parameters this could involve ongoing costs in the order of hundreds of thousands each year.	Not adopted.
Surveillance activities conducted during night-time hours, e.g. forward looking infra-red (FLIR) systems can detect oil on water at night.	AMSA Search and Rescue (SAR) aircraft are fitted with side looking airborne radar (SLAR), FLIR, ultraviolet and infra-red marine pollution scanning sensors tuned to detect and map surface oil spills and transmit information back to shore whilst in flight. AMSA SAR aircraft are only available for oil spill response if not tasked for SAR activities. FLIR or SLAR systems are required to be installed on specific aircraft or vessels, not readily available to VOGA. The costs of sourcing such vessels/aircraft is approximately $20,000 per day. This has not been adopted in the initial strategy given that there may be the availability of the AMSA SAR aircraft and that daylight observations will enable sufficient response planning. While this would not preclude their use in a spill, VOGA has identified that for the initial response the current	Not adopted.

Improvements considered	Assessment of option	Adopted/not adopted
	arrangements are sufficient to meet the objective, and as such the system is not being planned for.	
UAVs with video or FLIR can detect oil on water or shorelines in remote hard to access areas.	UAVs may provide surveillance in remote areas and could potential increase the area monitored. However, these were not adopted as it was identified that aerial surveillance proposed in the response would can undertake this task sufficiently.	Not adopted.
Additional dedicated aircraft and observers.	An increase in surveillance would increase the identification of marine fauna presence. Additional charter costs would be incurred by VOGA to increase aerial surveillance. There may be a need for additional resources if determined through the IMT based on the amount of available information and potential data gaps. These can be arranged without need for further upfront costs or planning. Additionally, aerial surveillance is not the only dedicated surveillance tactic. Opportunity for surveillance will also occur from satellite surveillance, vessel surveillance, responder movements and opportunistic aerial surveillance through the shared use of aircraft deployed for other purposes e.g. aerial dispersant spraying, containment and recovery and shoreline strategies). The dedicated aerial surveillance units are sufficient to validate and inform the IAP process to ensure overall response is commensurate with nature and scale of incident. Therefore, there is no value in increasing dedicated overpasses and therefore the arrangements described in the OPEP are considered ALARP.	Not adopted.
Additional dedicated vessels and observers.	In the event that additional dedicated vessels are required due to data gaps, resources are available. The cost of the additional vessels will be added to the cost of the response. There is no benefit in having additional dedicated surveillance vessels given surveillance can be performed from any vessel and these duties will be shared amongst spill response vessels. Increasing vessel surveillance would increase the safety risk. Aerial surveillance and drones are more efficient and effective at determining extent of oil movement, vessel surveillance is a secondary tactic. Therefore, there is no value in increasing dedicated vessel numbers and therefore the arrangements described in the OPEP are considered ALARP.	Not adopted.
Additional tracking buoys.	No environmental benefit for additional dedicated resources.	Not adopted.

Improvements considered	Assessment of option	Adopted/not adopted
	Additional tracking buoys are available through AMSA and AMOSC within days. There is no additional upfront cost for accessing these secondary buoys. Tracking buoys are one tactic in the operational monitoring strategy, with three available on the nearby Wandoo B platform. The number of buoys immediately available is sufficient to cover tracking of oil given the other response activities that will be undertaken.	

5.4.5.3 Dispersant Application

Dispersant Application Rates

VOGA has reviewed timeliness of dispersant application to understand benefits (is there reduction in impact) of earlier application and options to improve arrangements to enable a more rapid response. Under current arrangements, timeframe for application of dispersant from FWADC or marine vessel without contracted standby assets available is within 30 hours (12 m^3).

Assuming 50% of a Wandoo crude spill of 300 m^3 remains floating on the surface after natural weathering through photooxidation, entrainment, dissolution and evaporation there is potentially 150 m^3 of oil available to treat. At a dispersant to oil ratio of 1:20 the maximum volume of dispersant required for this volume of oil is 7.5 m^3. In reality this volume may be less because the spread of the oil to thresholds less than 50 g/m^2 and dispersant efficacy declining beyond this thickness.

For this specific scenario if arrangements were in place to reduce application times, based on the volume of dispersant required, impact reduction is considered negligible.

Reducing the application time for dispersant would require either having equipment including FWADC to be located closer to the Wandoo Field, or available on standby. The FWADC are contracted via MOU's and given the requirements under the MOU need to remain at their point of origin, these specific aircraft could not be moved to Karratha and placed on standby. Consequently, additional aircraft would need to be contracted and the spray system adjusted to spray dispersant at the desired droplet size..

Having a FWADC would introduce an ongoing cost to the operations of $30,000/day, or millions of dollars annually (either on hire or purchased craft which would require upkeep). This is not considered to be commensurate to the benefits gained by reducing the timeframe for application to within 30 hours.

In lieu of contracting additional aircraft, additional vessels could be used to implement a larger surface dispersant load in between application of dispersant by aircraft. However, to achieve more surface dispersant application prior to 30 hours, vessels would either need to be contracted or vessels of opportunity utilised with dispersant spray systems and portable tanks.

A dedicated vessel with dispersant setup is required to guarantee application within 12-18 hours. The costs involved in establishing a standalone vessel suitable for marine dispersant application would be $20,000/day. There is logistical complexity in using a vessels of opportunity approach and difficult to guarantee availability of a vessel of opportunity with competent crew.

Another option would be a drop-in container onboard the facility that could be loaded onto a supply vessel. The supply vessels are third party contractors that would require training in the use of the equipment with additional costs and complexity. It is difficult to guarantee usage with competent crew given high crew turnover in the industry and on occasions when a replacement vessel maybe required with the regular supply vessel unavailable due to maintenance, drydocking, operational needs or contractual changes.

ALARP Assessment

The application of dispersant as a key response strategy for the loss of Wandoo crude from the export system scenario.

To assess the efficacy of dispersants, VOGA has undertaken efficacy testing as well as OSTM to assess whether dispersant application provides any potential reduction in impacts from an oil spill. The effectiveness of chemical dispersant application is outlined in the Wandoo Field OSCP [WAN-2000-RD-0001].

Chemical dispersant will only be applied when the IAP decision-making process has determined that its application will have a net environmental benefit. Once the decision to apply chemical dispersant has been supported by the NEBA process, VOGA will mount an ongoing aerial and marine operation to apply chemical dispersant within the dispersant application zone to allow maximum time for dispersal, thereby reducing the likelihood of shoreline impacts. The Dispersant Application Zone in place is based on criteria that exclude dispersant being applied in the vicinity of submerged sensitive receptors.

Given the environmental sensitivities within the Hydrocarbon Area, the use of dispersants as an offshore response strategy will potentially minimise impacts on the ecosystems and reduce the need for extensive shoreline clean-up and remediation. A slightly negative impact is likely on the local offshore fisheries of the region, but its significance will largely depend on the extent and duration of a spill.

The ALARP review is provided in Table 5-35.

Table 5-35: Chemical dispersant ALARP review

Improvements considered	Assessment of option	Adopted/not adopted
Supply chain and consumption analysis to ensure dispersant stockpile availability for the duration of a worst-case spill.	VOGA conducted a full supply chain and consumption analysis to assess whether there were shortfalls in supply. This analysis demonstrated sufficient supply. Annual analysis to reconfirm availability is undertaken annually as part of the VOGA Oil Spill Response Capability Review [VOG-7000-RH-0009].	Adopted
Reduce time to application of dispersant.	VOGA has reviewed timeliness of dispersant application to understand benefits (is there reduction in impact) of earlier application and options to improve arrangements to enable a more rapid response. Dispersant efficacy testing has shown that Wandoo crude remains amenable to dispersant 4-5 days after release, meaning it is effective on both fresh and weathered oil.	Not adopted.

Improvements considered	Assessment of option	Adopted/not adopted
Additional application rates (e.g. more aircraft, vessels, associated equipment).	Review of potential oil surface area that could be dispersed was conducted and it was identified sufficient dispersant could be applied to reduce impact of surface oil. The resources have been identified to meet the minimum application rates. If there are spare capacity resources these will be allocated to best mitigate environmental impact from surface oil. Additional FWADC would cost approximately $30,000/day. While this would not preclude the use in a spill, VOGA has identified that for the initial response the current arrangements are sufficient to meet the objective, and as such the additional aircraft is not being planned for.	Not adopted.
Subsea dispersant application.	Subsea dispersant application – not considered as not applicable for the this scenario.,	Not adopted
Increase storage of dispersant in Dampier.	Analysis of the supply chain determined that increasing stockpile in Dampier is not a benefit as current arrangements enable for aerial dispersant to be applied within 30 hours. Dispersant can deteriorate over time and effectiveness diminish. For ongoing maintenance, it is more advantageous for industry to store dispersant in larger stockpiles and cooler areas.	Not adopted

5.4.5.4 Mechanical Dispersion

The impacts associated with this response strategy have been assessed within the scope of the day-to-day operational support activities or are considered no greater than the impact of the spill itself.

The ALARP review is provided in Table 5-36.

Table 5-36: Mechanical dispersion ALARP review

Improvements considered	Assessment of option	Adopted/not adopted
Dedicated vessels.	Mechanical dispersion is not a planned activity but will be opportunistic as directed by the Planning Chief. A specific level of provision of resources for this activity has not been provided because the vessels used to undertake mechanical dispersion will be tasked for other activities such as transfer of personnel and equipment or monitor and evaluation. This will be done on an opportunistic basis when marine resources are available tasked with complementary activities.	Not adopted.

5.4.5.5 Containment and Recovery

Priority of the implementation of tasks to support this strategy will be focused on containing and recovering oil that has not been successfully chemically dispersed, and to remove as much oil as feasible from the marine environment to prevent it from potentially impacting the shorelines of

the Dampier Archipelago and the Barrow, Montebello, Great Sandy and Lowendal islands as well as the mainland of the WA coastline.

The ALARP review is provided in Table 5-37.

Table 5-37: Containment and recovery ALARP review

Improvements considered	Assessment of option	Adopted/not adopted
Implement a greater containment and recovery response (i.e. increase the number of teams).	Size of initial response is based on the spill trajectory (minimum time to shoreline contact). Equipment is available within the first 48 hrs from the AMOSC Broome and Exmouth stockpiles and vessels of opportunity from Damper region and considered adequate for the amount of oil expected outside the dispersant zone in that timeframe. From 72-96 hours additional equipment from other more distant AMOSC stockpiles (and more vessels from the region) can be utilised and increase the response based on slicks outside the dispersant zone. Cost of relocating equipment to reduce response time is not considered reasonable as it is unlikely to be required prior to 48 hr window.	Not adopted.
Deploy containment and recovery resources sooner.	By increasing the recovery of oil off the water, less is able to contact shorelines thereby reducing potential environmental impacts. Additionally, shoreline waste volumes and associated environmental impacts on shorelines is reduced. Currently capability is based upon activation of resources within six hours (equipment available from Broome and Exmouth AMOSC stockpiles) and actual onsite deployment within 48 hours. Additional equipment from AMOSC Fremantle and Geelong would be available within 96 hours). Booms and skimmers identified in equipment stockpiles are able to be deployed to priority locations (outside the dispersant zone) within the timeframe required. Identified ro-boom and skimmers are available locally through AMOSC, AMSA and Australian Marine Service Pty Ltd (via stand-by contract).	Not adopted.
NOFI current buster to complement boom and skimmer operations.	NOFI current buster contains and recovers oil in one system thus providing efficiencies in containment and recovery operations and a subsequent environmental benefit.	Adopted.
Additional stockpile in Dampier through AMS contract.	Access to additional equipment for containment and recovery activities.	Adopted.
Reduce manufacturing time of boom.	Purchase of boom was assessed as not reasonably practicable due to cost and impact reduction. For prolonged events VOGA investigated how much boom is stored in manufacturers warehouses, time required to	Not adopted.

Improvements considered	Assessment of option	Adopted/not adopted
	manufacture booms and what it would take to reduce manufacturing times. Boom manufacturers stock minimum supplies of boom and manufacture it on demand. Manufacturers were also not interested in buying and storing material that would reduce manufacturing time.	

5.4.5.6 Protection and Deflection

Protection and deflection strategies are subject to amenable weather and sea conditions as well as equipment operational limits. As for containment and recovery, the priority of the implementation of tasks to support this strategy will be focused on deflecting oil that has not been successfully chemically dispersed and nearing shorelines.

The ALARP review is provided in Table 5-38.

Table 5-38: Protection and deflection ALARP review

Improvements considered	Assessment of option	Adopted/not adopted
Reduce deployment time of protection and deflection resources through various means including: • Pre-positioning equipment at protection priorities • Storing on vessels.	Unlike other strategies, this response requires small to medium sized vessels which are more readily available, and thus implementation of this strategy is limited by mobilisation times of protection and deflection equipment. The risk of shoreline contact within 72 hours is highly unlikely and exact locations of shoreline contact not known until real time modelling is available. There is little environmental benefit in reducing deployment times as existing equipment can be deployed within three days.	Not adopted.
Implement a greater initial protection and deflection response.	Oil doesn't contact all shorelines instantaneously but reaches various locations over a period of time dependant on oceanic currents and wind directions. As such, implementing a greater initial response is not appropriate, however resources are ramped up over a longer period of time as they are required. Mobilising additional resources too early, may result in excess resources being on-location that are not required. Consequently, this has the potential to cause additional environmental impacts if larger than required storage areas and increased personnel presence result in further sensitising coastal habitats without providing significant benefit.	Not adopted.
Additional protection and deflection stockpiled equipment to that in the OPEP.	Western Australia has access to approximately 60 km of deployable boom when combining operator-held equipment, AMOSC's Fremantle stockpile, and National Plan stockpiles located in Fremantle, Dampier, and Broome. AMOSC's WA stockpile alone contains several tens of kilometres of offshore and shoreline protection	Not adopted.

Improvements considered	Assessment of option	Adopted/not adopted
	boom, with additional kilometres held by AMSA and local operators. This combined capability provides a realistic planning basis for protection and deflection strategies requiring up to 30 km of shoreline coverage. Additional stocks would be made available from international sources if long term up scaling were necessary. Total cost for purchase supplemental protection and deflection equipment would be approximately A$455,000 per package. Therefore, there is no value in supplemental protection and deflection equipment and therefore the arrangements described in the OPEP are considered ALARP.	
Additional protection and deflection trained personnel to that in the OPEP.	The level of training and competency of the response personnel allows the shoreline protection and deflection operation is delivered with minimum secondary impact to the environment. Training additional personnel does not provide an increased environmental benefit. Additional specialist personnel would cost A$2,000 per person per day. This option is not adopted as the existing capability meets the need.	Not adopted.
Tactical plans for identified protection priorities.	Tactical plans can assist response teams identify appropriate protection shoreline response. The development of tactical plans for priority areas were identified as a priority action to better inform the implementation of response strategies and determine local resource requirements and supply chain mobilisation and staging considerations.	Adopted.

5.4.5.7 Shoreline Clean-up

The purpose of shoreline clean-up is to remove stranded hydrocarbons from shorelines without causing greater environmental damage impact than leaving the hydrocarbons in-situ.

The ALARP review of the proposed response strategy to meet the response objective 'to remove stranded hydrocarbons from shorelines without causing greater environmental impact than leaving the hydrocarbons in-situ' is provided in Table 5-39.

- Shoreline clean-up will implement a three-stage methodology
- Bulk removal of oil from the shore to prevent remobilisation
- Removal of stranded oil and oiled shoreline material
- Final clean-up of light contamination and removal of stains, if required.

The focus for shoreline response will be initially on areas of heavy oiling where manual collection is possible and there is a moderate to high potential for remobilisation of the oil. Sandy shorelines

are generally the most accessible and amenable to manual and mechanical clean-up activities than mangroves, mudflats and salt flats. However, with extensive repeated shoreline clean-up operations, there is a risk these activities can cause their own impacts. That is, each shoreline clean-up operation may cause additional negative ground disturbance.

As a part of response planning, VOGA has undertaken assurance around the provisioning required to implement large scale shoreline clean up. As such VOGA has detailed a base case inventory of the human resources and major oil spill response equipment needed to implement a shoreline clean-up response based on a worse-case deterministic modelling run for a theoretical oil spill. Based on the modelling output, the length of each major shoreline type that might be contacted and the volume of oil ashore was estimated and volume. Personnel resources needed to clean-up the oiled shoreline was then determined.

Table 5-39: Shoreline clean-up ALARP review

Improvements considered	Assessment of option	Adopted/not adopted
Reduce the time for shoreline response.	Allocating shoreline clean-up resources relies on understanding the trajectory of the oil and timeframe for expected contact. It is not practical to pre-position teams ready for rapid deployment to reduce the timeframe for shoreline response because the stochastic OSTM used in planning indicates a number of potential shoreline contact locations. Resources (people and equipment) can be activated and deployed on initiation of OPP2 in readiness for the real time OSTM outputs. Earliest contact on shorelines is predicted to be Day 3, this is sufficient time to mobilise people and equipment.	Not adopted.
Increase manning of shoreline clean-up teams.	VOGA has planned for shoreline clean up teams of 10 (IPIECA, 2015). An assessment of what further work is required can then be made and a decision to increase or decrease personnel made. Ten people is considered maximum span of control for one team leader to effectively manage operations and safety.	Not adopted.
Increase in the number of vessels used to support shoreline response.	Vessels will be used to transport people and equipment; and assist in nearshore protection and deflection if required. The minimum resources specified are sufficient to transport the shoreline clean-up teams to locations identified in planning OSTM. These can be ramped up or assigned concurrent roles/tasks if required after the initial response activities using VOGA's marine contract lists.	Not adopted.
Increase in the number of equipment sets used to support shoreline response.	The equipment sets identified in planning are intended to be used for manual removal of oil from shorelines. Not all oil on shorelines will be able to be manually removed with this equipment. One set of manual clean-up tools per team is sufficient as a minimum requirement (8 teams = 80 sets). Real time modelling and assessment will determine if extra resources are required. If this is the case, then the clean-up tools required are readily available from hardware outlets and can be transported to site within a day.	Not adopted.
Preposition containers of equipment.	Equipment stockpiles in Exmouth and Dampier are sufficient to deploy equipment in a timely manner. Equipment can be transported from Perth in a timely manner. VOGA owns	Not adopted.

Improvements considered	Assessment of option	Adopted/not adopted
	shoreline clean-up equipment to mount an initial shoreline response.	
Survey shorelines and describe characteristics pre-spill.	Shoreline surveys are costly and resource intensive. Surveys have been conducted by other operators, coastal compartment mapping available – no benefit in VOGA undertaking more field work but rather compiling existing information regarding protection priorities.	Not adopted. VOGA has joined the BlueSands baseline database service.
Tactical plans for identified protection priorities.	Tactical plans can assist response teams identify appropriate protection shoreline response. The development of tactical plans for priority areas were identified as a priority action to better inform the implementation of response strategies and determine local resource requirements and supply chain mobilisation and staging considerations. Chevron, Woodside and Santos have agreed to share Tactical Plans for shorelines within Barrow Island, Montebello Islands and Dampier Archipelago to assist VOGA.	Adopted.

5.4.5.8 Oiled Wildlife Response

VOGA Oiled Wildlife Response (OWR) efforts are guided by the WA Oiled Wildlife Response Manual 2023 (WAOWRM) and the WA Oiled Wildlife Response Plan 2023 (WAOWRP) developed and maintained by DBCA.

Oiled Wildlife Response (OWR) encompasses the combination of activities that minimise the impacts of an oil spill on wildlife by a) prevention of oiling and b) mitigation of effects when oiling has taken place. VOGAs role in OSR will be to facilitate response actions that will provide coordinated, immediate and effective protection, rescue and rehabilitation of wildlife during marine pollution incidents.

VOGA will coordinate the initiation of OWR activities and assist ongoing OWR operations through facilitating access to assets such as aircraft and marine vessels, staging areas, transport, waste management and personnel as identified in the VOGA Oil Spill Response Capability Review [VOG-7000-RH-0009]. Once activated, the WAOWRM has eight stages, which require alignment to the IAP process for the incident. OWR activities will follow the procedures and guidelines set out in the WAOWRP for the eight phases of response and utilise the templates and forms specifically designed to support these procedures.

All response strategies will be developed by the Wildlife Planning Officer in collaboration with the Wildlife Operations Officer with advice from the Wildlife Division Coordinator and the industry Oiled Wildlife Advisor. These form the basis of the IAP oiled wildlife sub-plan which includes:

- Wildlife priorities for protection
- Exposure modification measures
- Recovery and treatment of oiled wildlife

- Resourcing of equipment
- Personnel requirements.

The IC approves the oiled wildlife sub-plan as part of the IAP process managed by the Planning Chief. The WAOWRM contains standardised operating procedures, protocols and processes for the wildlife response to a marine oil pollution event in WA. All oiled wildlife management activities must follow this manual and the accompanying WA OWRP.

The most appropriate staging locations will be determined in a response with real time trajectory data and analysis of seasonal vulnerabilities through the NEBA process and in consultation with DBCA and DTMI. The ALARP review is provided in Table 5-40.

Table 5-40: Oiled wildlife ALARP review

Improvements considered	Assessment of option	Adopted/not adopted
Pre-positioning of oiled wildlife response resources.	Oiled wildlife response equipment containers for first strike activities are currently already positioned in Exmouth and Karratha No additional resources required.	Not adopted.
Direct contracts with oiled wildlife service providers.	This option duplicates the capability accessed through AMOSC and OSRL and would compete for the same resources. Does not provide a significant increase in environmental benefit. These delivery options provide increased effectiveness through more direct communication and control of specialists. However, no significant net benefit is anticipated. This option is not adopted as the existing capability meets the need.	Not adopted.
Additional resources (equipment and personnel).	VOGA purchased an oiled wildlife washing container in 2012. Additional equipment can be mobilised at the time of an event. Personnel requirements could range from 50-150 people across a variety of ICC and field roles. VOGA has planned for a high impact event which in the WAOWRP indicates an estimated 93 personnel being required. These personnel are accessed directly through the AMOSC Industry Oiled Wildlife Response Group processes.	Not adopted.
Prepare induction training for oiled wildlife response labour hire personnel.	The DBCA and AMOSC have significant training and induction resources for oiled wildlife response. There is no benefit in VOGA preparing additional resources.	Not adopted.

5.4.5.9 Operational and Scientific Monitoring

By adopting the Joint Industry OSM Framework and joining the Supplementary Agreement for Operational and Scientific Monitoring services, VOGA has enhanced its operational and scientific monitoring for the loss of well control scenario. Monitoring will be undertaken following the methods referenced in the Joint Industry OSM Framework however, in the event of a spill the monitoring design will depend on the nature of the spill and availability of baseline data. OSM service providers will refer to the guiding principles outlined in the Joint Industry OSM Framework when determining monitoring design.

The ALARP review is provided in Table 5-41.

Table 5-41: Operational and scientific monitoring ALARP review

Improvements considered	Assessment of option	Adopted/not adopted
Access additional baseline data.	Access to baseline data to inform scientific monitoring programs is required. VOGA has joined the Marine Environment Baseline Database Joint Industry Collaborative service.	Adopted.
Provision of additional response personnel.	VOGA joined the Joint Industry OSM Service which provides personnel required for monitoring.	Adopted.
Satellite imagery availability.	Direct contract with Satellite provider that is available 24/7 and can be used night and day – may decrease time to access the satellite imagery, and increase usage to night time	Not adopted. AMOSC put a contract in place with KSAT in April 2019 for satellite imagery.

5.4.6 Acceptability Demonstration

Table 5-42: Acceptability demonstration – Environmental impacts of oil spill response

ACCEPTABLE LEVEL OF IMPACT/RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant principles of ESD not compromised given proposed controls (Table 5-22).
External context – objections or claims considered	N/A – no external objections or claims received.
Internal context – VOGA HSE policy/procedure met	Yes – Risk managed in accordance with VOGA HSE policy. Potential spills to be managed in accordance with the Wandoo Field OSCP [WAN-2000-RD-0001].
Other requirements met	Yes – Notice to Mariners issued via AMSA in a timely manner. • Potential spills to be managed in accordance with SOPEP/SMPEP (equivalent to class) Yes – it is considered that the petroleum activity is consistent with the objectives and actions of the following EPBC management plans that identify pollution or habitat modification as a threat (Table 1-3): • National Recovery Plan for albatrosses and petrels (2022) (DCCEEW, 2022a) • National recovery plan for the red *goshawk Erythrotriorchis radiatus* (DCCEEW, 2012) • National Recovery Plan for the Australian Fairy Tern (*Sternula nereis nereis*) (DAWE, 2020a) • Approved Conservation Advice *for Sternula nereis nereis* (Fairy Tern) (TSSC, 2011) • Approved Conservation Advice for *Calidris canutus* (Red Knot) (DCCEEW, 2024k) • Approved Conservation Advice for *Calidris frruginea* (Curlew sandpiper) (DCCEEW, 2023a)

	• Approved Conservation Advice for *Papasula abbotti* (Abbott's booby) (TSSC, 2020a) • Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW, 2024o) • Conservation Advice for *Charadrius leschenaultii* (greater sand plover) (DCCEEW, 2023e) • Conservation Advice for *Limnodromus semipalmatus* (Asian dowitcher) (DCCEEW, 2024m) • Conservation Advice for *Numenius madagascariensis* (far eastern curlew) (DCCEEW, 2023g) • Conservation Advice *Phaethon lepturus fulvus* white-tailed tropicbird (Christmas Island) (DoE, 2014) • Conservation Advice for *Tringa nebularia* (common greenshank) (DCCEEW, 2024p) • Wildlife Conservation Plan for Migratory Shorebirds – 2015 (DoE, 2015b) • Approved Conservation Advice for *Pristis zijsron* (green sawfish) (DEWHA, 2008b) • Approved Conservation Advice for *Pristis clavata* (dwarf sawfish) (DEWHA, 2009) • Sawfish and River Sharks Multispecies Recovery Plan: (*Pristis pristis, Pristis zijsron, Pristis clavata, Glyphis glyphis* and *Glyphis garricki*) (DoE, 2015c) • Recovery Plan for Marine Turtles in Australia, 2017-2027 (Commonwealth of Australia, 2017) • Approved Conservation Advice for short-nosed sea snake (*Aipysurus apraefrontalis*) (DSEWPC, 2011b) • Approved Conservation Advice for *Aipysurus foliosquama* (Leaf-scaled Sea Snake) (DSEWPC, 2011c).
RR < High (RRII)	Yes – Medium (RRIII)
EPO(s) manage impacts to acceptable levels	Yes – The following relevant EPOs will be maintained: EPO-OP-02 See Section 7 for further details.
Acceptability summary: The impacts and potential risks of oil spill response have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-22), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.7).	

5.5 Accidental Release – Diesel Handling, Storage and Distribution

5.5.1 Hazard Report

Table 5-43: Hazard report – Accidental release – Diesel handling, storage and distribution

HAZARD	Accidental release – diesel handling, storage and distribution
EP risk no.	EP-OP-R05
Activity/cause	Loss of diesel from support/bunkering vessel caused by collision with another vessel or the Facility. Diesel spill caused by hose rupture during bunkering. Potential overflow from pedestal tank or day tanks. Rupture of diesel distribution network.
Potential impacts	Loss of diesel of up to 300 m^3.
Extent and duration	Exposure up to 500 km. Transient short term impact.

PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Loss of diesel from support/bunkering vessel caused by collision with another vessel or the Facility.	Vessel Navigational lights	Engineering	Reduction	EPO-OP-01 No unplanned discharge of hydrocarbons or chemicals to the marine environment	All vessels operating within the Operational Area must display navigation lights in accordance with COLREGS, as implemented by Marine Order 30. Lighting must be appropriate to vessel class, length, and operational status (underway, at anchor, restricted in ability to manoeuvre).	Wandoo Marine Operations Checklist [WNB-1000-NV-0001] verifies compliance with vessel class rules and statutory lighting requirements.
	Permission required for field entry, mooring-up and departure.	Administrative	Reduction		Vessels comply with permissioning protocols for vessels entering the field, mooring-up and departure, as defined in the Wandoo Marine Operations Manual [WNB-1000-YV-0001].	Marine assurance or internal audits confirm adherence to permissioning protocols prior to vessel entry, mooring, or departure.
	Station keeping requirements for vessels.	Administrative	Reduction		All vessels operating within the Petroleum Safety Zone (PSZ) must comply with the station-keeping and dynamic positioning (DP) requirements defined in the Wandoo Marine Operations Manual (WNB-1000-YV-0001). Vessels must maintain safe position relative to the Facility at all times, using DP or alternative approved station-keeping methods appropriate to vessel class, capability, and operational tasking.	Completion of the Wandoo Marine Operations Checklist (WNB-1000-NV-0001) confirming vessel DP capability, station-keeping mode.

PREVENTION						
	Speed limit for all vessels inside Wandoo restricted zone.	Administrative	Reduction		All vessels operating within the Wandoo 500 m Restricted Zone must comply with the speed limits specified in the Wandoo Marine Operations Manual (WNB-1000-YV-0001). Vessel masters must ensure speeds are reduced to safe manoeuvring limits when approaching, operating within, or departing the Restricted Zone to minimise collision risk and maintain safe separation from the Facility.	Wandoo Marine Operations Checklist (WNB-1000-NV-0001) verifies that vessel masters have acknowledged and are complying with Restricted Zone speed limits.
	Vessel operations restricted in adverse weather.	Administrative	Reduction		Vessel operations within the Operational Area must be restricted during adverse weather conditions in accordance with the Wandoo Marine Operations Manual (WNB-1000-YV-0001). Vessel masters must suspend, delay, or modify operations when environmental conditions exceed safe operating limits to prevent loss of position, collision risk, or reduced manoeuvrability.	Wandoo Marine Operations Checklist (WNB-1000-NV-0001) verifies that weather conditions are within operational limits prior to vessel entry, mooring, or critical operations.
	SIMOPS Plan.				SIMOPS Plan shall define controls to be implemented when multiple vessels are in the PSZ.	SIMOPS Plan implemented.
	Vessels contracted by VOGA have certified masters.				Vessels contracted by VOGA have certified masters	Review of contractors CMS.
	Vessels have systems and personnel to assist with tracking and identifying vessels in the general area.				All vessels contracted by VOGA must be equipped with radar, Automatic Identification System (AIS), and VHF radio, and must maintain a continuous bridge watch in accordance with the Wandoo Marine Operations Manual (WNB-1000-YV-0001). These systems and personnel must provide effective tracking, identification, and situational awareness of vessels in the general area to minimise collision risk.	VOGA inspection or marine assurance audit confirms the presence and operability of radar, AIS, and VHF radio on all vessels entering the Operational Area.
Diesel spill caused by hose rupture during bunkering.	Vessel pump rating.	Engineering	Reduction		Bunkering hoses must be maintained, inspected, and replaced in accordance with the planned maintenance system, including annual hose change-out and pressure testing of hoses and fittings.	Maintenance records confirm annual hose replacement and completion of pressure testing for hoses and fittings.
					The pressure rating of the diesel bunkering hose must exceed the maximum discharge pressure of the vessel pump	Records verify that the hose pressure rating exceeds the maximum vessel pump pressure prior to bunkering.

PREVENTION						
	Quick close breakaway coupling assembly on bunkering hose	Engineering	Reduction		Refuelling hoses used for diesel bunkering must be fitted with quick close breakaway coupling assembly to minimise the volume of fuel released in the event of excessive hose tension. The breakaway coupling must separate prior to hose tensile failure, ensuring that any loss of containment is limited to the small residual volume within the hose ends. Any non-conformance is recorded and rectified before bunkering operations commence.	VOGA inspection or marine assurance audit confirms the presence and correct installation of quick close breakaway couplings on all bunkering hoses. Pre-bunkering checklists verify coupling integrity and readiness.
	Bunkering procedure.	Administrative	Reduction		Diesel bunkering must be conducted in accordance with WNB-000-105 Diesel Bunkering Operations. Bunkering activities must include: • pre-operation hose checks, • continuous monitoring of gauges, hoses, fittings and sea surface Bunkering may be conducted during hours of darkness; however, operations must commence during daylight hours and only proceed when weather conditions remain within procedural limits.	Records confirm bunkering operations undertaken in accordance with WNB-000-105 Diesel Bunkering Operations. Wandoo Diesel Bunkering Report completed for each bunkering event, verifying: • Pre-operation hose checks completed • Continuous monitoring undertaken throughout the operation • Bunkering commenced during daylight hours • Weather conditions remained within procedural limits.
Potential overflow from pedestal tank or day tanks	Crane pedestal tank has level alarms.	Engineering	Reduction		Crane pedestal inspection and maintenance includes level alarm testing.	Maintenance records.
Rupture of diesel distribution network.	Maintenance plans. 24 monthly external visual integrity inspections. 48 monthly internal NDT integrity inspections.	Engineering	Reduction		Pipework on the diesel distribution network shall be inspected and maintained in accordance with the preventative maintenance system.	24 monthly visual integrity inspections conducted in accordance with INSP PIPE EXT VIS 361PIPE 24M. 48 monthly pressure integrity inspections conducted in accordance with INSP PIPE NDT NII 48M.

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Vessels will implement a SOPEP/ SMPEP (equivalent to class) in the event of a spill.	Administrative	Mitigation	EPO-OP-02 In the event of loss of hydrocarbons, implement NOPSEMA-accepted spill response documents.	SOPEP/SMPEP (equivalent to class) procedures shall be available during activities.	VOGA inspection or audit confirms SOPEP/SMPEP (equivalent to class) procedures are available on the vessels during activities.

MITIGATION					
Wandoo Emergency Response Plan [VOG-2000-RD-0017].	Administrative	Mitigation		Emergency response arrangements are adequate to manage identified oil spill emergency scenarios Emergency/oil spill response organisational arrangements shall allow effective response management regardless of the scale of the emergency Emergency/oil spill response personnel shall be competent for the ICT role to which they are assigned	Annual oil spill response capability review confirms following arrangements are in place: • Oil spill response testing as per VOGA Emergency Response Schedule [VOG-1100-YH-0001]. • Post exercise and incident review of emergency response arrangements. • Training and competency records are maintained for ICT members.
The NOPSEMA accepted Wandoo Field Operational and Scientific Monitoring Bridging Implementation Plan [VOG-1100-RG-0002] will be implemented.	Administrative	Mitigation		Oil spill operational and scientific monitoring shall be implemented in accordance with the VOGA Operational and Scientific Monitoring Bridging Implementation Plan [VOG-1100-RG-0002].	IAP records

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Moderate (3)	Unlikely (B)	Medium

ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
Medium risk is defined as tolerable on demonstration of ALARP under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		
Additional management controls	**Assessment**	**Adopted/Not adopted**
Refer to Section 5.4 for oil spill response ALARP evaluation tables.		
Refuelling restricted to daylight hours.	Restricting bunkering to daylight hours imposes a significant operational and logistical burden, increasing vessel transit time, reducing scheduling flexibility, and adding cost without delivering a commensurate reduction in environmental risk. A dedicated environmental impact assessment undertaken in 2009 (ENV-TN-J9085-015 Rev 1) concluded that the risks associated with night-time bunkering can be adequately managed through existing equipment integrity controls and frequent surveillance, noting that calmer night-time conditions and the short duration of bunkering operations act as additional safeguards. The EnvID further determined that, in the unlikely event of a diesel leak or spill, the fuel would rapidly disperse and would not reach the shoreline under any credible scenario—consistent with the outcomes for daytime bunkering. Given the robustness of current engineering and procedural controls (including hose integrity, pump-to-hose pressure matching, breakaway couplings, continuous monitoring, and weather-based operational limits), the incremental risk reduction achieved by prohibiting night-time bunkering is minimal. On this basis, night-time bunkering can be considered ALARP, as the residual risk is low and further restriction would be grossly disproportionate to the operational cost and inefficiency imposed.	Not adopted.

RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Moderate (3)	Unlikely (B)	Medium

5.5.2 Description of Hazard

Diesel handling is a routine but controlled activity, undertaken under established bunkering procedures, marine assurance requirements, and engineered safeguards documented in the Wandoo Marine Operations Manual [WNB-1000-YV-0001].

Credible pathways for loss of containment during fuel handling, storage, and distribution include:

- Loss of diesel from the bunkering vessel (or any other vessel) due to collision with another vessel or the Facility
- Diesel spill caused by hose rupture during bunkering operation
- Overflow or rupture within the facility fuel system, including potential overfill of the pedestal tank or day tanks
- Loss of containment from the diesel distribution network (e.g., transfer lines, pumps, valves).

Worst-Case Credible Spill Scenario Identification

VOGA conducted a HAZID workshop to identify the worst-case credible spill scenarios that could occur during the activity. The maximum credible volume for the vessel collision scenario was identified by determining the volume of the largest fuel tank (AMSA, 2015). The maximum volume of the single largest fuel tank (based upon 100% capacity) aboard any vessel covered by this EP is 300 m^3. This approach aligns with AMSA's guideline for indicative maximum credible spill volumes for other, non-oil tanker, vessel collision (AMSA 2015).

VOGA has assessed the vessel collision scenario as the worst-case credible scenario for MDO handling, storage and distribution and have used this scenario as the basis for the impact and risk evaluation below.

Other Credible Spill Scenarios

Hose or Coupling Failure During Fuel Transfer

An unplanned release of diesel may occur if a hose or coupling fails during bunkering. Inspection criteria for transfer hoses and the use of dry break couplings significantly reduce the likelihood and potential volume of release. In the unlikely event of failure, the maximum spill volume is estimated at ~10 m^3, based on:

- a maximum transfer rate of 110 m^3/hr
- conservative shut-down respond time of 5-minutes.

This represents a small, short-duration release with limited potential for environmental impact.

Pedestal Tank or Fuel Line Failure

A diesel spill may also occur due to a rupture or fracture at the base of the crane pedestal tank or associated pipework. In this scenario, the maximum volume of diesel that could be released is 64 m^3. Overflow from the crane pedestal to the environment is unlikely as the tank is fitted with:

- an overflow line to Shaft 2

- a high-level alarm providing early warning and preventing overfill.

Stored Diesel in Shaft 2

Scenarios involving accidental release of MDO stored within Shaft 2 are assessed separately due to their distinct inventory, release mechanisms, and consequence profile.

Refer to Section 5.3 for the Shaft 2 MDO spill assessment.

5.5.2.1 Spill Modelling Results

Descriptions of the spill model used, modelling parameters, exposure thresholds and hydrocarbon characteristics are provided in Section 4.12.

Table 5-44 provides a summary of the results from the stochastic modelling report for an accidental release of 300 m^3 MDO (RPS, 2024; Appendix B).

Table 5-44: Summary of the hydrocarbon modelling results for an accidental release of MDO (RPS, 2024)

Exposure values	Summary of worst-case predicted exposure
Surface exposure	
Low (1 g/m^2)	The maximum distance for floating surface hydrocarbon exposure at or above this threshold from the source was predicted to be 31 km. No exposure was predicted to any receptor(s) at this threshold.
Moderate (10 g/m^2)	The maximum distance for floating surface hydrocarbon exposure at or above this threshold from the source was predicted to be 18 km. No exposure was predicted to any receptor(s) at this threshold.
High (50 g/m^2)	The maximum distance for floating surface hydrocarbon exposure at or above this threshold from the source was predicted to be 6 km. No exposure was predicted to any receptor(s) at this threshold.
Shoreline exposure	
Low (10 g/m^2)	The highest probability of hydrocarbon accumulation on any shoreline at or above this threshold was 24%. The minimum time to shore at or above the low threshold was 91 hours (Barrow Island, Lowendal Islands, and Montebello Islands). The maximum total volume of hydrocarbon ashore for a single spill trajectory was 23.2 m^3. The maximum length of hydrocarbon ashore above the low threshold was 14 km (across Barrow Island and Montebello Islands).
Moderate (100 g/m^2)	The highest probability of hydrocarbon accumulation on any shoreline at or above the moderate threshold was 6%. The minimum time to shore at or above the moderate threshold was 110 hours (Montebello Islands). The maximum total volume of hydrocarbon ashore for a single spill trajectory was 20.3 m^3. The maximum length of hydrocarbon ashore above the moderate threshold was 6 km (Montebello Islands).
High (500 g/m^2)	No exposure at this threshold was predicted.

Exposure values	Summary of worst-case predicted exposure
In-water exposure – dissolved	
Low (10 ppb)	The maximum distance for dissolved hydrocarbons at or above this threshold from the source was predicted to be 169 km. The minimum time to dissolved hydrocarbon exposure at any given receptor(s) was 27 hours (Montebello AMP). The probability of intersect with the Montebello AMP is 7%.
Moderate (50 ppb)	The maximum distance for dissolved hydrocarbons at or above this threshold from the source was predicted to be 58 km. The minimum time to dissolved hydrocarbon exposure at any given receptor(s) was 51 hours (Montebello AMP). The probability of intersect with the Montebello AMP is 1%.
High (400 ppb)	No exposure at this threshold was predicted.
In-water exposure – entrained	
Low (10 ppb)	The maximum distance for entrained hydrocarbons at or above this threshold from the source was predicted to be 494 km. The minimum time to dissolved hydrocarbon exposure at any given receptor(s) was 22 hours (Montebello AMP). The probability of intersect with the Montebello AMP is 54%.
High (100 ppb)	The maximum distance for entrained hydrocarbons at or above this threshold from the source was predicted to be 237 km. The minimum time to dissolved hydrocarbon exposure at any given receptor(s) was 23 hours (Montebello AMP). The probability of intersect with the Montebello AMP is 24%.

5.5.3 Impact and Risk Evaluation

The accidental release of MDO may result in:

- Change in water quality.

The potential risks from a change in water quality caused by the accidental release of MDO include:

- Disruption to marine fauna
- Injury/mortality to marine fauna
- Change in ecosystem dynamics and conservation values
- Changes to the functions, interests, or activities of other marine users
- Change in submerged cultural heritage.

The following receptors within the Operational Area may be impacted:

- Benthic habitats.
- Coastal communities.

- Marine fauna, such as:
  - plankton
  - benthic invertebrates
  - seabirds and shorebirds
  - fish, sharks and rays
  - marine mammals
  - marine reptiles
  - Protected and significant areas.
- Social and economic environment, such as:
  - recreational fishing, fisheries and aquaculture
  - other marine users.
- First Nations values.

5.5.3.1 Risk Assessment

Water Quality

The accidental release of MDO into the marine environment will result in a localised reduction in water quality. A visible oil sheen on the water surface may also occur.

As discussed in Section 3.3.2 the water quality within the Hydrocarbon Area and EMBA is expected to be representative of the typically pristine water found offshore WA. Water quality surveys undertaken in 2003 identified no detectable hydrocarbons; with BTEX, PAH and Total Petroleum Hydrocarbon (TPH) below the laboratory LOR (Wenziker et al., 2006). Surveys undertaken in 2025 (Worley, 2025) identified slightly higher concentrations of total recoverable hydrocarbons compared to previous surveys. Except for the two of the closet sites to the Wandoo B platform, all of the receiving water samples were below the LOR. These concentrations were shown to rapidly dilute in receiving waters with increasing distance from the facility (Worley, 2025).

The hydrocarbon modelling predicted that the maximum distance for floating surface hydrocarbon exposure at any threshold would extend out to 31 km, and 169 km and 494 km for dissolved and entrained hydrocarbons, respectively (RPS, 2024). Therefore, changes to water quality will occur outside of the Operational Area.

Due to the highly dispersive environment typical of the offshore area, and the rapid weathering expected for the light non-persistent hydrocarbon, with approximately 15–36% evaporated within 24 hours depending on the conditions (Section 5.5.2.1), any change to water quality is expected to be short term and will recover to pre-spill state as the hydrocarbon weathers. The consequence ranking of '3' (Moderate) was assigned to a change in water quality due to the extent of the spill outside the Operational Area.

Benthic Habitats

Benthic habitats have been assessed based on the hydrocarbon exposure at the thresholds that have the potential to cause ecological impacts, which is defined as the Hydrocarbon Area (refer

to Section 3.1.1). Table 5-45 evaluates the potential impact that hydrocarbon spills for this activity may have on benthic habitat receptors found within the Hydrocarbon Area.

Table 5-45: Risk assessment for an accidental release of MDO – benthic habitats

Benthic habitats
Exposure evaluation:
The seafloor in the Hydrocarbon Area is comprised of fine silt/sand substrates with low densities of benthic communities. Coral, seagrass, or macroalgae communities are found in nearshore areas of islands within the Hydrocarbon Area (i.e. Montebello Islands) (Section 3.4.1). The seafloor of the deeper waters of the NWS is primarily a soft sediment habitat that can support scavengers, benthic filter feeders and epifauna communities (Brewer et al., 2007). Any areas of exposed hard substrate are likely to be colonised by deep water filter-feeding organisms, such as hydroids and sponges. Biologically significant coral reef formations are found within the Hydrocarbon Area, such as hard corals found at the Montebello Islands. Seagrasses are found through shallower areas of the Hydrocarbon Area. Montebello Island contain sparse seagrass habitat (McMahon et al., 2017), however, the closest known key areas of seagrass habitat to the Operational Area are the Exmouth Gulf and Ningaloo Reef area, outside of the Hydrocarbon Area. Macroalgae is widespread within shallower hard substrate areas within the Hydrocarbon Area. Due to the widespread nature of macroalgal habitat within the Hydrocarbon Area, there are no identified areas of significant environmental value. The maximum distance for dissolved hydrocarbons at moderate exposure (50 ppb) from the source was predicted to be 58 km and 237 km for entrained hydrocarbons at the high threshold (100 ppb). Release of MDO will be at the surface, with the majority of hydrocarbon and weathered products remaining at or near the surface.
Predicted impact:
In-water
Corals Exposure of entrained hydrocarbons to shallow subtidal corals has the potential to result in lethal or sublethal toxic effects, resulting in acute impacts or death at moderate to high exposure thresholds (Shigenaka, 2011). Physical effects from entrained hydrocarbons have the potential to coat contacted coral reefs. The phenomena of smothering of exposed coral surfaces or polyps by hydrocarbon spills has only been reported where very large oil spill quantities, or very sticky oil slicks, have been encountered. Contact with corals may lead to reduced growth rates, tissue decomposition, impaired fertilisation and larval settlement, and poor resistance and mortality of sections of reef (NOAA, 2010). In-water exposure (dissolved or entrained) at relevant exposure thresholds is typically only predicted to occur within the upper 0–10 m of the water column, therefore, corals found in water depths below 10 m are not anticipated to be impacted by in-water hydrocarbon exposure. Seagrass In-water exposure (dissolved or entrained) is only predicted to occur within the upper 0–10 m of the water column; therefore, benthic habitat, such as seagrass, within intertidal or shallow nearshore waters has the potential to be exposed.

Benthic habitats
Intertidal and subtidal seagrass ecosystems can be damaged in a number of ways. Direct mortality from smothering can occur, however, sub-lethal impacts from smothering are more likely to occur than lethal impacts because much of seagrasses' biomass is underground in their rhizomes and less likely to be exposed to hydrocarbons (Zieman et al., 1984). However, exposure also can take place via uptake of hydrocarbons through plant membranes and seeds may be affected by contact with oil contained within sediments (NRDA, 2012). Petroleum fractions absorbed into the seagrass tissues, can also lower the organism's tolerance to other stressors and reduce growth rates (Zieman et al., 1984) (Runcie et al., 2010). Studies of offshore benthic seaweeds in the northwest Gulf of Mexico prior to and after the Macondo well blowout at Sackett and Ewing banks (in water depths of 55–75 m) found a dramatic die-off of seaweeds after the spill (60 species pre-spill compared with 10 species post-spill) (Felder et al., 2014). However, these banks are exposed to influences from Mississippi River discharges that vary year to year, so definitive links to the oil spill were not possible. Petroleum residues were observed on Ewing Bank and it is possible that this may have caused localised mortalities. Entrained hydrocarbon within the water column can affect light qualities and the ability of macrophytes, including seagrasses and macroalgae, to photosynthesise. Macroalgae In-water exposure (entrained and dissolved) is only predicted to occur within the upper 0-10 m of the water column; therefore, benthic habitats, such as macroalgae, within intertidal or shallow nearshore waters has the potential to be exposed. Intertidal macroalgal beds are more prone to hydrocarbon spills than subtidal beds because, although the mucous coating of the macroalgae prevents oil adherence, oil that is trapped in the upper canopy may be more persistent, which impacts site-attached species. Additionally, when oil sticks to dry fronds on the shore, they can become heavy and break as a result of wave action (IPIECA, 2002). The physical effects of smothering, fouling and asphyxiation has been documented from oil contamination in marine plants (Blumer, 1971; Cintron et al., 1981). In macroalgae, oil can act as a physical barrier for the diffusion of CO_2 across cell walls (O'Brien and Dixon, 1976). The effect of hydrocarbons, however, is largely dependent on the degree of direct exposure and how much of the hydrocarbon adheres to algae, which will vary depending on the oils physical state and relative 'stickiness'. The morphological features of macroalgae, such as the presence of a mucilage layer or the presence of fine 'hairs' will influence the amount of hydrocarbon that will adhere to the algae. A review of field studies conducted after spill events by Connell et al. (1981) indicated a high degree of variability in the level of impact, but in all instances, the algae appeared to be able to recover rapidly even from very heavy oiling. The rapid recovery of algae was attributed to the fact that for most algae, new growth is produced near the base of the plant while the distal parts (which would be exposed to the oil contamination) are continually lost. Other studies have indicated that kelp beds oiled by crude oil had a 90% recovery within 3–4 years of impact, however, full recovery to pre-spill diversity may not occur for long periods after the spill (French-McCay, 2004). The toxicity of hydrocarbons to macroalgae varies for the different macroalgal life stages, with water-soluble hydrocarbons more toxic (Van Overbeek and Blondeau, 1954; Kauss et al., 1973; cited in O'Brien and Dixon, 1976). Toxic effect concentrations for hydrocarbons and algae have varied greatly among species and studies, ranging 0.002–10,000 ppm (Lewis and Pryor, 2013). The sensitivity of gametes, larva and zygote stages, however, have all proven more responsive to oil exposure than adult growth stages (Thursby and Steele, 2004; Lewis and Pryor, 2013).

Benthic habitats
Entrained hydrocarbon within the water column can also affect light qualities and the ability of macrophytes, including seagrasses and macroalgae, to photosynthesise.
Predicted impact summary:
Given the restricted range of exposure for benthic communities; restricted to shallow nearshore and intertidal waters only, outside of the main exposure area predicted within 0–10 m of the sea surface, the rapid weathering of the hydrocarbon expected following a spill release (Section 4.12.4.2), and the predicted low concentrations of hydrocarbons expected to reach these waters, any impacts to benthic habitats and associated communities is anticipated to be localised and short-term, with rapid recovery expected.

Coastal Communities

Coastal communities have been assessed based on the hydrocarbon exposure based on the thresholds that have the potential to cause ecological impacts, defined as the Hydrocarbon Area. Table 5-46 evaluates the potential impact that hydrocarbon spills for this activity may have on coastal receptors found within the Hydrocarbon Area.

Table 5-46: Risk assessment for an accidental release of MDO - coastal communities

Mangroves		
Exposure evaluation:		
A few isolated regionally significant mangrove communities are found along the coastline of the Montebello islands within the Hydrocarbon Area (Section 3.4.2.1). The spill modelling identified that the highest probability of hydrocarbon accumulation on any shoreline at or above the moderate threshold (100 g/m^2) was 6% at Montebello Islands. The minimum time to shore was 4.5 days (110 hours) and the maximum total volume of hydrocarbon ashore for a single spill trajectory was 20.3 m^3. Montebello Island also recorded the maximum length of hydrocarbon ashore above the moderate threshold (6 km). No contact at threshold was predicted for Barrow Island where mangroves communities are also present (Figure 3-6).		
Predicted impact:		
Surface	**In-water**	**Shoreline**
Mangroves are considered to have a high sensitivity to hydrocarbon exposure. Mangroves can be killed by heavy or viscous oil, or emulsification, that covers the trees' breathing pores thereby asphyxiating the subsurface roots, which depend on the pores for oxygen. The severity of exposure for mangroves depends on the amount and type of oil entering the intertidal zone (Duke, 2016). While heavy oils (high specific gravity) are particularly proficient at coating and smothering small plants and aerial root systems, lighter oils with low specific gravity, such as MDO and condensates, are more toxic to mangroves (Hensel et al., 2014; Connolly et al., 2020). The potential for toxicity effects from hydrocarbons may be reduced by weathering processes that should serve to lower the content of soluble aromatic components before contact occurs.	The change in toxicity levels within the marine environment can penetrate the root surfaces, via the respiratory capabilities of the roots, poisoning the plant. Mangroves can also take up in-water hydrocarbons from contact with leaves, roots or sediments, and it is suspected that this uptake causes defoliation through leaf damage and tree death (Wardrop et al., 1987). Acute impacts to mangroves can be observed within weeks of exposure, whereas chronic impacts may day months to years to detect.	Oil can enter mangrove forests when the tide is high and be deposited on the aerial roots and sediment surface as the tide recedes. This process commonly leads to a patchy distribution of the oil and its effects because different places within the forests are at different tidal heights (IPIECA 1993; NOAA, 2014). The physical smothering of aerial roots by standard hydrocarbons can block the trees' breathing pores used for oxygen intake and result in the asphyxiation of sub-surface roots (International Petroleum Industry Environmental Conservation Association (IPIECA, 1993).
Predicted impact summary:		
Isolated coastal mangroves communities that may be exposed to hydrocarbons within the Hydrocarbon Area are located at Montebello Island.		

Given the non-persistent nature of MDO, as a light non-persistent hydrocarbon, the distance to the nearest mangrove communities that may be exposed (~92 km southwest of the Operational Area), and the anticipated weathering that the hydrocarbon will undergo prior to impact with the minimum time to shoreline accumulation predicted after 4.5 days, any impact to mangroves are anticipated to be highly localised, with hydrocarbons highly weathered prior to exposure.

Despite impacts predicted to be limited, given their sensitivity to hydrocarbons, the potential consequence to mangroves is assessed conservatively based on the potential for localised, medium-term impacts, to species or habitats of recognized conservation value or to local ecosystem function.

Saltmarsh

Exposure evaluation:

Saltmarsh habitat is common within tidal flats or wetland habitats within the wider EMBA area (Section 3.4.2.2), with very few isolated saltmarsh habitats present just outside of the Hydrocarbon Area, along the coastline of Barrow Island (Figure 3-6).

The probability of shoreline contact for Barrow Island was only predicted at the low threshold (up to a maximum of 15% probability), with no contact predicted for moderate thresholds.

Predicted impact:

Shoreline

Saltmarsh is considered to have a high sensitivity to hydrocarbon exposure. Hydrocarbon (in liquid form) will readily adhere to the marshes, coating the stems from tidal height to sediment surface. However, heavy oil coating is unlikely due to the highly volatile nature of the condensate hydrocarbon.

Oil can enter saltmarsh systems during the tidal cycles if the estuary/inlet is open to the ocean. Saltmarsh vegetation offers a large surface area for oil absorption and tends to trap oil. Similar to mangroves, this can lead to a patchy distribution of the oil and its effects, because different places within the inlets are at different tidal heights.

Evidence from case histories and experiments shows that the damage resulting from oiling, and recovery times of oiled marsh vegetation, are highly variable. In areas of light to moderate oiling where oil is mainly on perennial vegetation with little penetration of sediment, the shoots of the plants may be killed but recovery can be relatively rapid, occurring the following growing season or earlier. However, when oil penetrates the soil and the initial mortality of the vegetation is extensive, recovery to reference conditions may take 3–4 years (Hester and Mendelssohn, 2000).

Predicted impact summary:

Given that the modelling did not predict shoreline accumulation to occur at Barrow Island at the moderate hydrocarbon threshold, impacts to saltmarshes following the accidental release of MDO are expected to be negligible and have not been assessed further.

Rocky and sandy beaches

Exposure evaluation:

Intertidal beaches and mudflats, sandy beaches, rocky beaches and rocky shorelines and reef platforms occur in island shores within the wider EMBA region (Section 3.4.2). Rocky substrate shorelines are the dominant shoreline found within the Hydrocarbon Area at Montebello Islands (Figure 3-7).

The highest probability of hydrocarbon accumulation on any shoreline within the Hydrocarbon Area was predicted to occur at the Montebello Islands (6%) within 110 hours. The maximum length of hydrocarbon ashore above the moderate threshold was 6 km at the Montebello Islands.

As discussed within Section 3.4.2, sandy beaches are a dominant coastal shoreline on the Montebello Islands, with patchy of rocky beaches and rocky limestone outcrops.
Predicted impact:
Shoreline
Sandy Shoreline Hydrocarbons can become concentrated as it strands ashore. However, most of the oil is concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA, 1995). Sandy beaches provide habitat for a diverse assemblage (although not always abundant) of infauna (including nematodes, copepods and polychaetes); and macroinvertebrates (e.g. crustaceans). A sandy beach may also allow oil to percolate through the sand, thus increasing its ability to hold more oil ashore over tidal cycles and various wave actions than an equivalent area of water; hence oil can increase in thickness onshore over time. The viscosity of the oil will influence how likely it will percolate into the sand. For example, lower viscosity oils, such as condensates and diesels, are more like to permeate into sand areas compared to heavier, highly viscous oils. The influence of tidal action and wave washing are expected to lead to increase levels of weathering of any hydrocarbons in the intertidal area and reduce the level of smothering or toxicity effects to exposed fauna along shorelines. Rocky Shoreline Hydrocarbons can become concentrated as it strands ashore. However, most of the oil is concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA, 1995). The sensitivity of a rocky shoreline to oiling is dependent on a number of factors including its topography and composition, position, exposure to oceanic waves and currents etc. Exposed rocky shorelines have been shown to be less sensitive than sheltered rocky shorelines. Rocky shorelines provide habitats for invertebrates (e.g. sea anemones, sponges, sea-squirts, molluscs) and can also be utilised by pinniped (haul-out sites) and bird species; noting that foraging and breeding/nesting typically occurs above high tide line. The impact of oil on any organism depends on the toxicity, viscosity and amount of oil, on the sensitivity of the organism and the length of time it is in contact with the oil. Even where the immediate damage to rocky shores from oil spills has been considerable, it is unusual for this to result in long-term damage and the communities have often recovered within 2 or 3 years (IPIECA, 1995).
Predicted impact summary:
Given the low probability of the worst-case shoreline exposure (6%), the weathering expected for the light non-persistent hydrocarbon, and the tidal action and constant wave washing on this type of shoreline which would contribute to further weathering of any hydrocarbons in the intertidal shoreline area, any impacts to shorelines from exposure to MDO are anticipated to be localised and short term.

Marine Fauna

Marine fauna has been assessed based on the hydrocarbon exposure based on the thresholds that have the potential to cause ecological impacts (Section 3.1.1), defined as the Hydrocarbon Area. Table 5-47 evaluates the potential impact that hydrocarbon spills for this activity may have on marine fauna receptors found within the Hydrocarbon Area.

Table 5-47: Risk assessment for an accidental release of MDO – marine fauna

Plankton	
Exposure evaluation:	
Plankton has been identified as a receptor that may be present within the Hydrocarbon Area. Plankton are drifting organisms which includes eggs and larvae of fish and other animals. As discussed in Section 3.4.3.1, plankton are found in nearshore and open waters beneath the surface and form the basis for the marine food web, including whales and whale sharks which migrate through the Hydrocarbon Area. These organisms migrate vertically through the water column to feed in surface waters at night and, when doing so, may be exposed to surface hydrocarbons and, to a greater extent, hydrocarbons dissolved or entrained in the water column (NRDA, 2012). Plankton species are known to be sensitive to the toxic effects of oil at low concentrations and large numbers of planktonic organisms may be affected in the event of a spill event (ITOPF, 2014b). Plankton risk exposure through ingestion, inhalation and dermal contact.	
Predicted impact:	
Surface	**In-water**
Phytoplankton (photosynthetic organisms) can accumulate rapidly, due to their small size and high surface area to volume ratio, therefore populations are typically not sensitive to the impacts of oil (Hook et al., 2016). However, if phytoplankton are exposed to hydrocarbons at the sea surface, their ability to photosynthesise via smothering may be directly affected and would have implications for the next trophic level in the food chain (e.g. small fish) (Hook et al., 2016). In addition, the presence of surface hydrocarbons may result in a reduction of light penetrating the water column, which may again affect the rate of photosynthesis which may inhibit growth, particularly in instances where there is prolonged presence of surface hydrocarbons over an extensive area (Volkman et al., 1994).	Plankton species are sensitive to toxic effects of oil at low concentrations and large numbers of planktonic organisms may be affected (ITOPF, 2014a). Some zooplankton also have high lipid content, which facilitates hydrocarbon uptake and bioaccumulation (Hook et al., 2016). Water column organisms that come into contact with oil risk exposure through ingestion, inhalation and dermal contact (NRDA, 2012), can cause immediate mortality or declines in egg production, hatching rates and a decline in swimming speeds (Hook et al., 2016). However, any direct effects on plankton communities from spilled hydrocarbons is expected to be localised and temporary, as reproduction by survivors or migration from unaffected areas is likely to rapidly replenish any losses (Volkman et al., 1994). Furthermore, the proximity of nutrient-rich seasonal upwelling events which occur within the vicinity will further assist recovery rates. Once background water quality conditions have re-established, the plankton community may take weeks to months to recover due to short generation times (ITOPF, 2014a), allowing for seasonal influences on the assemblage characteristics.
Predicted impact summary:	
Plankton populations are numerous and widespread and expected to rapidly recover following an accidental release of MDO. Due to the highly dispersive environment of the offshore environment, and the rapid weathering expected for the MDO, 15–36.1% within 24 hours, depending on weather conditions (Section 5.5.2.1), any impacts to plankton from exposure to MDO are anticipated to be localised and short term, with rapid recovery expected.	

Benthic invertebrates
Exposure evaluation:
Benthic invertebrates may present within the Hydrocarbon Area and may be exposed to hydrocarbons following an accidental release of MDO. The benthic invertebrates within the Hydrocarbon Area are anticipated to be comparable to similar sites within the NWS region, of low abundance but highly diverse species, comprised largely of polychaete worms, crustaceans, echinoderms, and molluscs. (Rainer, 1991; SKM, 1996).
Predicted impact:
In-water
Entrained and dissolved hydrocarbons can have negative impacts on marine invertebrates and associated larval forms. Impacts to some adult species (e.g. crustaceans) is reduced as a result of the presence of an exoskeleton, while others with no exoskeleton and larval forms may be more prone to impacts. Exposure to microscopic oil droplets may also impact aquatic biota either mechanically (especially filter feeders) or act as a conduit for exposure to semi-soluble hydrocarbons (that might be taken up by the gills or digestive tract) (French-McCay, 2009). Toxicity is primarily attributed to water soluble PAHs, specifically the substituted naphthalene (C2 and C3) as the higher C-ring compounds become insoluble and are not bioavailable. Localised impacts to larval stages may occur which could impact population recruitment. If invertebrates are contaminated by hydrocarbons, tissue taint can remain for several months, although taint may eventually be lost. For example, it has been demonstrated that it took 2-5 months for lobsters to lose their taint when exposed to a light hydrocarbon (NOAA, 2002). Other possible impacts from the presence of dispersed and non-dispersed oil include effects of oxygen depletion in bottom waters due to bacterial metabolism of oil (and/or dispersants), and light deprivation under surface oil (NRDA, 2012). Water quality in benthic habitats exposed to entrained hydrocarbons would be expected to return to background conditions within weeks to months of contact. Several studies have indicated that rapid recovery rates may occur even in cases of heavy oiling (National Academies Press, 2003).
Predicted impact summary:
Due to the characteristics of the light, non-persistent hydrocarbons, surface release and associated water depths, coating of benthic assemblages and prolonged exposure to hydrocarbons is considered highly unlikely following a release of MDO. Furthermore, the highly dispersive environment of the offshore environment, and the rapid weathering expected for the MDO, with approximately 15-36.1% within 24 hours (Section 4.12.4.2), any impacts to benthic invertebrates from exposure to MDO are anticipated to be localised and short-term, with rapidly recovery expected.
Seabirds and shorebirds
Exposure evaluation:
Several threatened, migratory and/or listed marine species in the region have the potential to be rafting, resting, diving and feeding within the area predicted to be contacted by surface hydrocarbons; diving or foraging within in-water hydrocarbons; and foraging or nesting within shoreline exposure (Section 3.4.3.3). Six breeding BIAs for seabirds intersect the Hydrocarbon Area, including: • Brown booby (EPBC listed migratory) (Figure 3-8) • Fairy tern (EPBC Act listing as vulnerable (for the subspecies)) (Figure 3-9)

- Lesser crested tern (EPBC Act: not listed) (Figure 3-10)
- Lesser frigatebird (Figure 3-11)
- Roseate tern (EPBC Act listing as migratory) (Figure 3-13)
- Wedge-tailed shearwater (EPBC Act listing as migratory) (Figure 3-14).

Breeding for the following species occurs:

- Brown booby: several islands including the Lacepede Islands, Bedout Island, White Island and Ashmore Reef, throughout the year.
- Fairy tern: on offshore islands in the Gascoyne and Pilbara with breeding occurring late July to September.
- Lesser crested tern: around offshore islands in Gascoyne, Pilbara and Kimberley in March to June.
- Lesser frigatebird: known to breed on Bedout island between March and September.
- Roseate tern: around offshore islands in Gascoyne, Pilbara and Kimberly during mid-March to July.
- Wedge-tailed shearwater: in inshore islands around Montebello Islands between mid-August to April (Pilbara).

Refer to Section 3.4.3.3 for further details.

The modelling predicted that the maximum distance for floating surface hydrocarbon exposure at the moderate threshold (10 g/m^2) from the source was predicted to be 18 km. The minimum time to shore at or above the low threshold as 110 hours (Montebello Island), with the minimum time to dissolved hydrocarbon exposure and entrained hydrocarbon exposure at any given receptor(s) was 51 hours and 23 hours, respectively, both at Montebello AMP.

Predicted impact:

Surface	In-water	Shoreline
Seabirds rafting, resting, diving or feeding within surface hydrocarbons may be exposed to surface hydrocarbons. Species most at risk include those that readily rest on the sea surface (such as shearwaters) and surface plunging species, such as terns. Direct contact with hydrocarbons is likely to foul plumage, which may result in hypothermia due to a reduction in the ability of the bird to thermo-regulate and impaired waterproofing (ITOPF, 2014a). Increased heat loss as a result of a loss of water-proofing results in an increased metabolism of food reserves in the body, which is not countered by a corresponding increase in food intake and may lead to emaciation (DSEWPC, 2011). A bird suffering from cold, exhaustion and a loss of buoyancy (resulting from fouling of plumage) may dehydrate, drown or starve (ITOPF, 2014a; DSEWPC, 2011; AMSA, 2013). Physical smothering may also	Seabirds could be impacted by in-water hydrocarbon exposure directly (i.e. whilst diving through the water column foraging) or indirectly (i.e. by consuming hydrocarbon-tainted fish, resulting in sub-lethal or toxic impacts). As seabirds are top order predators, any impact on other marine life (e.g. pelagic fish) from hydrocarbon exposure may disrupt and limit	Shorebird species foraging for invertebrates in intertidal feeding habitats, such as exposed sand and mud flats at lower tides, will be at potential risk of both direct impacts through contamination of individual birds (ingestion or soiling of feathers) and indirect impacts through the contamination of foraging areas that may result in a reduction in available prey items (Clarke, 2010). Any direct impact of oil on terrestrial habitats has the potential to contaminate seabirds present at the breeding sites (Clarke, 2010). Bird eggs may also be damaged if an oiled adult sits on the nest. Fresh crude was shown to be more toxic than weathered crude, which had a medial lethal dose of 21.3 mg/egg (Clarke, 2010). Studies of contamination of duck eggs by small quantities of crude

result in impaired navigation and flight performance (Hook et al., 2016). Toxic effects on birds, including internal tissue irritation in their lungs and stomachs, may also result where the oil is ingested as the bird attempts to preen its feathers (ITOPF, 2014a). The preening process may also spread oil over otherwise clean areas of the body (ITOPF, 2014a). Whether this toxicity ultimately results in mortality will depend on the amount consumed and other factors relating to the health and sensitivity of the bird. In a review of 45 marine hydrocarbon spills, there was no correlation between the numbers of bird deaths and the volume of the spill (Burger, 1993).	food supply both for the maintenance of adults and the provisioning of young. Impacts are not anticipated at a population level due to the localised and temporary exposure of moderate levels of surface hydrocarbons.	oil, mimicking the effect of oil transfer by parent birds, have been shown to result in mortality of developing embryos (French-McCay, 2009). Shoreline accumulation will be concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA, 1995). As breeding activities of shorebirds and seabirds generally occurs above the high tide mark, exposure to hydrocarbons is considered unlikely to occur. However, oiled bird species may track oil into their nests, which may then have subsequent impacts on any eggs present.
Predicted impact summary:		
Acute or chronic toxicity impacts to seabirds is possible, however, the presence of birds within areas exposed to moderate threshold levels is expected to be limited, due to the transitory nature of foraging individuals, and given the absence of offshore aggregation areas in the area. Breeding BIAs for several bird species intersect the hydrocarbon area at several offshore Pilbara islands within the Hydrocarbon Area, such as the Montebello Islands which is a known nesting site for wedge-tailed shearwaters. However, shoreline accumulation is unlikely to impact breeding areas given that shoreline accumulation will be concentrated along the high tide mark, and breeding activities tend to occur above the high tide mark. Furthermore, exposure of any rafting or foraging seabirds to MDO is also expected to be limited due to the predicted rapid weathering and entrainment of MDO (Section 5.5.2.1), limiting the area of surface exposure, for seabirds to come into contact with. There is the potential for indirect impacts to seabirds in offshore waters as a result of hydrocarbon exposure, such as reduced prey abundance. Consequently, the potential impacts and risks to seabirds from a release of MDO event are expected to result in localised, short-term impacts to species of recognised conservation value, however not affecting population or ecosystem functioning.		
Fish, sharks and rays		
Exposure evaluation:		
Various fish and shark species were identified by the EPBC Protected Matters Search for the wider EMBA area (Section 3.4.3.4). A foraging BIA for the whale shark was identified within the Hydrocarbon Area (Figure 3-16). Any pelagic fish and shark species that occupy the water column, specifically within the upper 0–10 m of the water column the surface layers of the water column (where in-water hydrocarbon exposure is predicted), are more susceptible to entrained and dissolved hydrocarbons. Since fish, sharks, and rays do not generally break the sea surface, the impacts of surface hydrocarbons to fish and shark species are unlikely to occur. Near the sea surface, fish are able to detect and avoid contact with surface slicks meaning fish mortalities rarely occur in the event of a hydrocarbon spill in open waters (Volkman et al., 1994). There may be demersal species may be susceptible to oiled sediments, particularly species that are site restricted.		

The maximum distance for dissolved hydrocarbons at moderate exposure (50 ppb) from the source was predicted to be 58 km. The maximum distance for entrained hydrocarbons at this exposure from the source was predicted to be 237 km.

Predicted impact:

In-water

A Foraging BIA for the whale shark intersects the Hydrocarbon Area (Figure 3-16). Whale sharks are suction filter feeders and are known to congregate in Ningaloo during March to July to feed on the seasonal concentrations of krill and other zooplankton which occur during coral spawning events. The whale shark is generally encountered close to or at the surface spending 40% of their time in the upper 15 m of the water column and 50% of time at depths equal to or less than 30 m. Hydrocarbon spills may pose a threat to whale sharks (DoE, 2024).

Fish, sharks, and rays can be exposed to in-water hydrocarbon droplets through a variety of pathways, including:

- Direct dermal contact (e.g. whilst swimming through oil or waters with elevated dissolved hydrocarbon concentrations and other constituents, with diffusion across their gills (Hook et al., 2016))
- Ingestion (e.g. directly or via food base, fish that have recently ingested contaminated prey may themselves be a source of contamination for their predators)
- Inhalation (e.g. elevated dissolved contaminant concentrations in water passing over the gills).

Exposure to hydrocarbons entrained or dissolved in the water column can be toxic to fish. Studies have shown a range of impacts including changes in abundance, decreased size, inhibited swimming ability, changes to oxygen consumption and respiration, changes to reproduction, immune system responses, DNA damage, visible skin and organ lesions and increased parasitism. However, many fish species can metabolise toxic hydrocarbons, which reduces the risk of bioaccumulation of contaminants in the food web (and human exposure to contaminants through the consumption of seafood) (NRDA, 2012).

Sub-lethal impacts in adult fish include altered heart and respiratory rates, gill hyperplasia, enlarged liver, reduced growth, fin erosion, impaired endocrine systems, behavioural modifications and alterations in feeding, migration, reproduction, swimming, schooling, and burrowing behaviour (Kennish, 1998). Fish exposed to aromatics in the water have been shown to have a reduced aerobic capacity, which may be a result of the process to eliminate ingested oil from the fish (Cohen et al., 2005). However, generally these species are highly mobile species, and their patterns of movements makes it unlikely for them to remain within the area long enough to be exposed to hydrocarbons to experience sub-lethal impacts (ITOPF, 2014a). The exception would be in areas such as reefs and other seabed features where species are less likely to move away into open waters (i.e. site-attached species).

Pelagic species fish are able to detect and avoid contact with surface slicks meaning fish mortalities rarely occur in the event of a hydrocarbon spill in open waters (Volkman et al., 1994). As a result, wide-ranging pelagic fish of the open ocean generally are not highly susceptible to impacts from surface hydrocarbons. Adult fish kills reported after oil spills, occur mainly to shallow water, near-shore benthic species (Volkman et al., 1994).

Fish are most vulnerable to hydrocarbons during their embryonic, larval and juvenile life stages. Embryos and larvae may sustain mechanical damage to feeding and breathing apparatus from contact with oil droplets, and genetic damage, physical deformities and altered developmental timing from hydrocarbons in water (Fodrie and Heck, 2011). There may also be chronic effects to fish exposed to hydrocarbons in early life stages, such as disruption of predator avoidance behaviour (Hjermann et al., 2007). Eggs and larvae exposed to weathered concentrations of hydrocarbons in water for a prolonged period of time have been shown to be immunosuppressed (Hjermann et al., 2007).

Hydrocarbons in the water column can physically affect fish with high site fidelity. When exposed for an extended duration (weeks to months) coating of gills may lead to lethal and sub-lethal effects from reduced oxygen exchange and coating of body surfaces may lead to increased incidence of irritation and infection. Fish may also ingest hydrocarbon droplets or contaminated food, leading to reduced growth (Volkman et al., 1994).

Recovery of fish assemblages depends on the intensity and duration of an unplanned discharge, the composition of the discharge and whether dispersants are used, as each of these factors influences the level of exposure to potential toxicants. Recovery would also depend on the life cycle attributes of fishes. Species that are abundant, short-lived and highly fecund may recover rapidly. Whereas less abundant, long-lived species may take longer to recover. The range of movement of fishes will also influence recovery. The nature of the receiving environment would influence the level of impact on fishes.

Predicted impact summary:

As identified in Section 3.4.3.4, a number of fish and shark species, including the whale shark may occur in the Hydrocarbon Area.

Tuna Australia provided the feedback in regard to the significance of the SBT spawning area and potential for interactions with the EMBA. However, given there is no fishing effort for SBT recorded in the Operational Area, Hydrocarbon Area or EMBA (Table 3-8), and the SBT spawning area is located 555.19 km and 687.75 km northwest of the EMBA and Operational Area, respectively, with SBT known to migrate southwards down the Western Australian coastline to cooler temperate waters, an accidental release of MDO is not expected to impact population functioning.

Given the wide distribution of fish species in the region, the widespread foraging area typical of whale sharks (Figure 3-16), and the nature of potential impacts, impacts to an entire population or population's overall viability is not anticipated. Fish and shark populations are widespread throughout the Hydrocarbon Area, therefore, an accidental release of MDO is not expected to affect population functioning.

As such, due to the highly dispersive environment of the offshore environment, and the rapid weathering expected for the MDO, 15–36.1% within 24 hours depending on the conditions (Section 5.5.2.1), any impacts to fish and shark populations from exposure to MDO are anticipated to be localised and short term, and not expected to affect species populations or general ecosystem functioning.

Marine mammals

Exposure evaluation:

Several marine mammal species were identified by the EPBC Protected Matters Search for the Hydrocarbon Area (Section 3.4.3.5), including:

- Sei whale (EPBC Act listed vulnerable), foraging likely to occur
- Blue whale (EPBC Act listed endangered) known to occur, Hydrocarbon Area overlaps PBW foraging and migration BIAs (Figure 3-19)
- Fin whale (EPBC Act listed vulnerable), foraging likely to occur
- Southern right whale (EPBC Act listed endangered), likely to occur, Hydrocarbon Area overlaps breeding and migration BIAs (Figure 3-20)
- Humpback whale (EPBC Act listed migratory), known to occur, Hydrocarbon Area overlaps migration BIA (Figure 3-18)
- Australian snubfish dolphin (EPBC Act listed vulnerable), known to occur
- Australian humpback dolphin (EPBC Act listed vulnerable), known to occur
- Dugong (EPBC Act listed migratory), breeding known to occur, breeding, calving, nursing and foraging BIAs (Figure 3-21).

The maximum distance for dissolved hydrocarbons at moderate exposure (50 ppb) and entrained hydrocarbons at the high exposure (100 ppb) was predicted to be 58 km and 237 km (Section 5.5.2.1).

Predicted impact:

Surface	In-water
Marine mammals may come into contact with surface hydrocarbons when surfacing. However, direct surface oil contact with hydrocarbons is considered to have little deleterious effect on marine mammals, and any effect is likely to be minor and temporary. This may be due to the skin's effectiveness as a barrier to toxicity (Geraci and St Aubin, 1988). Cetaceans have mostly smooth skins with limited areas of pelage (hair covered skin) or rough surfaces such as barnacled skin. Oil tends to adhere to rough surfaces, hair or calluses of animals, so contact with hydrocarbons by cetaceans is expected to cause only minor hydrocarbon adherence. The inhalation of oil droplets, vapours and fumes is a distinct possibility if cetaceans' surface in slicks to breathe. Exposure to hydrocarbons in this way could damage mucous membranes, damage airways, or even cause death. Given the mobility of whales, only a small proportion of a population is anticipated to surface in the affected areas, resulting in short-term and localised consequences, with no long-term population viability effects. The susceptibility to ingested hydrocarbon has also been shown to vary with feeding habits. Baleen whales (such as blue, southern right and humpback whales) are not particularly susceptible to ingestion of oil in the water column but are susceptible to oil at the sea surface as they feed by skimming the surface. Oil may stick to the baleen while they 'filter feed' near slicks. Sticky, tar-like residues are particularly likely to foul the baleen plates. Habitat modification is identified as threats for the blue whale, southern right whale, and dugong. Activities within this EP will not be inconsistent with the conservation and management priorities outlined in these Conservation Management Plans.	Cetaceans exposed to entrained hydrocarbons can result in physical coating as well as ingestion (Geraci and St Aubin, 1988). Such impacts are associated with 'fresh' hydrocarbon, the risk of impact declines rapidly as the hydrocarbon weathers. The susceptibility to ingested hydrocarbon has also been shown to vary with feeding habits. Specifically, toothed whales and dolphins may be susceptible to ingestion of dissolved and entrained oil as they gulp feed at depth. There are reports of declines in the health of individual pods of killer whales (a toothed whale species), though not the population as a whole, in Prince William Sound after the Exxon Valdez vessel spill (heavy oil) (Hook et al., 2016). Geraci (1988) found little evidence of cetacean mortality from hydrocarbon spills; however, some behaviour disturbance (including avoidance of the area) may occur. Pelagic species have been said to avoid hydrocarbon, mainly because of its noxious odours, but this has not been proven. In the event avoidance was to occur, the potential for physiological impacts from contact with hydrocarbons would be reduced, however, active avoidance of an area may disrupt behaviours such as migration, or displace individuals from important habitat, such as foraging, resting or breeding. Although, the strong attraction to specific areas for breeding or feeding (e.g. the breeding, calving and nursing grounds within the North-West Cape region for the dugong) may override any tendency for marine mammals to avoid the noxious presence of hydrocarbons. Dolphin populations from Barataria Bay, Louisiana, USA, which were exposed to prolonged and continuous oiling from the Macondo oil spill in 2010, had higher incidences of lung and kidney disease than those in the other urbanised environments (Hook et al., 2016). The spill may have also contributed to unusually high perinatal mortality in bottlenose dolphins (Hook et al., 2016).

Predicted impact summary:
As highly mobile species, in general it is very unlikely that cetaceans will be constantly exposed to concentrations of hydrocarbons in the water column for continuous durations (e.g. >96 hours) that would lead to chronic toxicity effects (NRC, 2001). Of the BIAs overlapped by the Hydrocarbon Area, the overlap is either very small (e.g. Dugong BIAs) or the BIAs are very large (e.g. humpback whale migration corridor) therefore the overlap is small compared to the size of the BIA. The modelling predicted that the hydrocarbons would weather rapidly if released to the environment (Section 5.5.2.1). Relatively fresh hydrocarbons (closer to the release location) are considered to have the greatest potential for impact. Therefore, the potential for environmental impacts would be limited to a relatively short period following the release and would need to coincide with a migration or aggregation event to result in exposure to a large number of individuals. Regardless, such exposure is not anticipated to result in long-term population viability effects. A proportion of the migrating population of whales could be affected for a single migration event, which could result in temporary and localised consequences. Given the wide distribution of marine mammal species in the region and the nature of the potential impacts, impact to an entire population or the population's overall viability is not anticipated. Any impacts to marine mammals from exposure to MDO are anticipated to be localised and short term.
Marine reptiles
Exposure evaluation:
Marine reptiles may be exposed to hydrocarbon when transiting through the in-water hydrocarbons, surfacing to breathe within the surface slick, or nesting on oiled shorelines. BIAs and habitat critical for the survival of marine turtles for four species of marine turtles intersect the Hydrocarbon Area (Section 3.4.3.6)., including: • Flatback turtle (EPBC Act listed as vulnerable) Inter-nesting buffer, Mating and Foraging BIAs (Figure 3-22). • Green turtle (EPBC Act listed as vulnerable) Inter-nesting buffer, Nesting, Mating and Foraging BIAs (Figure 3-23). • Hawksbill turtle (EPBC Act listed as vulnerable) Inter-nesting buffer, Nesting, Mating and Foraging BIAs (Figure 3-24). • Loggerhead turtles (EPBC Act listed as endangered) Inter-nesting buffer BIAs (Figure 3-25). Turtle nesting and inter-nesting areas and rookeries for sea turtles in the Hydrocarbon Area including the Montebello islands. The Recovery Plan for Marine Turtles in Australia: 2017–2027 (CoA, 2017) highlights acute chemical discharge as one of several threats to marine turtles. EPBC Act listed sea snakes that are known to occur within the Hydrocarbon Area include: • Short-nosed sea snake (EPBC Act listed as critically endangered) • Leaf-scaled sea snake (EPBC Act listed as critically endangered) There may be sea snakes present in the area predicted to be exposed to surface hydrocarbon within the Hydrocarbon Area; however, their presence is expected to be of a transitory nature only, and most species are not pelagic and therefore unlikely to be in high numbers within the Hydrocarbon Area. Probability of shoreline contact for Montebello Islands reaching the moderate threshold is low and only expected during the transitional season (1%) and winter (6%). The maximum distance from the release location to floating oil exposure in moderate thresholds will be 18 km south during winter (Section 5.5.2.1).

Predicted impact:		
Surface	**In-water**	**Shoreline**
Marine Turtles Marine turtles make large, rapid inhalations before they dive which may result in inhalation of toxic vapours from hydrocarbons in surface waters (Milton and Lutz, 2003). This can lead to respiratory irritation, inflammation, emphysema or pneumonia (NOAA, 2010). Ingested oil may cause harm to the internal organs of turtles. Visibly oiled turtles showed higher indicators of PAH in tissues, stomach content, colon content and faeces compared to non-visibly oiled turtles (Ylitalo et al., 2017). This exposure pathway may cause an increase in the production of white blood cells and may affect the functioning of their salt gland (Lutcavage et al., 1995). Oiling has the potential to cause mortality depending on the size of the individual and the extent of oiling (DWH Natural Resource Damage Assessment Trustees, 2016). Sea Snakes Foraging behaviours which occur near the water surface may increase the vulnerability of individuals to hydrocarbon exposure (Yaghmour et al., 2022).	Some individual marine reptiles may come into contact with in-water hydrocarbon exposure while swimming or feeding. Marine Turtles Entrained hydrocarbons can adhere to body surfaces (Gagnon and Rawson, 2010) and can enter cavities such as the eyes, nostrils, or mouth. This can cause an elevated susceptibility to infections (NOAA, 2010). Records of oiled wildlife during spills rarely include marine turtles, even from areas where they are known to be relatively abundant (Short, 2011). An exception to this was the large number of marine turtles collected (613 dead and 536 live) during the Macondo spill in the Gulf of Mexico, although many of these animals did not show any sign of oil exposure (NOAA, 2021). Of the dead turtles found, 3.4% were visibly oiled and 85% of the live turtles found were oiled (NOAA, 2021). Of the captured animals, 88% were later released, suggesting that oiling does not inevitably lead to mortality. Sea Snakes Sea snakes have the potential to be directly and indirectly impacted by hydrocarbons. In general, there is limited literature on the impacts of oil spills to sea snakes. A recent study by Yaghmour et al. (2022) is the only study to record lethal impacts to sea snakes following a crude oil spill in the Gulf of Oman. The study identified varying levels of smothering, including over their eyes,	Marine turtles may experience oiling impacts on nesting beaches when they come ashore to lay their eggs. There is potential for contamination of turtle eggs to result in toxic impacts, such as developmental defects in hatchlings, to developing embryos. Studies on freshwater snapping turtles showed uptake of PAHs from contaminated nest sediments, but no impacts on hatching success or juvenile health following exposure of eggs to dispersed weathered light crude (Rowe et al., 2009). However, other studies found evidence that exposure of freshwater turtle embryos to PAHs results in deformities (Bell et al., 2006; Van Meter et al., 2006). Turtle hatchlings may be more vulnerable to smothering as they emerge from the nests and make their way over the intertidal area to the open water (AMSA, 2015). Hatchlings that contact oil residues while crossing a beach can exhibit a range of effects including impaired movement and bodily functions (Shigenaka, 2011). Hatchlings sticky with oily residues may also have more difficulty crawling and swimming, rendering them more vulnerable to predation. Marine pollution is listed as a threat to marine turtle in the Recovery Plan for Marine Turtles in Australia, 2017–2027, particularly in relation to shoreline oiling of nesting beaches.

	snout, mouth, and oesophagus. Due to the hydrocarbon characteristics of the MDO, as a light, non-persistent hydrocarbon, the impact would differ to spills of heavy crude as studied in Yaghmour et al. (2022). Light oils, which are less likely to cause severe external oiling, may expose marine fauna to volatile PAHs during at the surface during inhalations. However, the number of sea snakes that may be exposed is expected to be low due to the offshore location, the lack of BIAs, the extent of exposure above the threshold, and the anticipated rapid weathering of the light-non persistent hydrocarbon. Therefore, potential impact would be limited to individuals, with population impacts not anticipated.	

Predicted impact summary:

The number of marine turtles that may be exposed to hydrocarbons during a spill event is expected to be low due to the localised and temporary presence of surface hydrocarbons due to the rapid weathering anticipated (Section 5.5.2.1).

Shoreline accumulation at nesting beaches within the Hydrocarbon Area was predicted as a very low probability (Section 5.5.2.1). The activity will be conducted in a manner which is not inconsistent with the relevant management actions. Therefore, the potential impact would likely be limited to individual transiting marine turtles, with population impacts not anticipated.

Due to the low number of sea snakes anticipated within the Hydrocarbon Area, impacts to sea snakes at both an individual or population level is not anticipated.

Due to the highly dispersive environment of the offshore environment, and the rapid weathering expected for the MDO, with approximately 15–36.1% evaporated within 24 hours depending on the conditions (Section 5.5.2.1).

Therefore, any impacts to marine reptiles from exposure to MDO are anticipated to be localised and short term, with no impacts to population or ecosystem functioning.

Protected and Significant Areas

Protected and significant areas which have only ecological values have been assessed based on the hydrocarbon exposure based on the thresholds that have the potential to cause ecological impacts, defined as the Hydrocarbon Area.

Protected and significant areas which also include socio-economic value have been assessed based on the most conservative hydrocarbon exposure thresholds, such as those that have the potential to cause socio-economic effects, defined as the EMBA.

Table 5-48 evaluates the potential impact that hydrocarbon spills for this activity may have on protected and significant areas receptors found within either the Hydrocarbon Area or EMBA.

Table 5-48: Risk assessment for an accidental release of MDO - protected and significant areas

Marine parks
Exposure evaluation:
There are 7 Australian Marine Parks (AMPs) intersecting the EMBA, 4 of which also intersect the Hydrocarbon Area (Section 3.6.5): • Argo-Rowley Terrace AMP (EMBA) • Carnarvon Canyon AMP (EMBA) • Dampier AMP (Hydrocarbon Area and EMBA) • Gascoyne AMP (Hydrocarbon Area and EMBA) • Montebello AMP (Hydrocarbon Area and EMBA) • Ningaloo AMP (Hydrocarbon Area and EMBA) • Shark Bay AMP (EMBA). There are 7 WA State Marine Protected Areas (MPAs) intersects the EMBA, of which 6 also intersect the Hydrocarbon Area (Section 3.6.6): • Montebello Islands and Barrow Islands (jointly managed) • Pilbara Islands Nature Reserve (Great Sandy Island, Thevenard Island). • Ningaloo and Muiron Islands Marine Management area (jointly managed) • Rowley Shoals. The major conservation values for the above AMPs and State MPAs have been identified in Section 3.6.5 and Section 3.6.6, respectively. In general the AMPs and State MPAs include examples of unique ecosystems with characteristics that support diverse benthic or intertidal habitats, and often a range of species listed under the EPBC Act, often including BIAs, such as breeding and foraging habitat for seabirds, inter-nesting, foraging, mating, and nesting habitat for marine turtles, breeding, calving, foraging and nursing habitat for dugongs, foraging habitats, and migratory pathway for certain marine species, such as humpback whales, pygmy blue whales, whale sharks. Mangrove thickets are found on some of the Montebello Islands and Barrow Islands which provide essential habitat for coastal species and shorebirds (Section 3.4.2.1). Sea Country which overlaps these AMPs and MPAs is valued for Indigenous cultural identity, health and wellbeing. A few AMPs contains known shipwrecks listed under the *Underwater Cultural Heritage Act 2018*. Tourism, commercial fishing, mining, port activities, and recreation are important activities in some of the AMPs and MPAs (DNP, 2018). These sites and associated receptors may be impacted by exposure to surface, in-water, and shoreline hydrocarbons. No AMPs or State MPAs were exposed to floating hydrocarbon, at, or above, the low threshold for any season (RPS, 2024).

The minimum time to dissolved hydrocarbon exposure at the low 10 ppb threshold at any given receptor(s) was 27 hours at the Montebello AMP, which also recorded the highest probability of intersect with at 7%. The highest probability of entrained hydrocarbons at the low 10 ppb threshold was predicted at Montebello AMP at 54% with contact predicted in 22 hours (RPS, 2024). The in-water probability results for the other AMPs to be intersected by these threshold levels included:

- 54% entrained and 7% for dissolved at Montebello AMP.
- 13% entrained and no contact for dissolved at Gascoyne AMP.
- 1% entrained and no contact for dissolved at Dampier AMP.

The in-water probability results for the other MPs to be intersected by these threshold levels included:

- 37% entrained and 1% for dissolved at Montebello Islands and Barrow Islands MP.
- 13% entrained and no contact for dissolved at Ningaloo and Murion Islands MP.
- 7% entrained and no contact for dissolved at Pilbara Islands Nature Reserve MP.

The spill modelling identified that the highest probability of hydrocarbon accumulation on a specific shoreline at or above the low threshold (10 g/m^2) was 24% at the Barrow Island and Montebello Islands shoreline cell, which is a considered a part of the Pilbara Islands Nature Reserve MP. The shoreline cells for Barrow Island, Lowendal Islands and Montebello Islands recorded the minimum time to shore at 3.8 days (91 hours) and the maximum total volume of hydrocarbon ashore for a single spill trajectory was 23.2 m^3. Barrow Island and Montebello Islands recorded the maximum length of hydrocarbon ashore above the low threshold (14 km) (Section 5.5.2.1). The shoreline results for the other AMPs and MPs intersected by this threshold level included:

- 15% at the shoreline component of the Montebello Islands and Barrow Islands State MPA
- 4% at the shoreline component of the Ningaloo and Muiron Islands MPA.

Predicted impact:

In-water	**Shoreline**
The values identified within these Protected Areas (AMPs and MPAs) have the potential to be exposed to entrained hydrocarbons at, or above, the relevant threshold in the event of a spill incident. Marine fauna, such as seabirds, fish and whales, found within the water column are values of the AMPs and State MPAs that may be impacted when exposed to entrained or dissolved hydrocarbons. Exposure of in-water hydrocarbons will be greatest within the upper 10 m of the water column and areas close to the spill source, as such, values on the seafloor (i.e., benthic habitats, shipwrecks and cultural artefacts) are unlikely to be impacted.	Hydrocarbons can become concentrated as it strands ashore. However, most of the oil is concentrated along the high tide mark while the lower/upper parts are often untouched (IPIECA, 1995). Coastal habitats, such as mangroves, and communities which utilise these habitats, such as shorelines and marine turtles, are important and sensitive values of the MPAs. These values can be directly impacted, or have important activities disrupted, if exposed to shoreline hydrocarbons at the relevant thresholds. Visual surface hydrocarbons, or exclusion zones, have the potential to impact and/or displace certain values, such as tourism, recreational activities, and heritage values. Impact to these receptors from direct or indirect exposure to

In-water exposure at relevant thresholds may impact culturally important significant values, such as Sea Country, and result in adverse impacts to activities such as fishing.
Impact to these receptors from direct or indirect exposure to in-water hydrocarbons may cause a subsequent negative impact to the value of Protected Areas.
The spill scenario is expected to be localised and short term, with the MDO rapidly weathering within the first few days. Therefore, recovery of the Protected Areas is expected relatively rapidly.
The predicted impact to the individual values of the Protected Areas have been assessed separately. Refer to:
• Benthic habitats
• Marine fauna:
  ○ Plankton
  ○ Benthic invertebrates
  ○ Seabirds and shorebirds
  ○ Fish, sharks and rays
  ○ Marine reptiles
  ○ Marine mammals.
• Social and economic environment:
  ○ Tourism and recreational fishing
  ○ Other marine users (underwater heritage)
• First Nations.
	shoreline hydrocarbons may cause a subsequent negative impact to the value of the State MPAs.
	The spill scenario is expected to be localised and short term, with the MDO rapidly weathering within the first few days. Therefore, recovery of the Protected Areas is expected relatively rapidly.
	The predicted impact to the individual values of the Protected Areas have been assessed separately. Refer to:
	• Coastal communities
	• Marine fauna:
	  ○ Seabirds and shorebirds
	  ○ Marine reptiles
	• Social and economic environment:
	  ○ Tourism and recreational activities.

Predicted impact summary:	
Given the highly dispersive environment of the offshore environment, the weathering expected for the light non-persistent hydrocarbon (Section 4.12.4.2), and the tidal action and constant wave washing on this type of shoreline which would contribute to further weathering of any hydrocarbons in the intertidal shoreline area, the potential consequences to AMPs and State Marine Parks from exposure to hydrocarbons has the potential for localised and short-term impacts on habitats and species of recognised conservation value or to local ecosystem functioning.	

Heritage Properties and Places
Exposure evaluation:
There are 2 World Heritage Properties which intersect the EMBA and Hydrocarbon Area (Section 3.6.1): • Murujuga Cultural Landscape • Ningaloo Coast. There are 2 Commonwealth Heritage Places which intersect the EMBA and Hydrocarbon Area (Section 3.6.2): • Ningaloo Marine Area – Commonwealth Waters • Learmonth Air Weapons Range Facility There are 2 National Heritage Places which intersect the EMBA and Hydrocarbon Area (Section 3.6.3): • Dampier Archipelago (including Burrup Peninsula) • Ningaloo Coast. The Murujuga Cultural Landscape World Heritage Property is a landscape of ancient rocks encompassing the Burrup Peninsula, Dampier Archipelago Islands and nearby marine areas. The site is renowned for its dense concentration of petroglyphs, which provide a record of traditional use by First Nations people over thousands of years. The property holds cultural and spiritual significance to Traditional Custodians (Section 3.6.1). This site was only recently inscribed to the World Heritage List in 2025, as such there is no spatially defined data for the site. The Ningaloo Coast has been listed as Commonwealth Heritage Place, National Heritage place and a World Heritage Property (Sections 3.6.1, 3.6.2 and 3.6.3). The major conservation values for the Ningaloo Coast include unique marine ecosystems of high productivity and diversity, such as the Ningaloo Reef, one of the longest fringing reefs in the world, coral spawning events, seasonal nutrient upwelling, mangroves, estuaries, and diverse marine fauna, such as: whales, whale sharks, marine turtles, fish, molluscs, crustaceans. The area is also a site of unique terrestrial features, such as groundwater streams, cave networks, and endemic terrestrial species. The major conservation value of the Dampier Archipelago National Heritage Property is related to the cultural significance of the area; being home to the Ngarda-Ngarlie people for tens of thousands of years. The Burrup Peninsula is an area of rich and diverse rock art, with up to a million potential sites. Other culturally significant values, such as the marine area, middens, fish traps, rock shelters, ceremonial sites, and artefacts are prevalent throughout the area. The worst-case results identified for the Heritage Properties and Places to be intersected by in-water (entrained) at the low threshold (RPS, 2024), include: • 14% probability of entrained hydrocarbons at the Ningaloo Coast World Heritage Properties within 204 hours (8.5 days). • 13% probability of entrained hydrocarbons at the Ningaloo Coast National Heritage Place within 226 hours (9.4 days). • 1% probability of entrained hydrocarbons at the Dampier Archipelago (at the WAOMPRMA shoreline segment: WA11.East (317) - West Intercourse Island - Dolphin Island N point (G)) within 162 hours (6.75 days). • 1% probability of entrained hydrocarbons at the Murujuga Cultural Landscape (at the WAOMPRMA shoreline segment: WA11.East (317) - West Intercourse Island - Dolphin Island N point (G)) within 162 hours (6.75 days).

No Heritage Properties and Places were exposed to floating hydrocarbons, in-water (dissolved), or shoreline hydrocarbons, at, or above, the low threshold for any season (Table 5-44; RPS, 2024); therefore, no impacts to the surface, shoreline or terrestrial values are predicted to occur.

Importantly, no impact to any of the culturally significant terrestrial sites are expected, such as the ancient rocks encompassing the Burrup Peninsula, Dampier Archipelago Islands and nearby marine areas and the associated petroglyphs, middens, or artefacts.

The predicted impact to the individual values of the Heritage Properties and Places have been assessed separately. Refer to:

- Benthic habitats
- Marine fauna:
  - Plankton
  - Benthic invertebrates
  - Seabirds and shorebirds
  - Fish, sharks and rays
  - Marine reptiles
  - Marine mammals.
- Social and economic environment:
  - Tourism and recreational fishing
- First Nations.

Predicted impact:

In-water

Values identified within these Heritage Properties and Places have the potential to be exposed to only entrained hydrocarbons at, or above, the relevant threshold in the event of a spill incident.

Coral reefs, such as the Ningaloo fringing reef found along the Ningaloo Coast and the reefs found off the Dampier Archipelago, and their associated values may be impacted by entrained hydrocarbons. These reefs support both tropical and temperate marine fauna, including a high diversity of coral, fish, mollusc, crustacean, algae, sponge, and echinoderm species and features annual gatherings of whale sharks and sea turtles in high numbers. Many species that occur in the region are rare or threatened. The Ningaloo reef specifically features a high diversity of habitats including lagoons, reef, open ocean, estuaries, mangroves, and the continental shelf. As such, marine fauna, that are values of these World Heritage Properties/National Heritage Places may be impacted when exposed to entrained hydrocarbons. Impact to these receptors from direct or indirect exposure to in-water hydrocarbons may cause a subsequent negative impact to the value of the Heritage Properties and Places.

In-water exposure at relevant thresholds may also cause adverse impact to intangible culturally important significant values associated with the Murujuga and Damier Archipelago Heritage Sites, such as Sea Country (see Section 3.6.1).

Exposure of in-water hydrocarbons will be greatest within the upper 10 m of the water column and areas close to the spill source, as such, values on the seafloor (i.e., benthic habitats and any cultural artefacts) are not expected to be impacted by hydrocarbons.

Given the hydrocarbon characteristics of the MDO, as a light, non-persistent hydrocarbon, that rapidly weathers (21% expected decay after 7 days), a large proportion of the hydrocarbon is expected to have weathered prior to contact (RPS, 2024), with the spill scenario expected to be short-term and localised.

Predicted impact summary:

The spill modelling predicted no shoreline accumulation to occur at any threshold for any Heritage Properties or Places. As such, no impact to the terrestrial culturally significant values of Murujuga Cultural Landscape or Dampier Archipelago are expected (i.e. rock art, middens or artefacts), or any other terrestrial values, such as the diverse habitats found along the Ningaloo Coast (i.e., sandy and rocky beaches).

Given the highly dispersive environment of the offshore environment, the low probability of contact (14% at the Ningaloo Coast and 1% at both the Dampier Archipelago and the Murujuga Cultural Landscape), the minimum times to contact (8.5 days at the Ningaloo Coast and 6.75 days at both the Dampier Archipelago and the Murujuga Cultural Landscape), and the weathering expected for the light non-persistent hydrocarbon (Section 5.5.2.1), the potential consequences to Heritage Properties and Places will be limited to the short-term exposure of entrained hydrocarbons within the water column.

As such, following a vessel collision there is the potential for localised and short-term impacts on habitats and species of recognised conservation value or to local ecosystem functioning.

Key Ecological Features

Exposure evaluation:

The EMBA and Hydrocarbon Area intersects 7 KEFs as described in Section 3.6.9 and shown in Figure 3-55. These include:

- *Ancient coastline at 125 m depth contour* - defined as a key ecological feature as it is a unique seafloor feature with ecological properties of regional significance.
- *Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula* - defined as a key ecological feature as they are unique seafloor features with ecological properties of regional significance, which apply to both the benthic and pelagic habitats.
- *Commonwealth waters adjacent to Ningaloo Reef* - defined as a KEF for their high productivity and aggregations of marine life, which apply to both the benthic and pelagic habitats
- *Continental Slope Demersal Fish Communities* - this species assemblage is recognised as a KEF because of its biodiversity values, including high levels of endemism
- *Exmouth Plateau* - defined as KEF as it is a unique seafloor feature with ecological properties of regional significance, which apply to both the benthic and pelagic habitats
- *Glomar Shoals* - defined as a KEF for their high productivity and aggregations of marine life
- *Mermaid Reef and Commonwealth waters surrounding Rowley Shoals* (EMBA only) - defined as a KEF for its enhanced productivity and high species richness, that apply to both the benthic and pelagic habitats.

The conservation values for these KEFs have been described in Section 3.6.9 and include unique seafloor environments that are considered to be of regional importance for a region's biodiversity or ecosystem function and integrity.

Predicted impact:
In-water

No KEFs were predicted to be exposed to floating surface hydrocarbons at any threshold for any season. Glomar Shoals is predicted to be exposed to dissolved hydrocarbons at low thresholds. All KEFs have the potential to be exposed to entrained hydrocarbons at or above low threshold, with two KEFs (Ancient Coastline at 125 m depth contour and Glomar shoals) exposed at moderate entrained thresholds. Shoreline exposure is not relevant or predicted (RPS, 2024)
The exposure of entrained hydrocarbons will be greatest within the upper 10 m of the water column and areas close to the spill source. Therefore, the spill is unlikely to intersect with majority of the seafloor values of the KEFs which are concentrated within the water column >10 m deep or along the seafloor at varying water depths.
Hydrocarbon exposure to the key receptors of the KEFs (e.g. seabirds, pinnipeds and cetaceans) may cause a subsequent negative impact to the value of the KEFs, however, is expected to be limited to a small number of individuals, with no impacts to regional populations.
Refer to:
• Benthic habitats
• Marine fauna:
  ○ Plankton
  ○ Fish, sharks, and rays
  ○ Seabirds and shorebirds
  ○ Marine reptiles
  ○ Marine mammals.

Predicted impact summary:
Given the highly dispersive environment of the offshore environment, the weathering expected for the light non-persistent hydrocarbon (Section 5.5.2.1), and the tidal action and constant wave washing on this type of shoreline which would contribute to further weathering of any hydrocarbons in the intertidal shoreline area, the potential consequences to KEFs from exposure to hydrocarbons has the potential for localised and short-term impacts on habitats and species of recognised conservation value or to local ecosystem functioning.

Social and Economic Environment

Social and economic receptors have been assessed based on the hydrocarbon exposure based on the thresholds that have the potential to cause socio-economic effects, defined as the EMBA. Table 5-49 evaluates the potential impact that hydrocarbon spills for this activity may have on social and economic receptors found within the EMBA.

Table 5-49: Risk assessment for an accidental release of MDO – social and economic environment

Commercial fisheries
Exposure evaluation:
Several State-managed fisheries were identified to have management areas that intersect the EMBA. The maximum distance for dissolved and entrained hydrocarbons at a low threshold (100 ppb) from the source was predicted to be 169 km and 494 km, respectively (RPS, 2024). The fisheries that have the potential to interact with the EMBA include 5 Commonwealth Fisheries: • North West Slope Trawl Fishery • Southern Bluefin Tuna Fishery • Western Deepwater Trawl • Western Skipjack Tuna Fishery • Western Tuna and Billfish Fishery. However, none of these fisheries have recorded active fishing within the EMBA based on historical datasets. Fourteen WA State Fisheries intersect the EMBA (Section 3.5.1). However, of these fisheries, only 11 fisheries have recorded active fishing in the EMBA between 2018 and 2023 and have potential to interact with the EMBA, including: • Exmouth Gulf Prawn Managed Fishery • Mackerel Managed Fishery • Marine Aquarium Fish Managed Fishery • Nickol Bay Prawn Fishery • Onslow Prawn Limited Entry Fishery • Pilbara Crab Managed Fishery • Pilbara Fish Trawl Interim Managed Fishery • Pilbara Line Fishery (Condition) • Pilbara Trap Managed Fishery • Specimen Shell Managed Fishery • Tour Operator • West Coast Deep Sea Crustacean Managed Fishery Refer to Section 3.5.1 for a further description on fisheries that intersect the EMBA.

Predicted impact:	
Surface	**In-water**
Physical displacement of commercial fishers may occur due to the establishment of exclusion zones during the spill response. Visible surface hydrocarbons (i.e. a rainbow sheen) may have the potential to cause impact public perception of the industry, potentially causing a negative economic impact. Refer to: • Fish, sharks, and rays.	As discussed in the relevant sections above (i.e. fish and invertebrates) exposure to in-water hydrocarbons has the potential to impacts species. Due to the sensitivity, a small number of juvenile fish, larvae, and planktonic organisms, may be impacted. This could result in some component or all of a year class being impacted, given that most species have seasonal, pulsed recruitment. This has been identified to pose a significant risk for short-lived species and less for long-lived species (Young et al., 2011). However, despite the potential for localised impacts to population recruitment for commercially targeted species, impacts to an entire population or the population's overall viability is not anticipated. In-water hydrocarbon exposure may result in a reduction to individual commercially targeted marine species (i.e. fish and invertebrate species), subsequently having the potential to result in impacts to commercial fishing productivity. Contamination of target species can cause economic impacts to the industry. Refer to: • Fish, sharks, and rays • Invertebrates.
Predicted impact summary:	
Acute impacts to commercially fished species are expected to be limited to a small number of juvenile fish, larvae, and/or planktonic organisms. Depending on the timing of the spill, in the event it overlaps with the timing of a species reproduction event (i.e. a spawning event), there is potential for localised impacts to population recruitment for a commercially targeted species for a year class. However, due to the wide distribution of fish species typical in the region, the typical timing of recruitment events, and the nature of potential impacts from a spill of MDO, impacts to an entire population, or population's overall viability is not anticipated. Due to the highly dispersive environment of the offshore environment, and the rapid weathering expected for the MDO, as a light, non-persistent hydrocarbon, 15–36.1% evaporated within 24 hours depending on the conditions (Section 5.5.2.1), and high anticipated entrainment rates, any exclusion zones are not expected to be long-term and not cause significant impacts to the economic viability of the fishery. Impacts are expected to be limited to localised and short-term exclusion from the area affected.	

Tourism and recreational fishing		
Exposure evaluation:		
The Ningaloo region is a major tourism area that is overlapped by the EMBA. The Ningaloo region includes Ningaloo AMP, Ningaloo World Heritage Area, Ningaloo and Muiron Islands State MP, and Coral Bay and Exmouth communities. These areas are popular for a diverse range of marine-based tourism and recreational activities, such as: whale watching, recreational boating and fishing, charter fishing, snorkelling/diving, and surfing. As noted in Section 3.5.1, DPIRD's FishCube fishing effort data between 2013 – 2023 notes that there were active fishing Tour Operators in the Operational Area, which correlates with the Wandoo platform being listed as a recreational fishing site by DPIRD (2023b) (Section 3.5.4.1) and correspondence with RecfishWest (Sensitive Information Report). The area is used for deepwater fishing by fishing charters and large private fishing boats. With the exception of offshore fishing charters and some offshore recreational fishers, most marine-based tourism occurs in shallower waters. See Section 3.5.4.1 for further details.		
Predicted impact:		
Surface	**In-Water**	**Shoreline**
Visible surface hydrocarbons (i.e. a rainbow sheen) have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities. Recreation is also linked to the presence of marine fauna and direct impacts to marine fauna such as whales, birds, and pinnipeds can result in indirect impacts to recreational values. It is important to note that the impact from a public perception perspective may be even more conservative. This may deter tourists and locals from undertaking recreational activities. If this occurs, the attraction is temporarily closed, economic losses to the business are likely to eventuate. The extent of these losses would be dependent on how long the attraction remains closed. Refer also to: • Fish, sharks and rays • Seabirds and shorebirds • Marine mammals • Benthic invertebrates.	The main source of recreational activities, such as marine-based tourism occur within nearshore waters, with the exception of offshore fishing charters and recreational fishers who visit the Wandoo platform (Section 3.5.4.1). Any impact to receptors that are associated with marine-based tourism (e.g. whales, and whale sharks) may cause a subsequent negative impact to recreation and tourism businesses in the locally affected area. Recreational fishing over the area and Wandoo platform is popular. Precautionary exclusion from impacted areas following a hydrocarbon spill may be implemented until water quality monitoring verifies the absence of residual hydrocarbons. This could result in a temporary disruption to some recreational and tourism activities within and area for the duration of the response (if applicable).	Visible hydrocarbons stranded on shorelines have the potential to reduce the visual amenity of the area for tourism and discourage recreational activities. In general, recreational and tourism activities are restricted to shallower coastal waters and shorelines. Precautionary exclusion from shorelines may be implemented by local governments until water quality monitoring verifies the absence of residual hydrocarbons. This could cause disruption to some recreational and tourism activities within that area. Furthermore, visible hydrocarbons along shorelines may impact the aesthetic value for tourism and discourage recreational activities that may be operating within the area.

Predicted impact summary:	
Given the nature of the hydrocarbon, being a light and non-persistent, the low probability of shoreline impacts, and high anticipated evaporation and entrainment rates (Section 5.5.2.1), any impacts to recreation and tourism are expected to be localised and short term.	
Other marine users	
Exposure evaluation:	
Surface hydrocarbons may interact with other marine users, such as • Commercial shipping • Other oil and gas industry • Defence activities • Underwater heritage. The closest AMSA shipping fairway is ~9 km south of the Operational Area, which indicates high shipping use within the area and the potential to interact with the EMBA (Section 3.5.2). Several other offshore oil and gas industries and pipelines are located within the EMBA (Section 3.5.5). The EMBA encompasses defence activities including an Exmouth naval communication station and several offshore training areas including the North West Exercise Area (NWXA) and Learmonth Air Weapons Range in the EMBA. These areas are used for Defence Force training exercises, including live firing. Five UXO sites have been identified to overlap the EMBA (Section 3.5.3). There are 65 known historical shipwrecks and shipwreck artefacts located within the EMBA (see Table 3-13).	
Predicted impact:	
Surface	**In-water**
Physical displacement of other marine users may occur due to the establishment of exclusion zones during the spill response. However, due to the comparatively small area of exposure, and the fact that exclusion zones are not expected to be long-term, significant impacts are not anticipated.	In the event of a hydrocarbon spill, other marine users may be impacted by exclusion zones surrounding a spill. These users include: • Commercial shipping • Other oil and gas industry • Defence activities. Exclusion zones could reduce access for other marine users for the duration of the response undertaken for spill clean-up (if applicable) meaning vessels may have to take detours leading to potential delays and increased costs. Underwater Heritage

	In general, in-water exposure is limited to the upper 0 – 10 m of the water column, and not within the deeper areas of the water column where underwater heritage is located. Therefore, impacts are not expected.
Predicted impact summary:	
Given the nature of the hydrocarbon, being a light and non-persistent, the low probability of shoreline impacts, and high anticipated evaporation and entrainment rates (Section 5.5.2.1), any impacts to other marine users are expected to be localised and short term.	

First Nations

First Nations values and sensitivities have been assessed based on the hydrocarbon exposure based on the most conservative thresholds that have the potential to cause socio-economic effects (Section 3.1.1). Therefore, the extent of the hydrocarbon exposure has been defined by using low hydrocarbon exposure thresholds for surface, shoreline and in-water (dissolved and entrained) hydrocarbons. This is defined as the EMBA.

Table 5-50 evaluates the potential impact that hydrocarbon spills for this activity may have on First Nations values and sensitivities found within the EMBA.

Table 5-50: Risk Assessment for an accidental release of MDO – First Nations heritage

First Nations heritage		
Exposure evaluation:		
The EMBA overlaps the following Native Title Determinations (Section 3.7.3): • Ngarluma/Yindjibarndi (ID: WCD2005/001). • Ngarluma People (ID: WCD2015/007) • Yaburara & Mardudhunera People (ID: WCD2018/006) • Gnulli, Gnulli #2 and Gnulli #3 - Yinggarda, Baiyungu and Thalanyji People (ID: WCD2019/016) There are 98 registered sites present within the EMBA. First Nations people are intrinsically linked to Sea Country which encompasses lands, waterways, seas, cultural practices and values to which they are connected (AIATSIS 2025). Country is a cultural landscape which includes both tangible values (i.e. cultural heritage sites) and intangible values (i.e. creation stories and cultural practices). First Nations cultural concepts are directly connected with Country. Country describes all aspects of place, environment, spirituality, law and identity. Values of Country differ between First Nations groups, and not all First Nations groups and communities in Australia hold the same belief systems or spirituality. Sea Country is Country that extends into the ocean. Smyth and Isherwood (2016) describe Sea Country as all estuaries, beaches, bays, and marine areas collectively, within a traditional estate. Sea Country contains evidence of the ancient mystical events by which all geographic features, animals, plants and people were created. Sea Country contains sacred sites and tracks (or 'Songlines') along which mythological beings travelled during the creation period (or 'Dreamtime') (Smyth and Isherwood, 2016). The sea, like the land, is integral to the identity of First Nations groups. Connection to Sea Country is accompanied by a complexity of cultural rights and responsibilities. Coastal areas traditionally were amongst the most densely populated areas due to the abundance of resources available. Formal recognition of Sea Country rights is significantly slower compared to land rights. This could be for a range of reasons including conflicting perspectives and opinions on traditional custodianship of land and how far it extends (Smyth and Isherwood, 2016). An unplanned hydrocarbon spill will impact the waters within Sea Country for a period while the spill disperses and weathers and has the potential to disrupt cultural values of Sea Country. The likelihood of a hydrocarbon spill occurring is assessed as highly unlikely and the actual area that may be affected from any single spill event would be considerably smaller than represented by the EMBA. The sea component of these areas may be contacted from surface, in-water, and shoreline hydrocarbon exposure. Hydrocarbon exposure may have the potential to impact the aesthetic and cultural values of Sea Country by the presence of physical hydrocarbons or the presence of oil spill responders.		
Predicted impact:		
Surface	**In-water**	**Shoreline**
Visible surface hydrocarbons have the potential to reduce the visual amenity of known culturally significant values identified within the marine	First Nations people connection to Sea Country could potentially be impacted by exposure to hydrocarbons. See Section 3.7 for further details of the values.	Visible hydrocarbons along a shoreline have the potential to reduce the visual amenity of known heritage sites along the coastline, subsequently potentially

environment, subsequently potentially impacting the value of the site to First Nations people. The Kariyarra Aboriginal Corporation, Ngarluma Aboriginal Corporation, Wanparta Aboriginal Corporation and the Murujuga Aboriginal Corporation identified values, features and interests of cultural value during consultation (Table 3-19). These areas, however, sit outside the EMBA and are unlikely to be exposed to hydrocarbons in the event of a spill. Refer also to: • Seabirds and shorebirds • Marine reptiles • Marine mammals.	In-water exposure at relevant thresholds may impact culturally important significant coastal habitats such as mangroves, and species to First Nations peoples, such as cetaceans, marine reptiles, and fish which may impact the cultural value of the species and cultural obligation to care for Country. The 10 ppb low entrained exposure threshold (used to define the extent of the EMBA) represents the very lowest concentration and corresponds generally with the lowest trigger levels for chronic exposure for entrained hydrocarbons in water quality guidelines, no ecological impacts are anticipated at this threshold. It is considered highly unlikely that there will be long-term impacts to First Nations activities from contact at the low entrained threshold. Furthermore, the spill scenario is expected to be localised and short term, with the MDO rapidly weathering within the first few days. As evaluated above, impacts and risks to First Nations values are not expected to result in widespread long-term impacts to Sea Country, ecosystem functions and integrity, or culturally significant species populations. Refer also to: • Benthic habitats and communities • Marine invertebrates • Mangroves • Cetaceans • Marine reptiles • Seabirds and shorebirds • State Marine Parks • Commonwealth Marine Parks.	impacting the value of the site to First Nations people. Refer also to: • Coastal habitats • State Marine Parks.

Predicted impact summary:
First Nations people's connection to Sea Country could potentially be impacted by exposure to hydrocarbons. However, due to the characteristics of the spill scenario, and the open water conditions of the Operational Area, the MDO is anticipated to rapidly disperse through the mixing of surface waters and near surface waters, driven by tidal current and wave action. Aboriginal Corporations identified a number of values, features and interests of cultural value during consultation (Table 3-19). These areas sit outside the Operational Area, however some of these are located within the EMBA and may be exposed to hydrocarbons in the event of a spill. Consequently, the potential impacts and risks to cultural heritage receptors from an accidental of MDO are expected to result in localised medium-term impacts to socio-economic activities.

5.5.4 Risk Ranking

Vessel movements will occur within the Operational Area, introducing the potential for vessel collisions resulting in an accidental release of MDO. However, given the hydrocarbon characteristics of MDO as a light non-persistent hydrocarbon, the anticipated rapid weathering of the MDO, and minimal shoreline accumulation, any impact is anticipated to be predominantly highly localised, with short-medium term impacts to individuals, not affecting species populations or general ecosystem functioning. Therefore:

- The consequence ranking of '3' (Moderate) was assigned to a change in water quality, coastal communities, and First Nations values, and a likelihood of 'B' (Unlikely) was considered appropriate, resulting in a risk ranking of 'Medium' (RRIII).
- The consequence ranking of '2' (Minor) was assigned to benthic habitats, marine fauna, protected and significant area, and social and economic environment, and a likelihood of 'B' (Unlikely) was considered appropriate, resulting in a risk ranking of 'Low' (RRIV).

5.5.5 ALARP Demonstration

Table 5-43 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with accidental release of diesel. No additional controls were identified that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with an accidental release of MDO from handling, storage or distribution are assessed as low as reasonably practicable.

5.5.6 Acceptability Demonstration

Table 5-51: Acceptability demonstration - Accidental release – Marine diesel oil

ACCEPTABLE LEVEL OF IMPACT/RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant principles of ESD not compromised given proposed controls.
External context – objections or claims considered	N/A – no external objections or claims received.
Internal context – VOGA HSE policy/procedure met	Yes – Risk managed in accordance with VOGA HSE policy. Potential spills to be managed in accordance with the Wandoo Field OSCP [WAN-2000-RD-0001].
Other requirements met	Yes – including: • Notice to Mariners issued via AMSA in a timely manner. • Potential spills to be managed in accordance with SOPEP/SMPEP (equivalent to class)

	It is considered that the petroleum activity is consistent with the objectives and actions of the following EPBC management plans that identify marine pollution as a threat (Table 1-3): • National Recovery Plan for albatrosses and petrels (2022) (DCCEEW, 2022a) • National recovery plan for the red goshawk *Erythrotriorchis radiatus* (DCCEEW, 2012) • National Recovery Plan for the Australian Fairy Tern (*Sternula nereis nereis*) (DAWE, 2020a) • Approved Conservation Advice for *Sternula nereis nereis* (Fairy Tern) (TSSC, 2011) • Approved Conservation Advice for *Calidris canutus* (Red Knot) (DCCEEW, 2024k) • Approved Conservation Advice for *Calidris frruginea* (Curlew sandpiper) (DCCEEW, 2023a) • Approved Conservation Advice for *Papasula abbotti* (Abbott's booby) (TSSC, 2020a) • Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW, 2024o) • Conservation Advice for *Charadrius leschenaultii* (greater sand plover) (DCCEEW, 2023e) • Conservation Advice for *Limnodromus semipalmatus* (Asian dowitcher) (DCCEEW, 2024m) • Conservation Advice for *Numenius madagascariensis* (far eastern curlew) (DCCEEW, 2023g) • Conservation Advice *Phaethon lepturus fulvus* white-tailed tropicbird (Christmas Island) (DoE, 2014) • Conservation Advice for *Tringa nebularia* (common greenshank) (DCCEEW, 2024p) • Wildlife Conservation Plan for Migratory Shorebirds – 2015 (DoE, 2015b) • Approved Conservation Advice for *Pristis zijsron* (green sawfish) (DEWHA, 2008b) • Approved Conservation Advice for *Pristis clavata* (dwarf sawfish) (DEWHA, 2009) • Sawfish and River Sharks Multispecies Recovery Plan: (*Pristis, Pristis zijsron, Pristis clavata, Glyphis and Glyphis garricki*) (DoE, 2015c) • Recovery Plan for Marine Turtles in Australia, 2017-2027 (Commonwealth of Australia, 2017) • Approved Conservation Advice for short-nosed sea snake (*Aipysurus apraefrontalis*) (DSEWPC, 2011b) • Approved Conservation Advice for *Aipysurus foliosquama* (Leaf-scaled Sea Snake) (DSEWPC, 2011c).
RR < High (RRII)	Yes – Medium (RRIII).

EPO(s) manage impacts to acceptable levels	Yes – The following relevant EPOs will be maintained: • EPO-OP-01 • EPO-OP-02 See Section 7 for further details.
Acceptability summary: The impacts and potential risks of an accidental release of MDO have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-43), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.9).	

5.6 Accidental Release – Produced Fluids from Topsides Process

5.6.1 Hazard Report

Table 5-52: Hazard report – Accidental release – Produced fluids from topsides process

HAZARD	Accidental release – Produced fluids from topsides process
EP risk no.	EP-OP-R17
Activity cause	Failure of process piping and vessels from over pressuring, human error during process break-ins, erosion and corrosion, process upsets and dropped objects.
Potential impacts	Release of up to 3 m^3 of oil to sea.
Extent and duration	Highly localised short-term impacts which rapidly recovers.

PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Failure of process piping and vessels from over pressuring.	Pipework and pressure vessel containment.	Administration	Prevention	EPO-OP-01 No unplanned discharge of hydrocarbons or chemicals to the marine environment.	Physical condition of process pipework and pressure vessel shall allow safe containment of pressurised hydrocarbons, and anomalous effects shall satisfy fitness for service.	Pressure integrity performance monitoring records. Routine pressure integrity review meetings, with summaries of inspection metrics (inspections completed and in backlog), and summaries of new anomalies and overdue remediation actions
	Pressure safety devices to prevent overpressure leading to loss of containment.	Administration	Prevention		Pressure relief devices shall relieve at the set pressure.	Records of maintenance and inspection tasks: • A0001909 : 1010 • A0001910 : 1010 • A0001911 : 1010 • A0001912 : 1010 • A0002063 : 1010.
	Competency management of Wandoo production team members.	Administration	Reduction		All production team members shall have the required level of role-specific training and be assessed as competent to perform their duties.	Training plan and competency records.
Human error during process break-ins.	Isolation controls to ensure adequate drainage, venting and positive isolation prior to performing a process break-in.	Administration	Prevention	EPO-OP-01 No unplanned discharge of hydrocarbons or chemicals to the marine environment.	Equipment and/or facilities are adequately prepared for work activities to be performed, including safe and environmentally sound draining, venting, purging and isolation. Equipment and/or facilities are reinstated to a safe and environmentally sound working condition after the work activity is completed, and that appropriate personnel are made aware of the revised equipment status.	Isolation records on permit to work forms are completed in accordance with the Work Management Manual [WPA-7000-YG-0021].
Process upsets resulting in unplanned hydrocarbon release through produced water discharge.	Instrument protective and alarm systems (interface level low level trips in production and second stage separators).	Engineering	Reduction	EPO-OP-01 No unplanned discharge of hydrocarbons or chemicals to the marine environment.	Level transmitters in production and second stage separators are maintained.	Maintenance records.
	Topsides hazardous drains and bunding on WNB.	Engineering	Prevention		There shall be no significant damage or deterioration of bunded areas and drainage systems on WNB such that the system will not contain hydrocarbons.	Maintenance records.

PREVENTION						
Dropped objects/ swinging loads onto topsides equipment.	Lifting management procedures.	Administrative	Reduction	EPO-OP-01 No unplanned discharge of hydrocarbons or chemicals to the marine environment.	Crane operations shall be managed as per the Crane Operations, Maintenance and Inspection Manual [WPA-7000-YM-0002] to ensure safe lifting operations when lifting over live process.	Documentation as per Critical lifting requirements and Crane Operator Checklist completed prior to crane operation.
	Crane maintenance.	Engineering	Prevention		Performance criteria, as per WAN-WNAB-CE-PR-05-01 - Platform Cranes and Man-riding Winch. Safely perform lifting operations to prevent dropped objects or swinging loads.	Assurance records, as per WAN-WNAB-CE-PR-05-01 - Platform Cranes and Man-riding Winch.

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Shutdown system.	Engineering	Mitigation	EPO-OP-01 No unplanned discharge of hydrocarbons or chemicals to the marine environment.	On receipt of signal from field initiators Integrated Control System shall operate and send an output signal in accordance with the Cause and Effects.	Maintenance records for Function Test of ESD 1 and ESD2: • A0001129:1040.
Wandoo Emergency Response Plan [VOG-2000-RD-0017].	Administrative	Mitigation	EPO-OP-02 In the event of loss of hydrocarbons, implement NOPSEMA-accepted spill response documents.	Emergency response arrangements are adequate to manage identified oil spill emergency scenarios Emergency/oil spill response organisational arrangements shall allow effective response management regardless of the scale of the emergency Emergency/oil spill response personnel shall be competent for the ICT role to which they are assigned	Annual oil spill response capability review confirms following arrangements are in place: • Oil spill response testing as per VOGA Emergency Response Schedule [VOG-1100-YH-0001]. • Post exercise and incident review of emergency response arrangements. • Training and competency records are maintained for ICT members.
The NOPSEMA-accepted Wandoo Field OSCP [WAN-2000-RD-0001] will be implemented.	Administrative	Mitigation		Oil spill response strategies shall be implemented in accordance with the Wandoo Field OSCP [WAN-2000-RD-0001].	IAP records.
The NOPSEMA accepted Wandoo Field Operational and Scientific Monitoring Bridging Implementation Plan [VOG-1100-RG-0002] will be implemented.	Administrative	Mitigation		Oil spill operational and scientific monitoring shall be implemented in accordance with the VOGA Operational and Scientific Monitoring Bridging Implementation Plan [VOG-1100-RG-0002].	IAP records

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Minor (2)	Unlikely (B)	Low risk

ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
A low risk is defined as acceptable and typically do not require special attention outside of normal activities under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		
Additional management controls	**Assessment of option**	**Adopted/not adopted**
Refer to Section 5.4.1 for oil spill response ALARP evaluation tables.		

RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Minor (2)	Unlikely (B)	Low risk

5.6.2 Description of Hazard

Loss of crude oil from the topsides production facilities may occur due to failure of process piping and vessels from over pressuring, human error during process break-ins, erosion and corrosion, process upsets and dropped objects.

A hydrocarbon release from the topsides process facilities is likely to continue for a significant duration depending on the size of the release, inventory and operating pressure. In the event of a leak detected by the fire and gas system, the ESD system will isolate the entire topsides process to minimise the inventory which could be released into the environment.

The maximum credible volume of production fluid that may be released due to a leak from the topsides facility is assumed to be the maximum volume of the largest tank (100 m3).Impact and Risk Evaluation

The accidental release of produced fluid from topside processes may result in:

- A change in water quality.

The potential risks from a change in water quality caused by an accidental release of produced fluid from topside processes include:

- Injury/mortality to marine fauna.

The following receptors within the Operational Area may be impacted by an accidental release of produced fluid from topside processes:

- Water quality
- Marine fauna.

5.6.2.1 Risk Assessment

Water Quality

Change in Water Quality

The accidental release of produced fluid from topside processes into the marine environment has the potential to cause a localised reduction of the water quality in the receiving marine environment. Produced fluids are mostly water, however, will contain 2-8% Wandoo Crude. A visible oil sheen on the water surface may also occur in the event of minor hydrocarbon spills. Wandoo Crude is classified as a persistent crude, due to the proportion of hydrocarbon compounds which are unlikely to evaporate in the marine environment. Discharge would be at the surface, meaning any discharge would be subjected to rapid dispersion and dilution by the open ocean environment.

Given the small volume of accidental release, any change in the water quality following a minor spill is anticipated to be highly localised, within the immediate vicinity of the release and result in short-term impacts which rapidly recovers.

See Section 5.2 for the impact assessment of a worst-case loss of containment of Wandoo Crude.

Marine Fauna

Injury/Mortality to Marine Fauna

As a result of a change in water quality from an accidental release of produced fluid from topside processes, further impacts to receptors may occur, which include potential injury or mortality from toxicity exposure to sensitive marine fauna, such as surfacing plankton. Given the small volume of accidental release, potential impacts would be highly localised and temporary, and the potential for toxicity to marine fauna will be rare as the temporary exposure will preclude toxic effects.

See Section 5.2 for the impact assessment of a worst-case loss of containment of Wandoo Crude.

5.6.3 Risk Ranking

An accidental release of produced fluid from topside processes is expected to result in highly localised and temporary change to water quality within the immediate vicinity of the release. Due to the offshore oceanographic nature of the environment, the minimal volume, and low toxicity of the spill, impacts to water quality and to marine fauna are expected to be localised and short-term. Therefore,

- The consequence ranking of '2' (Minor) was assigned to water quality, and a likelihood of 'B' (Unlikely) was considered appropriate, resulting in a risk ranking of 'Low' (RRIV).
- The consequence ranking of '1' (Incidental) was assigned to marine fauna and a likelihood of 'B' (Unlikely) was considered appropriate, resulting in a risk ranking of 'Low' (RRIV).

5.6.4 ALARP Demonstration

Table 5-52 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with accidental release from topsides equipment. No additional controls were identified that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with an accidental release of produced fluids from topsides equipment are assessed as low as reasonably practicable.

5.6.5 Acceptability Demonstration

Table 5-53: Acceptability demonstration - Accidental release – Produced fluids from topsides process

ACCEPTABLE LEVEL OF IMPACT/RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant principles of ESD not compromised given proposed controls.
External context – objections or claims considered	N/A – no external objections or claims received.

Internal context – VOGA HSE policy/procedure met	Yes – Risk managed in accordance with VOGA HSE policy. • Potential spills to be managed in accordance with the Wandoo Field Oil Spill Contingency Plan (OSCP) [WAN-2000-RD-0001].
Other requirements met	Yes – Notice to Mariners issued via AMSA in a timely manner. • Potential spills to be managed in accordance with SOPEP/SMPEP (equivalent to class) It is considered that the petroleum activity is consistent with the objectives and actions of the following EPBC management plans that identify marine pollution as a threat (Table 1-3): • National recovery plan for the red goshawk *Erythrotriorchis radiatus* (DCCEEW, 2012) • National Recovery Plan for the Australian Fairy Tern (*Sternula nereis nereis*) (DAWE, 2020a) • Approved Conservation Advice for *Sternula nereis nereis* (Fairy Tern) (TSSC, 2011) • Approved Conservation Advice for *Calidris canutus* (Red Knot) (DCCEEW, 2024k) • Approved Conservation Advice for *Calidris frruginea* (Curlew sandpiper) (DCCEEW, 2023a) • Approved Conservation Advice for *Papasula abbotti* (Abbott's booby) (TSSC, 2020a) • Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW, 2024o) • Conservation Advice for *Charadrius leschenaultii* (greater sand plover) (DCCEEW, 2023e) • Conservation Advice for *Limnodromus semipalmatus* (Asian dowitcher) (DCCEEW, 2024m) • Conservation Advice for *Numenius madagascariensis* (far eastern curlew) (DCCEEW, 2023g) • Conservation Advice *Phaethon lepturus fulvus* white-tailed tropicbird (Christmas Island) (DoE, 2014) • Conservation Advice for *Tringa nebularia* (common greenshank) (DCCEEW, 2024p) • Wildlife Conservation Plan for Migratory Shorebirds – 2015 (DoE, 2015b) • Approved Conservation Advice for *Pristis zijsron* (green sawfish) (DEWHA, 2008b) • Approved Conservation Advice for *Pristis clavata* (dwarf sawfish) (DEWHA, 2009) • Sawfish and River Sharks Multispecies Recovery Plan: (*Pristis pristis, Pristis zijsron, Pristis clavata, Glyphis glyphis and Glyphis garricki*) (DoE, 2015c).
RR < High (RRII)	Yes – Low (RRIV).

EPO(s) manage impacts to acceptable levels	Yes – The following relevant EPOs will be maintained: • EPO-OP-01 • EPO-OP-02 See Section 7 for further details.
Acceptability summary: The impacts and potential risks of an accidental release of produced fluid from topside processes have been managed to a level that is broadly acceptable based on the demonstration of ALARP, alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.9).	

5.7 Accidental Release – Crude from Flow Lines and Risers

5.7.1 Hazard Report

Table 5-54: Hazard report – Liquid hydrocarbon release from flow lines and risers

HAZARD	Liquid hydrocarbon release from flow lines and risers
EP risk no.	EP-OP-R22
Activity/cause	Loss of integrity of hydrocarbon containing equipment. Incorrect operation of valves during pigging operation. Structural failure of the platform due to fatigue/aging asset. Vessel collision with riser.
Potential impacts	Liquid hydrocarbon release to environment, i.e. 0.8 m^3 of oil to sea.
Extent and duration	Highly localised short-term impacts which rapidly recovers.

PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Performance standard**	**Measurement criteria**
Loss of integrity of hydrocarbon containing equipment.	Production risers are designed and tested to maximum allowable operating pressure.	Engineering	Prevention	EPO-OP-01 No unplanned discharge of hydrocarbons or chemicals to the marine environment.	The Wall Thickness of production risers shall be sufficient to satisfy fitness for service.	Records of inspection task: • A0003000 : 1010.
	Production flow lines shall contain pressurised well fluids.	Engineering	Prevention		• There shall be no visible damage to the outer sheath. • There shall be no over-bending of the flowline. • There shall be no evidence of leaking from the flowline (except from fitted gas relief valves at less than one bubble per minute).	Records inspection task: • Visual Inspection A0002158 : 1010 • Visual Inspection A0002158 : 1020.
Incorrect operation of valves during pigging operation.	Pigging procedure specifies correct valve sequence.	Administrative	Prevention		Pigging procedure specifies correct valve sequence within the Wandoo Platform Operations Manual [VOG-7000-MN-0001].	Records of pigging activity in Pigging Report.
Structural failure of the platform due to fatigue aging asset.	Codes and standards as per facilities' Basis of Design.	Engineering	Prevention		Performance criteria, as per WAN-WNAB-CE-PR-07-01.01 (Superstructure - Primary Structural Steel); WAN-WNAB-CE-PR-07-02.04 (Substructure - Corrosion control measures).	Assurance records, as per WAN-WNAB-CE-PR-07-01.01 (Superstructure - Primary Structural Steel); WAN-WNAB-CE-PR-07-02.04 (Substructure - Corrosion control measures).
Vessel collision with riser.	Vessels to adhere to the navigation safety requirements including the *Navigation Act 2012* and any subsequent Marine Orders.	Administrative	Prevention		Vessels compliant with *Navigation Act 2012* and Marine Order 21 (Safety of navigation and emergency procedures) and Marine Order 30 (Prevention of collisions).	Marine assurance inspection records demonstrate compliance with standard maritime safety procedures.

PREVENTION						
	Static tow by support vessel to control tanker position.	Engineering	Reduction		A support vessel shall be present to assist with each offtake operation and must remain connected to the Tanker, providing static tow, throughout the offtake as per as per the SPM Marine Facility Procedures [WPA-7000-YV-0002].	Safety Checklist

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Performance standard**	**Measurement criteria**
Shutdown system.	Engineering	Mitigation	EPO-OP-01 No unplanned discharge of hydrocarbons or chemicals to the marine environment.	On receipt of signal from field initiators Integrated Control System shall operate and send an output signal in accordance with the Cause and Effects.	Maintenance records for Function Test of ESD 1 and 2: • A0001129:1040.
Wandoo Emergency Response Plan [VOG-2000-RD-0017].	Administrative	Mitigation	EPO-OP-02 In the event of loss of hydrocarbons, implement NOPSEMA-accepted spill response documents.	Emergency response arrangements are adequate to manage identified oil spill emergency scenarios Emergency/oil spill response organisational arrangements shall allow effective response management regardless of the scale of the emergency Emergency/oil spill response personnel shall be competent for the ICT role to which they are assigned	Annual oil spill response capability review confirms following arrangements are in place: • Oil spill response testing as per VOGA Emergency Response Schedule [VOG-1100-YH-0001]. • Post exercise and incident review of emergency response arrangements. • Training and competency records are maintained for ICT members.
The NOPSEMA-accepted Wandoo Field Oil Spill Contingency Plan Document 2: Oil Pollution Emergency Plan [WAN-2000-RD-0001.02] will be implemented.	Administrative	Mitigation		Oil spill response strategies shall be implemented in accordance with the Wandoo Field OSCP [WAN-2000-RD-0001].	IAP records.
The NOPSEMA accepted Wandoo Field Operational and Scientific Monitoring Bridging Implementation Plan [VOG-1100-RG-0002] will be implemented.	Administrative	Mitigation		Oil spill operational and scientific monitoring shall be implemented in accordance with the VOGA Operational and Scientific Monitoring Bridging Implementation Plan [VOG-1100-RG-0002].	IAP records

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Incidental (1)	Unlikely (B)	Low risk
ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
A low risk is defined as acceptable and typically do not require special attention outside of normal activities under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		
Additional management controls	**Assessment of option**	**Adopted/Not adopted**
Refer to Section 5.4.1 for oil spill response ALARP evaluation tables.		
Protection of flow lines (in areas which can be impacted by dropped objects)	This item was not considered necessary with no risk mitigation potential as the crane has limited reach over the flow lines.	Not adopted

INITIAL RISK WITH EXISTING CONTROLS		
Standby vessel in situ 24 hrs/day to monitor the PSZ and be equipped with an automatic identification system to aid in its detection at sea, and radar to aid in the detection of approaching third-party vessels.	Reduces risk of vessel collision to riser and subsequent unplanned release of hydrocarbons. High cost associated with contracting standby vessel. Costs of operating navigational equipment. The costs associated with having a vessel on location 24/7 are considered disproportionate to the environmental benefit gained, particularly given the infrastructure are marked on charts and navigational aids are present.	Not adopted
RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Incidental (1)	Unlikely (B)	Low risk

5.7.2 Description of Hazard

Accidental release of Wandoo Crude from subsea infrastructure (flowlines and risers) could occur as a result of the following scenarios:

- Corrosion of subsea infrastructure
- Human error during pigging
- Structural failure
- Vessel collision with infrastructure i.e. riser
- Dropped objects.

VOGA has assessed all possible spill pathways and determined that the largest possible spill volume from these scenarios is 0.8 m^3 of Wandoo Crude, based on the shut in inventory of the riser and the composition of oil in the reservoir fluids.

5.7.3 Impact and Risk Evaluation

The accidental release of Wandoo Crude from subsea infrastructure may result in:

- A change in water quality.

The potential risks from a change in water quality caused by an accidental release of Wandoo Crude from subsea infrastructure include:

- Injury/mortality to marine fauna.

The following receptors within the Operational Area may be impacted by an accidental release of Wandoo Crude from subsea infrastructure:

- Water quality
- Marine fauna.

5.7.3.1 Risk Assessment

Water Quality

Change in Water Quality

The accidental release of Wandoo Crude from subsea infrastructure into the marine environment has the potential to cause a localised reduction of the water quality in the receiving marine environment. A visible oil sheen on the water surface may also occur in the event of minor hydrocarbon spills. Wandoo Crude is classified as a persistent crude, due to the proportion of hydrocarbon compounds which are unlikely to evaporate in the marine environment. Discharge would be at the seabed or within the water column, which also reduces the weathering potential as there is less opportunity for wave action or winds to degrade the hydrocarbon compounds.

However, given the small volume of accidental release, any change in the water quality following a minor spill is anticipated to be highly localised, within the immediate vicinity of the release and result in short-term impacts which rapidly recovers.

See Section 5.2 for the impact assessment of a worst-case loss of containment of Wandoo Crude.

Marine Fauna

Injury/Mortality to Marine Fauna

As a result of a change in water quality from an accidental release of Wandoo Crude from subsea infrastructure, further impacts to receptors may occur, which include potential injury or mortality from toxicity exposure to sensitive marine fauna, such as surfacing plankton. Given the small volume of accidental release, potential impacts would be highly localised and temporary, and the potential for toxicity to marine fauna will be rare as the temporary exposure will preclude toxic effects.

See Section 5.2 for the impact assessment of a worst-case loss of containment of Wandoo Crude.

5.7.4 Risk Ranking

An accidental release of Wandoo Crude from subsea infrastructure is expected to result in highly localised and temporary change to water quality within the immediate vicinity of the release. Due to the offshore oceanographic nature of the environment, the minimal volume, and low toxicity of the spill, impacts to water quality and to marine fauna are expected to be localised and short-term. Therefore,

- The consequence ranking of '1' (Incidental) was assigned to water quality, and a likelihood of 'B' (Unlikely) was considered appropriate, resulting in a risk ranking of 'Low' (RRIV).
- The consequence ranking of '1' (Incidental) was assigned to marine fauna and a likelihood of 'B' (Unlikely) was considered appropriate, resulting in a risk ranking of 'Low' (RRIV).

5.7.5 ALARP Demonstration

Table 5-54 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with accidental release from flowlines and risers. No additional controls were identified that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with an accidental release of Wandoo crude from flowlines and risers are assessed as low as reasonably practicable.

5.7.6 Acceptability Demonstration

Table 5-55: Acceptability demonstration – Accidental release – Crude from flow lines and risers

ACCEPTABLE LEVEL OF IMPACT/RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant principles of ESD not compromised given proposed controls.
External context – objections or claims considered	N/A – no external objections or claims received.

Internal context – VOGA HSE policy/procedure met	Yes – Risk managed in accordance with VOGA HSE policy. Potential spills to be managed in accordance with the Wandoo Field Oil Spill Contingency Plan (OSCP) [WAN-2000-RD-0001].
Other requirements met	Yes – Notice to Mariners issued via AMSA in a timely manner. • Potential spills to be managed in accordance with SOPEP/SMPEP (equivalent to class) It is considered that the petroleum activity is consistent with the objectives and actions of the following EPBC management plans that identify marine pollution as a threat (Table 1-3): • National recovery plan for the red goshawk *Erythrotriorchis radiatus* (DCCEEW, 2012) • National Recovery Plan for the Australian Fairy Tern (*Sternula nereis nereis*) (DAWE, 2020a) • Approved Conservation Advice for *Sternula nereis nereis* (Fairy Tern) (TSSC, 2011) • Approved Conservation Advice for *Calidris canutus* (Red Knot) (DCCEEW, 2024k) • Approved Conservation Advice for *Calidris frruginea* (Curlew sandpiper) (DCCEEW, 2023a) • Approved Conservation Advice for *Papasula abbotti* (Abbott's booby) (TSSC, 2020a) • Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW, 2024o) • Conservation Advice for *Charadrius leschenaultii* (greater sand plover) (DCCEEW, 2023e) • Conservation Advice for *Limnodromus semipalmatus* (Asian dowitcher) (DCCEEW, 2024m) • Conservation Advice for *Numenius madagascariensis* (far eastern curlew) (DCCEEW, 2023g) • Conservation Advice *Phaethon lepturus fulvus* white-tailed tropicbird (Christmas Island) (DoE, 2014) • Conservation Advice for *Tringa nebularia* (common greenshank) (DCCEEW, 2024p) • Wildlife Conservation Plan for Migratory Shorebirds – 2015 (DoE, 2015b) • Approved Conservation Advice for *Pristis zijsron* (green sawfish) (DEWHA, 2008b) • Approved Conservation Advice for *Pristis clavata* (dwarf sawfish) (DEWHA, 2009) • Sawfish and River Sharks Multispecies Recovery Plan: (*Pristis pristis, Pristis zijsron, Pristis clavata, Glyphis glyphis* and *Glyphis garricki*) (DoE, 2015c).
RR < High (RRII)	Yes – Low (RRIV).

EPO(s) manage impacts to acceptable levels	Yes – The following relevant EPOs will be maintained: • EPO-OP-01 • EPO-OP-02 See Section 7 for further details.
Acceptability summary: The impacts and potential risks of an accidental release of Wandoo Crude from subsea infrastructure have been managed to a level that is broadly acceptable based on the demonstration of ALARP, alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.9).	

5.8 Discharge of PFW and Ballast Water

5.8.1 Hazard Report

Table 5-56: Hazard report – Discharge of PFW and ballast water from WNB

HAZARD	Discharge of PFW and ballast water from WNB					
EP risk no.	EP-OP-R06					
Activity Cause	Planned discharge of PFW and ballast water from WNB.					
Potential impacts	Change in water quality. Change in sediment quality. Bioaccumulation in marine fauna. Toxic effects to marine fauna.					
Extent and duration	Ongoing discharges with no effect beyond mixing zone (3.7 km).					
PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Planned PFW discharge.	Instrument protective and alarm systems (interface level low level trips in production and second stage separators).	Engineering	Prevention	EPO-OP-03 No impact to the environment outside the mixing zone from planned discharge of PFW and ballast water.	Level transmitters in production and second stage separators are maintained.	Maintenance records show level transmitters in production and second stage separators are maintained.
	Automatic shutoff solenoids installed to reduce potential for chemical overdosing when production is offline.	Engineering	Prevention		Automatic shutoff solenoids are maintained.	Maintenance records show automatic shutoff solenoids are maintained.
	OIW concentration monitored and alarmed in the MCS.	Engineering	Reduction		High and high-high OIW alarm set based on the Acceptable and Unacceptable daily OIW averages for the relevant Flow Regime (Table 5-57).	Calibration records of inline OIW analyser show High and high-high OIW alarm set based on the Acceptable and Unacceptable daily OIW averages for the relevant Flow Regime.
		Administration	Reduction		OIW performance shall be reported internally and reviewed daily in accordance with Platform Operations Manual [VOG-7000-MN-0001].	Wandoo daily report shows OIW performance.
		Engineering	Reduction		In the event the inline OIW analyser is out of service, manual OIW analysis will be undertaken (twice daily during normal operations, six times daily if diverting PFW inboard), in accordance with Platform Operations Manual [VOG-7000-MN-0001].	OIW test records shows manual OIW analysis undertaken in the event the inline PIW analyser is out of service.
		Administration	Reduction		OIW levels are monitored so as to not reach unacceptable 24-hour OIW limits in accordance with Platform Operations Manual [VOG-7000-MN-0001].	24-hour inline OIW analyser records Recordable incident reports for Unacceptable Limit exceedances.

PREVENTION						
		Engineering	Reduction		Deviation of inline OIW analyser results from manual OIW analysis results will be managed in accordance with Produced Water Adaptive Management Strategy [WNB-7000-RP-0010].	OIW test records from the offshore laboratory show deviation of OIW results managed in accordance with Produced Water Adaptive Management Strategy [WNB-7000-RP-0010].
	Produced Water Adaptive Management Strategy [WNB-7000-RP-0010].	Administration	Reduction		In the event the Produced Water Adaptive Management Strategy [WNB-7000-RP-0010] is triggered, adaptive management including identifying causes of constituent excursions will be implemented.	Records show the Produced Water Adaptive Management Strategy [WNB-7000-RP-0010] is implemented when triggered. Records show process of identification of constituent excursions as per the Produced Water Adaptive Management Strategy [WNB-7000-RP-0010].
	PFW discharge overboard can be diverted inboard.	Engineering	Reduction		PFW OIW exceedances shall be managed in accordance with WNB-012-502 - Measurement and Reporting of Produced Formation and Ballast Water Oil in Water Content • PFW shall be diverted inboard if the rolling average (or any 4 hourly manual laboratory sample) exceeds the Unacceptable limit. • Continue to diverting inboard until such time the OIW concentration is below the unacceptable limit.	OIW exceedances recorded in the OIW Event Log Recordable incident reports for Unacceptable Limit exceedances show management in accordance with WNB-012-502 - Measurement and Reporting of Produced Formation and Ballast Water Oil in Water Content.
	PFW discharge flow rates are monitored.	Engineering	Reduction		Discharge flow rate shall be monitored and maintained such that maximum limits are not exceeded in accordance with Platform Operations Manual [VOG-7000-MN-0001].	Wandoo daily report shows discharge flow rate monitored and maintained.
	Routine external laboratory testing to ensure PFW chemistry is within assumed levels.	Engineering	Reduction		A PFW representative sample shall be sent to a National Association of Testing Authorities (NATA) accredited laboratory on a monthly basis for OIW analysis to confirm accuracy of daily measurement methodology.	Monthly laboratory records of PFW.
		Engineering	Reduction		PFW chemistry monitoring is undertaken on a yearly basis, or more frequently if adaptive management is triggered in accordance with Table 8-13 of this EP.	Laboratory analysis records shows annual PFW chemistry monitoring.
		Engineering	Reduction		The toxicity of an end-of-pipe PFW sample is assessed on a two yearly basis, or more frequently if adaptive management triggered in accordance with Table 8-13 of this EP.	Laboratory analysis records shows DTA undertaken on two yearly basis, or more frequently if required.
	Chemical assessment and selection process.	Administration	Reduction		Chemicals used in the production process that will be discharged to the marine environment are selected in accordance with the Process Chemical Management Manual [WNB-7000-YC-0001].	Chemical assessment records. Assessment of existing chemicals is outlined in the review of current process chemicals.
		Administration	Reduction		Incumbent process chemicals NICNAS registration and OCNS substitution warnings will be reviewed annually.	Records show incumbent process chemicals NICNAS registration and OCNS.

PREVENTION						
Planned discharge of ballast water.	Instrument protective and alarm systems (interface level low level trips in production and second stage separators).	Engineering	Prevention		Level transmitters in production and second stage separators are maintained.	Records show instrument protective and alarm systems are maintained.
	WNB-012-502 - Measurement and Reporting of Produced Formation and Ballast Water Oil in Water Content.	Administration	Reduction		WNB-012-502 - Measurement and Reporting of Produced Formation and Ballast Water OIW Content outlines a process to identify and record OIW excursions.	Causes for OIW excursions are reviewed as per the WNB-012-502 - Measurement and Reporting of Produced Formation and Ballast Water Oil in Water Content.
	Ballast water discharge overboard can be deferred to allow for fault finding.	Engineering	Reduction		OIW levels are shall be monitored via the 24-hour OIW inline OIW analyser so as to not reach unacceptable 24-hour OIW limits in accordance with WNB-012-502 - Measurement and Reporting of Produced Formation and Ballast Water Oil in Water Content.	24-hour OIW inline OIW analyser records.
MITIGATION						
Existing management controls		**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
None identified.		N/A	N/A	N/A	N/A	N/A

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Incidental (1)	Almost Certain (E)	Medium risk

ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
A Medium risk is defined as tolerable on demonstration of ALARP under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		
Additional management controls	**Assessment of option**	**Adopted/not adopted**
Transport PFW to shore via vessel.	Disposal of PFW to a vessel tank would result in zero PW disposal to the marine environment PW volumes per day are vastly in excess of vessel storage and would require many vessels operating on a 24 hour basis between the FPSO and shore. This presents additional risks (e.g. spill risk, vessel presence, discharge). High cost of multiple vessels on contract. Additional environmental risks outweigh the environmental benefits.	Not adopted
Drill PW reinjection wells.	Will allow PW to be re-injected into a well rather than be discharged to the marine environment Drilling a re-injection well and installation of required water injection equipment is cost prohibitive and will pose other environmental impacts / risks (cuttings discharge, oil spill risk).	Not adopted

ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
Additional production chemical management processes.	Chemicals are currently managed via a rigorous selection process (e.g., OCNS/CHARM rankings or equivalent) and monitored via annual PFW chemical composition testing. Recent in-field monitoring (Worley, 2025) confirms that current production chemicals are already rapidly diluted to below analytical Limits of Reporting (LOR) within 100 m of the discharge point. Implementing further management processes (such as real-time chemical tracer tracking or tertiary treatment) would require significant capital expenditure and increased offshore logistical complexity. Given that current concentrations are already below ANZG (2018) PC99 levels, further management would result in no measurable improvement to the protection of marine fauna or water quality.	Not adopted
Further ecotoxicological testing.	Annual Whole Effluent Toxicity (WET) testing and Direct Toxicity Assessments (DTA) are already performed to verify the 3.7 km defined mixing zone. Current WET testing protocols are already based on the most sensitive life stages (larvae/embryos). Further testing would likely yield the same conservative results already used to protect megafauna. The current "1-hour exposure" threshold is already a highly conservative proxy. Additional testing on more species would not change the fundamental assessment that mobile megafauna (whales, turtles, whale sharks) transit the area faster than toxic effects can occur. The cost of additional specialised laboratory testing provides no additional "safety" to the environment beyond the rigorous buffers already established.	Not adopted
Improving the ecotoxicity and water chemistry analysis regime.	The regime includes annual WET testing, chemical composition analysis, and periodic in-field monitoring (e.g., the 2025 Worley program). Long-term monitoring data (RPS, 2024; Worley, 2025) shows that PFW constituents and radionuclides have remained stable and well within predicted dispersion models for over a decade. Increasing the frequency or sensitivity of the analysis (e.g., lower LORs or monthly sampling) would not change the management outcome, as current results are already consistently below regulatory trigger values. The current regime is sufficient to verify environmental performance. A more intensive regime would increase offshore man-hours and laboratory costs without providing any new data that would alter the current "Low" risk profile.	Not adopted

RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Incidental (1)	Almost Certain (E)	Medium risk

5.8.2 Description of Hazard

Water naturally present in the reservoir, from which the hydrocarbons are extracted, is treated, processed and discharged as PFW (Section 2.5.8.6). Process chemicals such as corrosion and scale inhibitors, biocides and water clarifiers are added at various stages of the production process. Up to 36,000 m^3 of PFW is currently discharged per day.

Water is also used to ballast the Wandoo Facility during hydrocarbon export (Section 2.5.8.7). As oil is exported, ballast water automatically flows from Shaft 4 to the CGS compartments via the buffer cell to replace the exported oil. Up to 1,500 m^3 of ballast water is currently discharged per day. It should be noted that the ballast water discharge rates are not capped and are based on production rates and CGS ballast management requirements.

PFW and Ballast Water is combined and discharged at the outfall line outside of Shaft 4 with a combined maximum discharge volume of 37,500 m^3/day (Section 2.4.2.1).

PFW components with the potential to impact the environment were identified from annual WET testing which characterises PFW chemical composition (Section 5.8.4.3). In contrast, ballast water constituents with potential environmental impact are limited to OIW.

Components of PFW and ballast water discharge that may pose environmental risks include:

- Hydrocarbons
- Ammonia
- Metals
- Radionuclides
- Production chemicals
- Temperature.

The discharge of ballast water from the Wandoo Facility is evaluated in this section, where water is taken up and discharged at the same location eliminating the potential of introduction of Invasive Marine Species (IMS). The discharge of ballast water from vessels are a pathway for the introduction of Invasive marine species (IMS) to the Operational Area. The risk of introduction of IMS is evaluated in Section 5.9.

5.8.3 Assessment Criteria

The assessment criteria for Produced Formation Water (PFW) and ballast water discharge are designed to protect the marine environment by defining thresholds at which no significant adverse biological effects are expected. These criteria are based primarily on the ANZG (2018) 99% species protection levels (PC99), national and international best-practice guidelines (e.g., PARCOM, OSPAR), relevant legislative limits, and site-specific historic characterisation data.

A tiered assessment approach is applied, considering both individual chemical constituents and the combined effect of the discharge. Notably, the whole-effluent PFW assessment criterion represents the most conservative management constraint for the Wandoo discharge. While individual components such as ammonia, hydrocarbons, and production chemicals contribute to

the overall toxicity profile, the whole-effluent PFW PC99 threshold (derived from Direct Toxicity Assessment) accounts for the potential synergistic and additive effects of all constituents.

As detailed in the following subsections, the whole-effluent PFW assessment criterion requires the greatest degree of dilution (1:714) to achieve the PC99 species protection level, thereby serving as the primary driver for defining the extent of the regulatory mixing zone.

5.8.3.1 Whole-Effluent PFW

VOGA has undertaken annual whole-effluent toxicity (WET) testing of produced formation water (PFW) since 2017, with species protection levels derived using the BurrliOz statistical distribution method in accordance with ANZG guidance. Over this period, the dilution required to achieve 99% species protection (PC99) has ranged from 1:77 to 1:1205, with annual results of 256 (2017), 77 (2019), 476 (2021), 714 (2022), 1205 (2023), 714 (2024), and 621 (2025). While this variation appears to indicate an increasing toxicity trend, independent technical reviews by AIMS (Negri, et al., 2025) and RPS (RPS, 2025) confirm that the observed pattern is not statistically significant and does not represent a deterioration in effluent quality.

Both reviews concluded that inter-annual comparisons of PC99 values are not directly comparable due to changes in test species, laboratory procedures, and ecotoxicological methods over the monitoring period. These methodological factors influence the species sensitivity distribution and therefore the calculated protection levels. For example, the December 2023 WET program incorporated two additional tropical species—*Acartia sinjiensis* (copepod) and *Saccostrea glomerata* (rock oyster). These species produced the lowest EC10 values of the eight bioassays conducted, which shifted the BurrliOz distribution and increased the calculated PC99 dilution factor for that year.

A review of historical PFW chemistry identified no individual constituent or group of constituents that correlates with the apparent increase in toxicity since 2021. Chemical concentrations remain within the expected operational range, and no emerging contaminants or changes in production chemistry were identified that could account for the variation in WET outcomes. The weight of evidence therefore indicates that the observed variability in PC99 values reflects methodological evolution rather than a change in environmental risk.

Justification for Adopting a 700-fold Dilution Threshold

To provide a transparent, conservative, and evidence-based benchmark for assessing toxicity risk, VOGA has adopted a 700-fold dilution threshold for evaluating compliance with the 99% species protection level. This threshold is justified as follows:

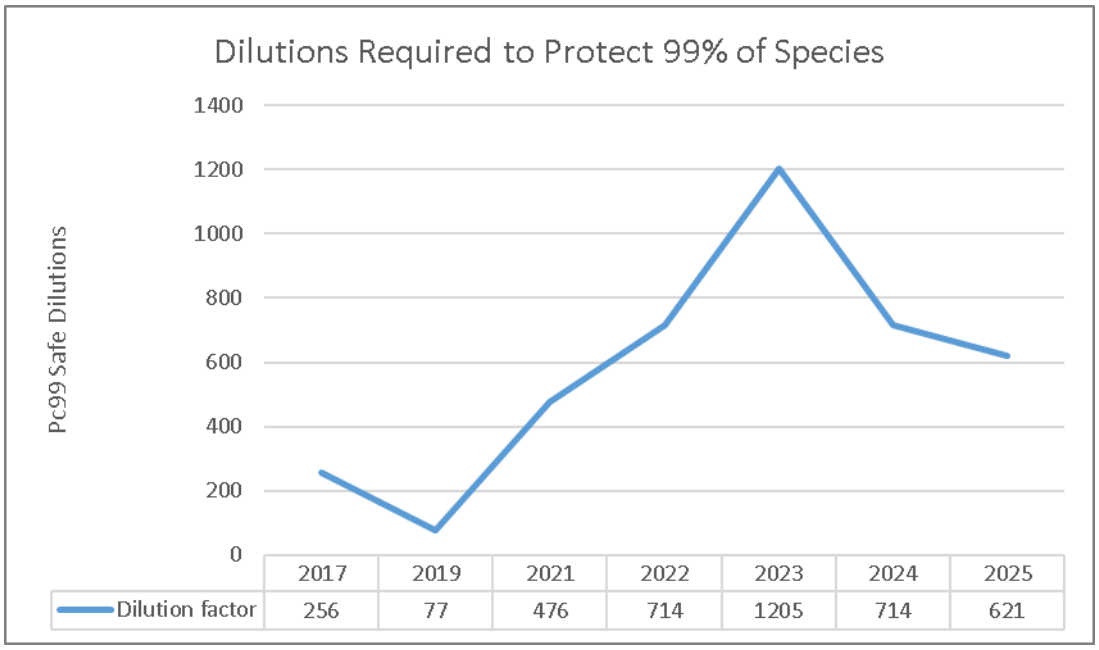
- Across seven years of testing, PC99 values span 77–1205, with the majority of results clustering between 476 and 714. A threshold of 700 sits at the upper end of the central cluster and is therefore representative of typical effluent toxicity while still precautionary.
- Excluding the 2023 methodological outlier, annual PC99 values range from 256 to 714. Selecting 700 therefore adopts a threshold that is at or above the highest empirically observed value under consistent test conditions.
- The 2023 result (1205) was driven by the introduction of two highly sensitive tropical species. Independent reviews confirm this year is not comparable to earlier datasets. Using 700

ensures the threshold remains conservative without being distorted by a single methodological shift.

- The threshold is derived from a multi-year dataset, supported by independent expert review, and incorporates a precautionary margin that ensures environmental protection even under conservative assumptions.

Details on how this threshold is applied in the impact assessment and monitoring and management framework is provided in Section 5.8.4. The adoption of a 700-fold dilution threshold provides a robust, transparent, and precautionary basis for assessing toxicity risk, ensuring that the discharge remains protective of the receiving environment under all credible operating conditions.

Figure 5-3: Annual whole-effluent toxicity (WET) results for VOGA (2017–2023) showing the dilution required to achieve 99% species protection (PC99) derived using the BurrliOz statistical distribution method. Apparent increases in PC99 dilution factors over time reflect changes in test species and laboratory procedures rather than a statistically significant increase in effluent toxicity



5.8.3.2 Hydrocarbons

Hydrocarbons within PFW and ballast water discharge can cause toxicity impacts or risks from contact or ingestion to marine fauna. Dissolved hydrocarbons are the primary drivers of toxicity because they are bioavailable and readily absorbed by marine organisms through gills, external tissues, and digestion (Carls et al., 2008; Nordtug et al., 2011; Redman, 2015). Entrained (dispersed) oil droplets are not bioavailable through absorption, the route of exposure include direct contact with tissues of organisms and uptake of oil by direct consumption, with potential for biomagnification through the food chain (NRC, 2005).

PFW and ballast water OIW performance standard is an engineering limit based on the PARCOM recommendations, below 30 mg/L and adapted for volume change as shown in Table 5-29. Whereas the dissolved and entrained thresholds for hydrocarbons provide limits for potential environmental impact.

Reviews of Wandoo PFW water quality and ecotoxicology data by AIMS (2025) and RPS (2024) identified hydrocarbons as one of the primary contributors to Wandoo PFW toxicity. The following subsections describes the hydrocarbon assessment criteria for PFW and ballast water in further detail.

Produced Formation Water

PFW is continuously monitored for OIW concentrations to ensure compliance with discharge specifications prior to overboard release` (Section 2.5.8.8). PFW that meets the specified OIW limits is discharged to sea in combination with ballast water..

The OIW concentration limit represents a bulk engineering control used to manage oil discharges and prevent pollution of the marine environment.. At a combined discharge rate of 26,100 m3/day and based on the PARCOM Recommendation 1997/16 Annex 3 methodology, the unacceptable ceiling for average produced water OIW concentration is 30 mg/L over 24-hours.

Where higher discharge rates occur, the allowable OIW concentration limit is progressively reduced to ensure that, despite increased flow, no additional mass of oil is discharged to the environment. Table 5-57 presents the acceptable and unacceptable 24-hour average OIW limits applicable across the proposed discharge flow regimes. For example, at a combined discharge rate of 36,000 m^3/day, the unacceptable OIW limit is reduced to 19.5 mg/L.

Table 5-57: Acceptable and unacceptable PFW OIW limits at proposed flow rate regimes

Flow Rate Regime (Combined PFW and Ballast)	Maximum PFW Flow Rate	Acceptable OIW 24-hour Limit	Unacceptable OIW 24-hour Limit
m3/day	m3/day	mg/L	mg/L
26,100	24,600	16.7	30.0
28,500	27,000	15.2	25.9
30,500	29,000	14.2	24.2
33,500	32,000	12.5	22.0
37,500	36,000	11.1	19.5

Hydrocarbon thresholds for PFW are also provided for dissolved oil and dispersed (entrained) oil:

- Dissolved oil: PC99 of 16 ppb was derived based on toxicity testing of the Wandoo crude (Intertek, 2019).
- Dispersed (entrained) oil: Predicted No Effect Concentrations (PNECs) of 70.5 ppb (OSPAR Agreement 2014-05).

The oil phase thresholds for PFW are environmental toxicity thresholds as detailed in Table 5-58.

Table 5-58: Thresholds for dissolved and dispersed oil in PFW

Oil Phase	Level of species protection	Threshold (ppb of OIW)	Source
Dissolved	99%	16	Wandoo Crude Ecotox (Intertek, 2020)

Oil Phase	Level of species protection	Threshold (ppb of OIW)	Source
Dispersed (Entrained)	PNEC	70.5	OSPAR Report (2014)

In addition to oil-in-water (OIW) and oil-phase thresholds, VOGA undertakes annual chemical characterisation of produced formation water (PFW) to assess petroleum hydrocarbons against the ANZG (2018) PC99 and PC95 species protection guideline values. Analytical methods and quality assurance procedures are described in Section 5.8.4.2. The suite of petroleum hydrocarbon analytes includes polycyclic aromatic hydrocarbons (PAHs), BTEX compounds, total petroleum hydrocarbons (TPH), and total recoverable hydrocarbons (TRH).

Across the entire historical dataset, no detectable concentrations of US EPA priority pollutant PAHs have been recorded, with the sole exception of trace pyrene at 0.2 µg/L, a value well below the ANZG PC99 guideline. All other priority PAHs were consistently below laboratory reporting limits (LORs), demonstrating the absence of persistent or bioaccumulative aromatic hydrocarbons in the discharge.

BTEX compounds (benzene, toluene, ethylbenzene, and xylenes) have remained below their respective LORs since monitoring commenced. Of these, benzene, toluene, and ethylbenzene are the only analytes with ANZG guideline values. All monitoring results for these compounds have been below both the PC95 and PC99 species protection levels, confirming that BTEX does not contribute materially to the toxicity profile of the PFW.

TPH and TRH concentrations have remained within expected operational ranges and do not exhibit any temporal trend indicative of increasing hydrocarbon loading. These results, combined with the absence of detectable priority PAHs and consistently non-detectable BTEX concentrations, demonstrate that petroleum hydrocarbons are not driving the variability observed in whole-effluent toxicity outcomes. This conclusion is consistent with the independent reviews by AIMS and RPS, which found no chemical constituents of the PFW that correlate with the apparent increase in toxicity since 2021.

Overall, the petroleum hydrocarbon characterisation dataset provides strong evidence that the PFW discharge remains low in persistent, bioaccumulative, and toxic hydrocarbons, and continues to meet the environmental performance outcomes defined in this Environment Plan.

Ballast Water

Currently, the OIW content for ballast water is typically kept below 3 mg/L with a typical discharge equal to the oil production and an upper discharge rate of 1,500 m^3/day (Section 2.5.8.8). Ballast water is discharged overboard with Wandoo PFW to form a combined discharge of up to 37,500 m^3/day. The combined PFW and ballast water volumes discharges will not exceed the flow rate regime volumes listed in Table 5-57.

Ballast water is continuously monitored for OIW content to ensure it is within specification (below 30 mg/L) before being discharged overboard.

5.8.3.3 Ammonia

Ammonia is a common constituent of PFW and can cause toxicity to marine organisms, particularly in its unionised form (NH_3). Between 2014 and 2024, total ammonia concentrations in PFW have ranged between 38–44 mg/L, based on a variety of laboratory testing methodologies.

Table 5-59 details the initial concentration of PFW based on the maximum total ammonia concentration observed and the assessment criterion for total ammonia based on the ANZG guidelines PC99 level (ANZG, 2018).

Table 5-59: Threshold and dilution factor for ammonia

Level of species protection	Initial Concentration	Trigger values (% sample)	Dilutions required
99%	44 mg/L	0.5 mg/L	84

Annual PFW WET tests include PFW chemical analysis of ammonia against ANZG guidelines PC99 and PC95 levels (Table 5-59). Results of total ammonia analysis have shown that all of the values exceed the ANZG guidelines PC99 and PC95 levels (ANZG, 2018).

Based on these exceedances, reviews of Wandoo PFW water quality and ecotoxicology data by AIMS (2025) and RPS (2024) identified ammonia as one of the primary contributors to Wandoo PFW toxicity. However, ammonia has a trigger value of 0.5 mg/L. The concentration of ammonia in the PFW discharge is 44 mg/L. This requires a dilution of 1:84 to achieve the trigger value. This dilution level is achieved within the mixing zone extent of 700 dilutions.

While ammonia is a primary contributor, its required dilution (1:84) is achieved well within the broader mixing zone extent of 700 dilutions established by the whole-effluent criteria.

5.8.3.4 Metals

Concentrations of metals above certain levels can cause environmental impacts. The impact assessment criteria for metals are based on the ANZG guidelines PC99 and PC95 levels (ANZG, 2018).

Annual PFW WET tests include PFW chemical analysis of dissolved metals and metalloids concentrations against ANZG guidelines PC99 and PC95 levels (ANZG, 2018) where applicable. When concentrations exceeded the PC99, dilution plots were used to calculate where the PC99 (ANZG, 2018) is achieved in proximity to the platform. Recent PFW composition chemical analysis results confirm that the majority of dissolved metal concentrations in the PFW are below the PC99 levels (ANZG, 2018), with the exception of copper, hexavalent chromium, zinc and mercury:

- Copper was above 95% and 99% species protection level in 2019 and 2020.
- Hexavalent chromium has exceeded the 95% species protection level, however remained within 99% levels and below the LOR of the testing, since 2014.
- Zinc exceeded the 99% species protection level in 2019 and 2020, however remained within 95% levels and within the LOR of the testing.

- Mercury exceeded the 95% and 99% species protection levels between 2017 and 2019, however remained within the LOR of the testing in 2017 and 2018. The most recent result (2020) exceeded the 99% protection level however was within the 95% level and the LOR.

Based on the highest result recorded for each analyte, dilutions of up to 14 times are required to achieve the PC99 limit. According to the dilution plots modelled by RPS (2020; 2025), these concentrations are achieved in the immediate vicinity of the platform during all seasons for both current and proposed flowrates.

Based on recent PFW composition chemical analysis results, metals as a component of PFW and ballast water discharge is considered a minor factor in potential environmental impact but warrants consideration.

5.8.3.5 Radionuclides

Wandoo PFW may include low levels of naturally occurring radionuclides (NORMS) in particular, uranium 238 and thorium 232 decay chains and the longer-lived radionuclides lead 210, polonium 210, radium 226 (Ra-226) and radium 228 (Ra- 228) (Coleman and West 2000). These radionuclides can occur in produced water either in solution or as fine mineral suspended solids (OSPAR Commission 2009).

The most significant radioactive element in PFW is radium-226, which is an alpha emitter with a half-life of 1,620 years. A review of the 226Ra and 228Ra concentrations in PFW by Neff et al. (2011) across PFW discharges worldwide indicates that 226Ra activity ranges from 0.002 to 1,119 Bq/L and 228Ra activity ranges from 0.3 to 180 Bq/L. Natural levels within ocean surface waters of 0.001–0.0015 Bq/l and 0.0002–0.0011 Bq/L for 226Ra and 228Ra, respectively have been reported (Neff et al., 2011). Typical total radium concentrations in PFW range from 0 to 190 Bq/L respectively (Neff, 2002). A study of 41 oil and gas platforms in Norway found radium-226 concentrations in PFW ranged from 0.5 to 16 Bq/L and radium-228 concentrations ranged from 0.5 to 21 Bq/L.

Levels of radium-226 and radium-228 within the Wandoo PFW (Table 1.6 in Appendix C) are within typical levels for PFW recorded at other oil and gas platforms but several orders of magnitude higher than background seawater concentrations (Jacobs 2019c, Neff et al., 2011). Long-term monitoring shows that measured radionuclide levels in PFW have remained stable over time, with simple linear trend analyses indicating no evidence of increasing concentrations (RPS, 2024).

Currently there are no ANZG (2018) guidelines or international guidance for concentrations of radionuclides in marine water, however, radionuclide concentrations within Wandoo PFW were similar to the drinking water guidelines (WHO, 2017).

Given long-term monitoring shows measured radionuclide levels in PFW have remained stable over time, and there were no statistically significant temporal trends in activity concentrations between 1994 and 2023 (AIMS 2025), radionuclides as a component of PFW and ballast water discharge is considered a minor factor in potential environmental impact but warrants consideration.

5.8.3.6 Production Chemicals

Production chemicals are routinely added to the PFW for a range of purposes.

Inhibitors and scavenger production chemicals are routinely added to protect pipes from PFW:

- Corrosion inhibitor
- Scale inhibitor
- Oxygen scavenger.

Demulsifiers and clarifier production chemicals are added to encourage phase separation between oils and water:

- Water clarifier
- Reverse demulsifier
- Forward demulsifier.

Finally, biocides are utilised for inspection and maintenance, including routine pigging prior to offtakes, and is assessed as part of Section 5.11. As detailed in Section 2.7.3, the biocide used biodegrades rapidly and has a very short half-life in the presence of seawater. Testing indicates the biocide remains active for 2-3 hours after injection and requires a minimum of 4 hours residence time in Shaft 4 before it can be discharged overboard Once the active biocide is exhausted, the PFW and ballast water can be discharged to the natural environment in accordance with the Wandoo Platform Operations Manual.

Toxicity values for specific water-soluble production chemicals are used as impact assessment criteria (Table 5-60). The toxicity values are based on product ecotoxity testing for a minimum three species with an addition of a 10 fold assessment factor to the LC50 data for conservatism in accordance with ANZG guidelines.

The concentration of the production chemicals in the PFW discharge is calculated. If this concentration exceeded toxicity values, dilution plots were used to calculate where the conservative toxicity values were achieved in proximity to the platform. If new production chemicals are required, they will be selected in accordance with the chemical assessment process outlined in this EP (Section 8.11). Production chemicals are managed using a chemical ranking scheme aligned with OSPAR Commission Decision 2000/2, ensuring selection of the lowest toxicity chemicals practicable.

Table 5-60: Toxicity values, target and maximum concentrations for production chemicals

Production chemical	Product toxicity threshold (including assessment factor)	Target concentration rates (in PFW discharge)	Maximum concentration rates (in PFW discharge)
Corrosion inhibitor (CRW24060)	0.1 mg/l	25 mg/l (25.3 ml/l)	70 mg/l

Production chemical	Product toxicity threshold (including assessment factor)	Target concentration rates (in PFW discharge)	Maximum concentration rates (in PFW discharge)
Oxygen scavenger (OSW24514)	10 mg/l	5 mg/l (6.8 ml/l)	7000 mg/l
Water clarifier (RBW24303)	0.17 mg/l	30 mg/l (34.6 ml/l)	119 mg/l
Reverse demulsifier (RBW24362)	100 mg/l	12 mg/l (12.3 ml/l)	70,000 mg/l
Scale inhibitor (SCW24069)	50 mg/l	6 mg/l (7.3 ml/l	3,500 mg/l
Forward demulsifier (DMO86539)	3 mg/l	10 mg/L (9.8 ml/l) (total produced fluids)	2,100 mg/L (total produced fluids)

Production chemicals as a component of PFW and ballast water discharge are not considered to pose measurable toxicity to local marine organisms. The concentrations of oxygen scavenger, scale inhibitor, forward demulsifier, reverse demulsifier does not contribute to potential environmental impacts as the target concentrations within the discharge are below the aquatic toxicity levels (Table 5-60).

Water clarifier (RBW24303) has an aquatic toxicity level of 0.17 mg/L (LC50 with assessment factor applied). As the concentration of water clarifier in the PFW discharge is 30 mg/L, this requires a dilution of 1:176 to achieve the conservative aquatic toxicity value. This dilution level is achieved within the mixing zone extent of 700 dilutions.

Corrosion inhibitor (CRW24060) has an aquatic toxicity level of 0.1 mg/L (LC50 with assessment factor applied). The concentration of corrosion inhibitor in the PFW discharge is 25 mg/L. This requires a dilution of 1:250 to achieve the conservative aquatic toxicity value. This dilution level is achieved within the mixing zone extent of 700 dilutions.

Based on the assessment against product toxicity thresholds and mixing zone dilutions, production chemicals are considered a minor factor in potential environmental impact but warrants consideration. It is noted that the most toxic chemicals (Corrosion Inhibitor at 1:250) still fall just under the whole-effluent dilution requirement of 1:700, reinforcing the WET result as the ultimate safety net.

5.8.3.7 Temperature

The assessment criteria for temperature is based on the Environmental Health and Safety Guidelines for Offshore Oil and Gas Development (IFC, 2007). These guidelines recommend a temperature increase of no more than 3˚C within 100 m of the discharge point.

The modelling results predicted that due to the turbulent mixing caused by the initial plunge and buoyant rise, the temperature of the PFW would return to within 3°C above background within 50m from the platform for all seasons and current speeds. As a result, temperature is considered a minor factor in potential environmental impact but warrants consideration.

5.8.4 Monitoring and Management Framework

Wandoo PFW and ballast water is routinely monitored to ensure environmental criteria as detailed in Section 5.8.3 are met. OIW monitoring and management is detailed in Section 2.5.8.8. Whereas the following subsections describe the monitoring and management process of the other constituents within the discharge including determining the spatial extent of PFW and ballast water discharge and the controls to ensure that this extent is not exceeded.

5.8.4.1 Discharge Modelling

The criteria used to define PC99 of whole-effluent PFW was used to determine the spatial extent of potential ecological impact from PFW and ballast water discharge. This is also called the mixing zone. The mixing zone was determined considering the results of the latest PFW dispersion modelling studies (RPS 2025).

The modelling studies consisted of three integrated stages:

1. **Hydrodynamic characterisation:** Generation of current data for the study area, incorporating combined oceanic and tidal influences.

2. **Near-field modelling:** Use of the UM3 near-field discharge model to predict plume temperature reduction and dilution under weak, medium, and strong seasonal current conditions.

3. **Far-field modelling:** Application of the generated current fields and near-field dilution estimates into MUDMAP to assess plume transport, dispersion, and potential recirculation back to the discharge location.

Modelling inputs for the studies are summarised in Table 5-61.

Table 5-61: PFW Dispersion Modelling Inputs

Parameter	Inputs
Depth of discharge below surface	8 m
Internal diameter of outlet	0.575 m
Salinity	29.2 ppt
Temperature	51°C

The modelling approach is considered conservative because:

- A conservative tracer method was used, accounting only for physical processes (transport, dispersion, mixing) and excluding biochemical degradation.

- Horizontal and vertical dispersion coefficients (which represent how quickly PFW dilutes in the water column) reflected weaker currents, resulting in conservative dilution estimates (i.e., stronger currents would increase turbulent mixing).

Thresholds for individual constituents were then applied in the PFW dispersion modelling studies (RPS 2020; RPS 2025). Hydrocarbons and ammonia, as the constituents with the greatest range for potential for environmental impact, were modelled across all seasons at the maximum discharge flow rates to estimate the spatial extent of potential exposure relative to these constituent criteria.

Results of the PFW dispersion modelling study (RPS 2020; RPS 2025) predicted the maximum mixing zone range for PFW and ballast water discharge to be 3.7 km from the discharge point (RPS 2020). Results of the study are summarised in Table 5-62.

Table 5-62: PFW PC99 Mixing Zone Extent

Level of species protection	Maximum distance (Area)
99%	3.7 km (3.5 km^2)

The latest PFW dispersion modelling (RPS 2025) indicates that the dilution required to achieve the Wandoo PFW PC99 level (714-fold dilution based on 2024 ecotoxicological data) is reached within 2.9 km of the discharge point.

5.8.4.2 Environmental Monitoring Programs

Environmental monitoring programs were undertaken, with the most recent conducted in October 2024, to characterise marine water quality, sediment quality and infauna species richness in the vicinity of the Wandoo B platform. Water quality and sediment quality samples were taken as part of the program to verify dispersion model predictions described above.

The environmental field monitoring campaigns found that environmental conditions around the Wandoo B platform remain consistent with previous surveys, showing no measurable degradation over time (Worley, 2025). Key observations include:

- PFW was rapidly diluted, with concentrations of potential contaminants below limits of reporting (LORs) within 100 m of the discharge.
- Sediment particle size at all sites was dominated by fine to medium sand, with a small portion of clay. Hydrocarbons in sediments were below the LORs.
- Cadmium, chromium, copper, lead, and zinc concentrations were all above their respective LORs but not elevated above the DGV (95%) or GV-high (99%) at any point.
- Benthic infauna results showed an increase in species at sites further from the facility. Species richness (total count of species/taxonomic groups identified) increased with distance from the platform.
- These infauna results may have been influenced by sediment composition and particle size distribution, with higher proportions of silt and clay at sites 500 m or more from the platform.

Overall, the field based environmental monitoring provided no evidence of any long term cumulative impact on either sediment or water quality from the discharge of PFW from the

Wandoo platform. The field monitoring results aligned with the PFW dilutions modelling and provided verification of the inputs and basis of the modelling.

5.8.4.3 Whole Effluent Toxicity (WET) Testing

VOGA undertakes annual end-of-pipe PFW Whole Effluent Toxicity (WET) testing. WET testing includes PFW chemistry and ecotoxicity testing through a National Association of Testing Authorities (NATA) accredited laboratory. The results from annual WET tests are used to validate the 3.7 km mixing zone defined in this EP (Section 5.8.4.1). The mixing zone was determined based on thresholds derived from the direct toxicity assessment (DTA) of the 2017 PFW WET test. A DTA of the PFW WET test is routinely undertaken every two years, and a screening test every alternative year.

Direct Toxicity Assessment

DTAs provide an integrated measure of toxicity using ecotoxicity data obtained from WET testing. DTAs are undertaken every two years. A DTA establishes negligible effect thresholds for ≥5 species from at least four different taxonomic groups, in accordance the ANZG Guidelines. The negligible effect thresholds are used to generate cumulative Species Sensitivity Distributions (SSDs), from which PC99 and PC95 levels are determined for Wandoo PFW. The PC99 and PC95 thresholds are then used to inform the validity of the mixing zone range in this EP through dispersion modelling. VOGA is currently evaluating undertaking future DTAs in accordance with Fox et al. (2021) which provides a more robust approach to SSDs modelling. Once the Fox et al. (2021) evaluation for future DTAs is finalised, this approach will be adopted and updated in VOGA's PFW monitoring and management framework.

The species selected for DTA testing include a range of local species and a range of life histories including larvae, which are generally considered more sensitive than adult species. The species used for DTA testing represent species with similar sensitivities found in the NWS to ensure thresholds derived from this test is suitable for Wandoo PFW and its discharge location (Ecotox Services Australasia, 2016b).

Ecotoxicity Screening Test

Every two years (alternating with DTA testing) VOGA undertakes an ecotoxicity screening test to compare against the most recent DTA test. The screening test is conducted against the taxonomic groups: fish, mollusc and algae based on the United Nations Globally Harmonized System (UN GHS). Ecotoxicity data derived from these tests assesses toxicity concentration/s (species % effects data) against these species background levels.

Toxicity Identification Evaluation

A toxicity identification evaluation (TIE) is performed to determine which components of the PFW were responsible for causing toxicity within ecotoxicity results, in the event the requirement is triggered through adaptive management (Section 8.12).

TIE uses the response of test organisms to detect the presence of toxicants before and after samples undergo a series of chemical manipulations. Chemical manipulations are used to isolate, identify and confirm the causes of sample toxicity.

A TIE was performed on Wandoo PFW in 2015. The TIE consisted of a 72 hour sea urchin larval development test performed on the PFW sample before manipulation using zeolite. Zeolite was added to the sample for a contact time of eight hours to determine if toxicity is associated with ammonia. The 72 hour sea urchin larval development test was performed again after ammonia isolation using zeolite. The results of the assessment showed the toxicity of the sample decreased significantly after isolating ammonia, which indicates that the majority of toxicity in the sample is caused by ammonia.

PFW samples were tested for ammonia before treatment to determine the source of ammonia in the WPF PFW. Ammonia levels in these samples were similar to ammonia levels in the discharge, confirming that ammonia levels are directly related to the characteristics of the reservoir.

5.8.4.4 PFW Composition

VOGA undertakes annual WET tests to also to monitor the chemical composition of PFW through a National Association of Testing Authorities (NATA) accredited laboratory. The chemical analytes tested include: anions, cations, total dissolved solids, total suspended solids, alkalinity as calcium carbonate (CaCO3), total recoverable mercury, hexavalent and trivalent chromium, dissolved and total metals/metalloids, BTEX, PAHs, total recoverable hydrocarbons (TRH), total petroleum hydrocarbons (TPH), ammonia and radionuclides.

Exceedances against ANZG guideline values (ANZG, 2018) or background levels may result in toxicity to marine organisms or eutrophication. Section 5.8.3 presents the chemical composition data obtained from this monitoring for the identified PFW constituents that have the potential for environmental impact.

5.8.4.5 Unplanned Releases

PFW and ballast water can also be released from the facility in quantities and composition, different to the planned discharge, during loss of containment events or due to process upsets.

For loss of containment and/or process upsets the volumes/concentrations would be no worse than those levels already assessed in this section for PFW and ballast water in:

- Sections 5.11 and/or 5.19 for production chemicals.

The impact of unplanned releases of PFW through the produced water outlet are therefore considered in these sections.

5.8.4.6 Produced Formation Water Adaptive Management Strategy

VOGA's Produced Water Adaptive Management Strategy [WNB-7000-RP-0010] establishes a structured framework for monitoring and managing PFW and ballast water discharges to ensure environmental impacts remain ALARP and acceptable. Utilising real-time inline OIW analysers verified by twice-daily manual laboratory sampling, the strategy employs a phased approach of escalating corrective actions—such as production trimming or fluid diversion—whenever OIW concentrations or flow rates approach defined "Unacceptable" limits (for further details on thresholds/assessment criteria refer to Section 5.8.3). Beyond routine OIW tracking, the framework incorporates monthly and annual NATA-accredited laboratory analysis of metals, hydrocarbons, and radionuclides, alongside biennial DTAs to validate the discharge mixing zone (Table 5-63). In the event of persistent excursions or significant deviations from established

assessment criteria, the strategy mandates rigorous contingency actions, including potential production shutdowns and formal revisions of the EP to maintain regulatory compliance and ecological integrity.

Detailed description of VOGA's Produced Water Adaptive Management Strategy [WNB-7000-RP-0010] is provided in Section 8.12.

5.8.5 Impact and Risk Evaluation

The discharge of PFW and ballast water has the potential to impact the local marine environment surrounding Wandoo B platform as a result of residual hydrocarbons, production chemicals, ammonia and to a lesser extent metals, radionuclides and increase in water temperature. Potential environmental impacts are expected to be confined well within the mixing zone boundary(3.7 km from the discharge location) (RPS 2025).

Potential impacts caused by discharge of PFW and ballast water include:

- Change in water quality
- Change in sediment quality
- Bioaccumulation in marine fauna
- Toxic effects to marine fauna.

The following receptors within the mixing zone may be impacted by discharge of PFW and ballast water:

- Water quality
- Sediment quality
- Marine mammals
- Marine reptiles
- Fish, sharks, rays
- Seabirds
- Plankton.

To understand potential impacts from PFW and ballast water discharge, VOGA conducted in-field sampling and testing through environmental monitoring programs to characterise marine water quality, sediment quality and infauna species richness in the vicinity of the Wandoo B platform (Aurecon, 2016; RPS, 2025). The field monitoring results combined with data collected from PFW and ballast water monitoring and management framework provide a robust foundation for evaluating environmental outcomes associated with PFW and ballast water discharge.

Potential impacts from PFW and ballast water discharge have been assessed based on 37,500 m^3/day continuous discharge, representing the worst case potential impact to the marine environment.

5.8.5.1 Impact Assessment

Water Quality

Change in Water Quality

Potential impacts to water quality from PFW and ballast water discharge have been assessed through annual WET testing (and subsequent toxicity tests), PFW chemical composition testing, dispersion modelling predictions and in-field environmental monitoring programs. Results of the most recent environmental monitoring program found no evidence of any long-term cumulative impact on water quality from the discharge of PFW from the Wandoo platform (Worley, 2025).

Recent chemical analyses from annual WET tests confirm that the majority of PFW constituents have been below their respective LORs or below the ANZG guideline PC99 levels (ANZG, 2018), with the exception of ammonia, copper, hexavalent chromium, zinc and mercury (Sections 5.8.3.3 and 5.8.3.4).

Despite WET test concentrations of some dissolved metals above the ANZG guideline PC99 level, in-field water quality monitoring of dissolved metals found concentrations of cadmium, chromium, copper, lead, and zinc to be above LORs however below ANZG guideline PC99 and PC95 levels (Worley, 2025).

PFW dispersion modelling studies (RPS;2015; RPS 2025) for volumes including ballast water discharge, indicate that hydrocarbons, ammonia, production chemicals reach their conservative aquatic toxicity values well within the whole effluent derived mixing zone for all seasons. This coincides with key observation during in-field water quality monitoring that PFW was rapidly diluted, with concentrations of potential contaminants below limits of reporting (LORs) within 100 m of the discharge (Worley, 2025).

Low concentrations of naturally occurring radionuclides—including uranium-238, thorium-232, lead-210, polonium-210, radium-226 and radium-228—may be present in PFW either dissolved or as suspended solids. Long-term monitoring shows that measured radionuclide levels in PFW have remained stable over time, with simple linear trend analyses indicating no evidence of increasing concentrations (RPS, 2024).

Near-field temperature modelling results indicates that the temperature of the PFW and ballast water would return to within 3°C above background levels within approximately 50 m from the platform for all scenarios and seasons (RPS;2015). This range is within the predicted extent of 100 m for change in water temperature from the discharge of cooling water (Section 5.15.3.1).

Collectively, these results indicate that any changes to water quality from PFW and ballast water discharge constituents are minor, rapidly diluted, and confined to the immediate vicinity of the discharge point (and well within the mixing zone) and therefore are expected to result in negligible environmental impact.

Sediment Quality

Change in Sediment Quality

Potential impacts to sediment quality from PFW and ballast water discharge have been assessed through annual WET testing (and subsequent toxicity tests), PFW chemical composition testing,

dispersion modelling predictions and in-field environmental monitoring programs. Results of the most recent environmental monitoring program found no evidence of any long term cumulative impact on sediment quality from the discharge of PFW from the Wandoo platform (Worley, 2025).

PFW dispersion modelling indicates that due to the buoyant and rapidly diluted nature of the plume—characterised by lower salinity (29,2 ppt) and higher temperature (~51 °C) relative to ambient seawater—the combined PFW and ballast water discharge initially plunges then rises through the water column (RPS, 2025), confining potential toxicity effects to near-surface waters The modelling predicts that any effects within the mixing zone are highly localised and indicates negligible risk to sediment quality. These predictions are supported by field-based environmental monitoring, which found no evidence of long-term or cumulative impacts on sediment quality (Worley, 2025; Aurecon, 2016; BBG, 1996; SKM, 1998). Concentrations of PFW and ballast water constituents in sediments with the potential for environmental impact were either below limits of reporting or below relevant ANZG guideline PC99 and PC95 levels (Worley, 2025).

These results indicate that any changes to sediment quality from PFW and ballast water discharge constituents are minor and confined to the immediate vicinity of the discharge point (and well within the mixing zone), and are therefore expected to result in negligible environmental impact.

Marine fauna

Marine fauna may contact the PFW and ballast water discharge plume for a short period should they transit through the Operational Area. There are several BIAs that overlap the Operational Area, including:

- Humpback whale – migration
- Flatback turtle – internesting buffer (60 km)
- Wedge-tailed shearwater – breeding (and buffer area)
- Whale shark – foraging.

These fauna species are predominantly pelagic seasonal species with associated First Nations cultural values and sensitivities (Section 3.7.6).

Bioaccumulation

For fauna species seasonally transiting through the mixing zone, there is the possibility of bioaccumulation risk from PFW and ballast water discharges. PFW and ballast water contains constituents (e.g., BTEX, PAHs, phenols, and metals) that could theoretically bioaccumulate in marine life, field data suggests the actual risk is minimal. This is supported by Neff et al. (2011), who conducted an extensive US EPA-requested study on the bioconcentration of PW constituents around high-volume discharge sites (>731 m^3/day) in the Gulf of Mexico.

The investigation analysed the tissue of fish and invertebrates for a comprehensive suite of 40 PAHs, volatile aromatics, and various heavy metals. Key findings included:

- Low Bioavailability: Despite elevated concentrations in the PW stream, the vast majority (>95%) of tissue samples showed no detectable uptake.

- Species-Specific Variation: Some bivalve molluscs near discharge points exhibited slight increases in specific petrogenic PAHs (e.g., alkyl naphthalenes), whereas fish showed no such trends.
- Safety Thresholds: Detected levels remained well within safety margins for both marine fauna health and human dietary standards.

This suggests that for offshore facilities, the rapid dilution of PW and the metabolic capabilities of many marine species effectively mitigate the risk of significant bioaccumulation of hydrocarbons and metals. It also infers that potential bioaccumulation risks are limited to the immediate vicinity of the discharge point and are unlikely to affect mobile species.

Recent annual WET tests of Wandoo PFW found no detectable concentrations of any of the 16 US EPA priority pollutant PAHs, except for trace amounts of Pyrene (0.2ug/L).

BTEX concentrations have been below their respective LORs for benzene, toluene, ethylbenzene, xylenes, and total BTEX since monitoring began. Benzene, toluene and ethyl-benzene are the only analytes with ANZG guideline values; all monitoring results were below the PC95 and PC99 levels (ANZG, 2018).

In-field water quality monitoring of dissolved metals found concentrations of cadmium, chromium, copper, lead, and zinc to be above LORs however below ANZG guideline PC99 and PC95 levels (Worley, 2025). Other bioaccumulating constituents including BTEX, PAH, NORMs, phenols, and bioaccumulating metals (As, Cd, Hg) were below analytical detection limits in all receiving water samples (Worley, 2025). This coincides with previous results of the 2015 sediment sampling which confirmed that concentrations of mercury and cadmium were below ANZECC ISQG Low trigger values, hence unlikely to bioaccumulate (Aurecon, 2016).

The potential for bioaccumulation related environmental impacts from PFW and ballast water discharge is considered unlikely. Any effects would be localised to organisms that remain close to the discharge location. No lasting or ecologically significant impacts are expected to affect populations of protected, commercially or culturally significant species. The risk to fisheries is further reduced to ALARP by the PSZ, which prohibits fishing activities near Wandoo operations, as a result, no further assessment will be provided against fisheries.

Given the low contaminant concentrations, rapid plume dilution, and conservative dispersion modelling results, the potential for bioaccumulation is restricted primarily to sessile organisms growing on Wandoo structures. EPBC Act listed species potentially within the mixing zone are expected to be limited to pelagic seasonal species transiting through the area. Potential bioaccumulation risks are unlikely to affect these mobile species.

Toxic Effects

The potential toxic impacts of PFW and ballast water discharge on marine biota were assessed by determining the whole-effluent PFW ANZG 99% species protection level (PC99) (Section 5.8.4.3). The PC99 value is derived from Direct Toxicity Assessment (DTA) to estimate the spatial extent within which toxicological effects to 99% of marine species may occur. The latest assessment identified a mixing zone extending approximately 2.9 km from the discharge point, well within the 3.7 km mixing zone (Section 5.8.4.1).

Toxic effects are expected only if receptors remain within the mixing zone for at least one hour. This minimum exposure duration is based on the timeframes used in previous DTA analyses, which demonstrated that whole-effluent PFW can elicit toxic responses in a range of test species when exposed under laboratory conditions for periods of one hour or longer. Accordingly, this one-hour exposure threshold has been applied to evaluate the potential for toxicological impacts on marine fauna within the identified mixing zone. The application of this one-hour exposure threshold is highly conservative for marine megafauna, as the whole-effluent toxicity (WET) and DTA data used to derive this timeframe are based on highly sensitive, small-bodied life stages (such as larvae and invertebrates) with significantly higher surface-area-to-volume ratios and faster metabolic uptake than large-bodied mammals, reptiles, seabird and fish species.

Marine Mammals

The PFW and ballast water discharge mixing zone overlaps the humpback whale migration BIA. Individual migrating humpback whales may experience short-term exposure to elevated levels of PFW and ballast water discharge constituents. Direct exposure may occur through ingestion of contaminated water or prey, while indirect effects may result from short-term changes in prey availability or water quality within the mixing zone.

Critically, the spatial extent of the mixing zone is defined based on the potential for acute and chronic toxicological effects on highly sensitive marine receptors, including fish, molluscs, algae, and sea urchin larvae. Using these high-sensitivity thresholds to assess potential impacts on cetaceans represents a significantly conservative approach, as the physiological resilience of a large-bodied marine mammal is considerably higher than that of larval or microscopic organisms.

Furthermore, the application of a 1-hour exposure threshold as a proxy for toxic effects in whales provides an additional layer of conservatism. Despite this rigorous method, site-specific plume modelling demonstrates that contaminant concentrations decline rapidly beyond the immediate discharge area and remain below ANZG (2018) guideline values (RPS, 2025). Based on an average migration velocity of 1.1 m/s (Braithwaite et al. 2015), a transiting whale would traverse the 3.7 km extent of the mixing zone in approximately 56 minutes.

Consequently, migrating humpback whales will not be exposed to PFW or ballast water constituents for a duration exceeding the 1-hour conservative threshold.

No measurable impact to humpback whale individuals or populations is expected due to these short contact times and low contaminant concentrations. Potential impacts are predicted to be localised and non-persistent. Overall, PFW and ballast water discharge is assessed as having no lasting or ecologically significant impact on transient migrating marine mammals, with discharges managed in accordance with the PFW and ballast water monitoring and management framework (Section 5.8.4) and produced water adaptive management strategy (Section 8.12) to ensure compliance with relevant environmental performance standards.

Marine Reptiles

The PFW and ballast water discharge mixing zone overlaps the flatback turtle internesting buffer BIA. Suitable internesting habitat for flatback turtles is typically defined as water depths shallower than 16 m (Whittock et al., 2016). Whittock et al., (2016) identified suitable internesting habitats for flatback turtles within water depths of 16m deep and within 5 to 10 km of the coastline. The use of these habitats decreased within increasing water depths and area within water depths over

25 m and more than 27 km from the coastline were defined as unsuitable. The Operational Area is located within water depths of 54 m, approximately 40 km away from the Dampier Archipelago. It is therefore reasonable to assume the mixing area is an unsuitable habitat for flatback turtle internesting behaviours. However, for the purpose of providing a conservative estimate, individual internesting flatback turtles may transit through the mixing zone.

As discussed above, the mixing zone boundaries are defined by toxicological thresholds for highly sensitive marine receptors (e.g., fish, molluscs, and larvae). Applying these limits to a mobile adult marine reptile is inherently conservative. Given the average swimming speeds flatback turtles to be 0.4 to 0.5 m/s (Pendoley Environmental, 2020), any transit through the 3.7 km mixing zone would result in only a transient, short-term exposure of approximately 2 to 2.5 hours. While slightly longer than the conservative 1-hour threshold used for more sensitive receptors, this duration remains significantly below the timeframe required to elicit acute toxicological responses in marine turtles. Consequently, no measurable impact to flatback turtle individuals or populations is expected.

No measurable impact to flatback turtle individuals or populations is expected due to these short contact times and low contaminant concentrations. Potential impacts are predicted to be localised, non-persistent, and limited to occasional transiting individuals. Overall, PFW and ballast water discharge is assessed as having no lasting or ecologically significant impact on internesting flatback turtles, with discharges managed in accordance with the PFW and ballast water monitoring and management framework (Section 5.8.4) and produced water adaptive management strategy (Section 8.12) to ensure compliance with relevant environmental performance standards.

Seabirds

The PFW and ballast water discharge mixing zone overlaps the Wedge-tailed Shearwater breeding BIA. The species has the potential to utilises the mixing zone for foraging, which involves surface feeding and shallow-to-moderate depth diving to pursue prey.

While individual birds may forage within the mixing zone, any exposure to discharge constituents is restricted by the transient nature of their diving behaviour. Foraging dives for this species are short-duration events, and individuals are highly mobile, frequently moving between surface feeding patches and subsurface prey. Consequently, even if a bird feeds within the mixing zone, the cumulative duration of contact with elevated contaminant concentrations—which are defined by toxicological thresholds for highly sensitive, sessile, or larval marine life—will be substantially less than the one-hour threshold required to elicit acute toxicological effects.

Applying these conservative toxicological limits to a mobile bird species is inherently conservative, as the metabolic and physiological pathways of adult seabirds are significantly more resilient than the larval and microscopic receptors used to define the mixing zone boundaries. No measurable impact to wedge-tailed shearwater individuals or populations is expected due to these short-term, intermittent contact times and the rapid decline of contaminant concentrations beyond the immediate discharge area. Overall, PFW and ballast water discharge is assessed as having no lasting or ecologically significant impact on breeding wedge-tailed shearwaters, with discharges managed in accordance with the PFW and ballast water monitoring and management framework (Section 5.8.4) and produced water adaptive management strategy (Section 8.12) to ensure compliance with relevant environmental performance standards.

Fish, Sharks and Rays

The PFW and ballast water discharge mixing zone overlaps the Whale Shark foraging BIA. Whale sharks are highly mobile, filter-feeding megafauna that utilise expansive oceanic ranges to track seasonal prey concentrations.

While individual whale sharks may occasionally forage within the vicinity of the mixing zone, any exposure to discharge constituents is restricted by their continuous movement. Based on an average foraging swimming speed of 0.5 to 1.1 m/s (Motta et al. 2010), a whale shark would transit the 3.7 km mixing zone in approximately 56 minutes to 2 hours. While the lower end of this speed range may result in a transit slightly exceeding one hour, the application of this threshold remains inherently conservative. The 1-hour limit is derived from toxicological data for highly sensitive, microscopic, or larval marine life; for a large-bodied elasmobranch with significantly greater physiological resilience, such a transient exposure is insufficient to trigger acute toxicological effects.

Consequently, no measurable impact to whale shark individuals or populations is expected due to these short-term, intermittent contact times and the rapid decline of contaminant concentrations beyond the immediate discharge area. Overall, PFW and ballast water discharge is assessed as having no lasting or ecologically significant impact on transient foraging whale sharks, with discharges managed in accordance with the PFW and ballast water monitoring and management framework (Section 5.8.4) and produced water adaptive management strategy (Section 8.12) to ensure compliance with relevant environmental performance standards.

Plankton

Planktonic species and early life stages of fish (embryos and larvae) within the PFW and ballast water discharge mixing zone are susceptible to injury or mortality. Due to their limited mobility and high surface-area-to-volume ratios, these receptors are the most susceptible to the hydrocarbons and chemicals present in the discharge. The mixing zone is specifically defined by the toxicological sensitivity of these lower-trophic organisms. However, the predicted spatial extent is negligible relative to the regional distribution of plankton populations.

Given the naturally high mortality rates and rapid turnover of planktonic species (UNEP, 1985), combined with the continuous replenishment of populations through reproduction and advection from surrounding waters (Volkman et al., 2004), no measurable population-level effects are expected. Any localised impacts would be short-lived and non-persistent. Therefore, the overall impact on plankton and early life stages of fish is assessed as being of no lasting or ecologically significant impact, with discharges managed in accordance with the PFW and ballast water monitoring and management framework (Section 5.8.4) and produced water adaptive management strategy (Section 8.12) to ensure compliance with relevant environmental performance standards.

5.8.6 Risk Ranking

The discharge of PFW and ballast water results in highly localised changes to water quality and sediment quality. Long-term in-field monitoring (Worley, 2025) and chemical analysis confirm that the majority of constituents remain below the Limits of Reporting (LOR) or ANZG (2018) PC99/PC95 levels within 100 m of the discharge point. Due to the buoyant nature of the plume

and rapid dilution, potential toxicity effects are confined to near-surface waters, with no evidence of cumulative impacts on sediment quality (Worley, 2025).

Impacts to plankton and early life stages of fish are restricted to a negligible spatial extent relative to regional distributions. Given high natural turnover and constant replenishment via advection, no population-level effects are expected. For marine megafauna (whales, turtles, sharks, and seabirds), the risk of toxicological impact or bioaccumulation is considered negligible. Exposure is limited to transient transit through a mixing zone that was conservatively derived based on the sensitivity of larval organisms and sessile life stages. Therefore:

- The consequence ranking of '1' (Incidental) was assigned to water and sediment quality, and a likelihood of 'E' (Almost Certain) was considered appropriate, resulting in a risk ranking of 'Medium' (RRIII).
- The consequence ranking of '1' (Incidental) was assigned to plankton and marine fauna, and a likelihood of 'C' (Possible) was considered appropriate, resulting in a risk ranking of 'Low' (RRIV).

5.8.7 ALARP Demonstration

Table 5-56 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with discharge of PFW and ballast water. No additional controls were identified that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with discharge of PFW and ballast water are assessed as low as reasonably practicable.

5.8.8 Acceptability Demonstration

Table 5-63: Acceptability demonstration – Discharge of PFW and ballast water

ACCEPTABLE LEVEL OF RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant principles of ESD not compromised given proposed controls (Section 5.8.1).
External context – objections or claims considered	N/A – no external objections or claims received.
Internal context – VOGA HSE policy/procedure met	Yes – Risk managed in accordance with VOGA HSE policy.
Other requirements met	ANZG (2018) guidelines The adopted controls and acceptability assessment has considered regulatory guidance, in particular the ANZG (2018) guidelines. The ANZG (2018) guidelines state that environmental values should be identified, and levels of ecological protection should then be set. To ensure ecosystem health is maintained overall, the cumulative size of the areas where lower levels of ecological protection apply should

	be proportionally small compared to the areas designated high and maximum. The the PFW and ballast water monitoring and management framework (Section 5.8.4) and produced water adaptive management strategy (Section 8.12) aligns to the levels of protection described by the ANZG (2018) guidelines through the acceptable limits of change. The level of ecological protection provided to sensitive receptors is consistent with the North-west Network Management Plan (2018). By monitoring and managing to the 99% species protection safe dilutions at boundary of the approved mixing zone, there can be high confidence that potential impacts are managed via the monitoring and management framework (Section 5.8.4) and produced water adaptive management strategy (Section 8.12). Minamata Convention 2013 The Minamata Convention 2013 (ratified by Australia in 2021) requires measures to be in place to control releases containing mercury or mercury compounds. Each of these measures, with information on how each measure is met for discharges of Wandoo PFW is provided below: • Release limit values to control, and where feasible, reduce releases. Guideline values related to mercury are in place and described above. • The use of best available techniques and best environmental practices to control releases. Monitoring via annual PFW WET tests at end-of-pipe, the monitoring and management framework (Section 5.8.4) and produced water adaptive management strategy (Section 8.12) provides adaptive management to ensure best environmental practices. • A multi-pollutant control strategy for mercury releases. The monitoring framework implemented includes full chemical characterisation and WET testing at end-of-pipe, which allows understanding of holistic toxicity of the effluent considering all contaminants. Species recovery plans, approved conservation advice and threat abatement plans VOGA have considered information contained in recovery plans, approved conservation advice and threat abatement plans published by DCCEEW. This includes the Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia, 2017). The overarching objective of the Recovery Plan for Marine Turtles in Australia is to reduce detrimental impacts on Australian populations of marine turtles and hence promote their recovery in the wild. The Mixing zone is within the flatback turtle internesting BIA. The Recovery Plan identifies chemical discharge as a relevant threat to marine turtles and lists the following relevant priority action: 'Manage anthropogenic activities to ensure marine turtles are not displaced from identified habitat critical to the survival.' With controls in place through the monitoring and management framework (Section 5.8.4) and produced water adaptive management strategy (Section 8.12), VOGA considers the potential

	impacts and risk to marine turtles from changes in water quality from PFW and ballast water discharges are low and consistent with the Recovery Plan for Marine Turtles.
RR < High (RRII)	Yes – Medium (RRIII).
EPO(s) manage impacts to acceptable levels	Yes – The following relevant EPOs will be maintained: • EPO-OP-03 See Section 7 for further details.
Acceptability summary: The impacts and potential risks of PFW and ballast water discharge have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-56), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.7).	

5.9 Introduction of Invasive Marine Species

5.9.1 Hazard Report

Table 5-64: Hazard report – Introduction of invasive marine pests

HAZARD	Introduction of invasive marine pests					
EP risk no.	EP-OP-R21					
Activity cause	Vessel operations.					
Potential impacts	Changes to habitat structure. Reduction in native species abundance through predation, competition or interspecies breeding. Change to the functions, interests and activities of other marine users.					
Extent and duration	Indeterminate.					
PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Ballast water from tankers and vessels	Vessels comply with Australian Ballast Water Management Requirements (DAWE, 2020).	Administrative	Prevention	EPO-OP-04 No introduction, establishment or spread of a known or potential invasive marine species.	Australian Ballast Water Management Requirements (DAWE, 2020) consistent with the International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Management Convention) (IMO, 2004).	Ballast water management plan or record of exemption. Valid ballast management certificate or record of exemption.
Biofouling on vessels and equipment	Vessel and immersible equipment complete the VOGA Biofouling Risk Assessment Process consistent with National Biofouling Guidelines for the Petroleum Production and Exploration Industry and IMO Guidelines for the control and management of a ships' biofouling to minimise the transfer of invasive aquatic species.	Administrative	Prevention		Vessels will complete a VOGA Biofouling Risk Assessment, identifying a low risk before mobilisation to the Operational Area: Biofouling risk based on a range of information including presence of a biofouling management plan and record book, last port of call, age of anti-fouling coating etc. If a risk category of moderate, uncertain or high is scored, the process requires an independent IMS expert to be engaged and further risk assessment and/or management measures undertaken.	Records of VOGA Biofouling Risk Assessments maintained for all vessels and relevant immersible equipment entering the Operational Area demonstrating low risk status.
	Vessels, including tankers, comply with Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships.	Administrative	Prevention		Anti-fouling Systems on tankers and vessels are maintained in compliance with International Convention on the Control of Harmful Anti-Fouling Systems on Ships (IMO, 2001): • Prohibits the use of harmful organotins in antifouling paints used on ships and establishes a mechanism to prevent the potential future use of other harmful substances in anti-fouling systems.	Records indicate ship anti-fouling systems have not used harmful organotins.
					IMS inspection of project infrastructure to validate absence of invasive marine pests on a 5 yearly basis.	IMS inspection records.

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
None identified.	N/A	N/A	N/A	N/A	N/A

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Major (4)	Unlikely (B)	Medium
ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
A Medium risk is defined as tolerable on demonstration of ALARP under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		
Additional management controls	**Assessment of option**	**Adopted/Not adopted**
Restrict vessel operations to using vessels and equipment that have only operated in local, State or Commonwealth waters to reduce potential for invasive marine species.	Would reduce potential for invasive marine species to be transported into area since vessels would not have originated elsewhere. Vessels and equipment suitable for the activity that have only operated in local, State or Commonwealth waters may not be available; therefore, work could not be completed	Not adopted
Mandatory dry docking of vessels prior to entering field to clean vessel and equipment and remove biofouling.	Would ensure that no invasive marine species are present on vessel or associated equipment. Significant cost (grossly disproportionate to the risk); would lead to scheduling delays.	Not adopted
Biofouling Management Plans in place for all vessels	Requiring each vessel to have an in place biofouling management plan and record book was not adopted given: • The presence of a biofouling management plan and record book is part of the Biofouling risk assessment process and so will inform the risk level assigned and any actions. • A biofouling management plan is best practice however not currently a legal requirement and as such not all vessels have this in place. This could lead to delays if ad hoc vessels are required and given the measure is part of the risk assessment process, not considered essential.	Not adopted
RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Major (4)	Unlikely (B)	Medium risk

5.9.2 Description of Hazard

Invasive marine species (IMS) are marine plants or animals that are not native to Australia but have been introduced by anthropogenic activities, such as shipping (DAFF, 2021). IMS can include fish, sea stars, crabs, molluscs, worms, sponges, microscopic dinoflagellates, shellfish, algae, bacteria and viruses.

For an IMS to be successful in a new location, it must colonise a vector (e.g. a vessel or submersible equipment), survive the transit of the vector, colonise the new environment and establish a viable population.

Vessels associated with the activity may be sourced from domestic or international waters. During operations, it is estimated that there will be one vessel movement per week, but will be more during project activities. During some project activities, replacement infrastructure may be brought to the Operational Area and installed following manufacturing overseas and storage in Dampier.

There is the potential for vessels or infrastructure to transfer IMS from international waters into the Operational Area and for them to establish on project infrastructure and in the local environment. There is also a smaller, but credible, risk of transfer of IMS from Australian waters (i.e. domestic ports).

Biofouling on immersed surfaces (e.g. ship hulls), floating/ immersible equipment and within internal seawater circulation systems, as well as ballast water, are potential pathways for IMS to translocate on offshore vessels or infrastructure (DAWR, 2018).

Most support vessels will be alongside the platform for a short period of time and will not come into direct contact with the platform. The exception is the accommodation vessel or MODU which may be connected to WNA or WNB via a gangway during project activities. If used, the accommodation vessel may be present for up to 7 weeks during a project.

5.9.2.1 Ballast Water

Ballast water is held in the ballast tanks of vessels and ensures that safe operating conditions are maintained by providing stability. When vessels require ballast, water from the surrounding environment is pumped into the ballast tanks. This water has the potential to be contaminated with microorganisms, such as, bacteria, microbes, small invertebrates, eggs, cysts and larvae of various species. When the weight of the vessel needs to be lightened ballast water is released into the receiving marine environment resulting in the potential introduction of foreign organisms. It is estimated that up to 30% of all marine pest incursions in Australia have arrived via ballast water (DAWR, 2018).

The Commonwealth Department of Agriculture, Fisheries and Forestry (DAFF) is the lead agency for management of ballast water. Vessels are required to manage ballast water in accordance with the IMO Ballast Water Management (BWM) Convention, IMO Guidelines and the mandatory Australian Ballast Water Management Requirements (DAWE, 2020) that is enforced under the *Biosecurity Act 2015*. The Australian Ballast Water Management Requirements set out the obligations on vessel operators with regards to the management of ballast water and ballast tank sediment when operating within Australian seas.

The requirements provide guidance for vessel operators on best practice policies and apply to all vessels operating internationally and domestically in Australia. The guidance includes the following obligations:

- All vessels must carry a valid ballast water management plan.
- All vessels must carry a valid International Ballast Water management certificate.
- Vessels with a ballast water management system (BWMS) must carry a Type Approval Certificate specific to the type of BWMS installed.
- All vessels must maintain a complete and accurate record of all ballast water movements.
- Vessels that are intending to discharge internationally sourced ballast water must submit a Ballast Water Report through MARS at least 12 hours prior to arrival.
- Domestic vessels that have been released from biosecurity control are still required to manage the movement of Australian sourced ballast water.
- All ballast water should be managed using one of the approved ballast water management options. All ballast water must be managed or receive a low risk exemption from the department prior to discharge.

The anticipated number of vessel movements is one per week. If an accommodation vessel or MODU is required during a project, it may be onsite for up to 7 weeks and will be connected to WNA or WNB.

During some project activities (e.g. infrastructure replacement) the volume of vessels will increase to up to 4 vessels per day for up to 7 weeks. The maximum number of vessels that will be in the Operational Area concurrently is 4, potentially consisting of 2 tow tugs, a crew transfer vessel and a diving support vessel.

Ballast water discharge from the Wandoo Facility is co-mingled with PFW and is assessed in Section 5.8.

5.9.2.2 Biofouling

Biofouling occurs when an accumulation of organisms attach and grow on immersed surfaces (e.g. ship hulls) and/or within internal seawater circulation systems.

DAFF is the lead agency for management of biofouling on vessel hulls, external niche areas and immersible equipment in Australian waters. Under the National Biofouling Management Guidelines for the Petroleum Production and Exploration Industry, IMO Guidelines for the control and management of ships' biofouling to minimise the transfer of IMS (resolution MEPC.207(62)) and Australian Biofouling Management Requirements (DAFF, 2023a) a risk assessment approach is applied to manage biofouling. IMO biofouling guidelines are considered 'best practice' for mitigation of transfer of IMS to ALARP.

All contracted vessels are required to complete the VOGA Biofouling Risk Assessment Process described in Section 8.13. The VOGA Biofouling Risk Assessment Process assigns a final risk category of low, moderate, uncertain or high to vessels based on a range of information including last port of call, age of antifouling coating etc. If a risk category of moderate, uncertain or high is

scored, a range of management options are available including inspections, cleaning or treatment of internal seawater systems.

The following Wandoo-to-vessel interactions are exempted from this risk assessment:

- Crude offtakes to tankers via the export system (CALM Buoy)
- Transfer of Mooring master to support vessels during pilotage of offtake tankers
- Offloading of equipment from another vessel onto the platforms, but the equipment will be deployed directly to the seabed.

The opportunity for organisms to translocate and settle on or in a vessel increases the longer a vessel is present at a location; and the length of time a vessel is stationary can impact on the performance of some types of anti-fouling coatings, in particular self-polishing copolymers. Stationary vessels in some conditions may slow the rate of biocide release and allow for organisms to colonise areas of the hull, which reduces the future effectiveness of the biofouling coating (Maritime Industry Australia Limited, 2020).

5.9.3 Impact and Risk Evaluation

Potential risks from the activity caused by the introduction of IMS include:

- Changes to habitat structure
- Reduction in native marine species abundance through predation, competition or interspecies breeding
- Change to the functions, interests and activities of other marine users.

The following receptors within the Operational Area may be impacted by the introduction of IMS:

- Benthic habitats and assemblages
- Commercial fisheries
- Offshore infrastructure.

5.9.3.1 Risk Assessment

IMS are organisms that have established within a marine environment outside of their natural area of distribution and impact on the local environment.

Not all marine species that are introduced to an area have the potential to establish themselves and become invasive. Species of concern are those that are not native to the region, are likely to survive and establish in the area, and are able to spread by anthropogenic or natural means. IMS concern varies from one region to another depending on the various environmental factors such as water temperature, salinity, nutrient levels and habitat type. IMS often have no competition or predators. These factors dictate their survival and invasive capabilities.

Studies have found that most IMS are temperate. Of the 60 species known to have become established in WA, only 6 are tropical species that occur north of Shark Bay (Wells et al., 2009). Most IMS are concentrated in port areas and relatively few have expanded their range beyond their presumed introductory points (Wells et al., 2009). Consequently, the IMS that have

established themselves in WA marine waters have, only resulted in changes to the ecosystems of highly localised port areas, with few repercussions for the broader marine environment.

IMS are generally found in shallow coastal locations and generally utilise hard substrata on which to settle. The deep offshore open waters of the Wandoo Field are not conducive to the settlement and establishment of IMS (Geiling, 2014), due to the lack of light or suitable habitat to sustain growth or survival. The Wandoo Facility is located on the NWS, ~40 km from Glomar Shoals in waters >50 m deep.

It is unlikely that any invasive marine species would survive and spread from the Wandoo Facility, given the seabed substrate (bare sand), lack of hard substrate within close proximity of Wandoo, and limited light availability at the seabed. The greatest potential for invasive marine species colonisation would be on subsea infrastructure (providing attachment points for sessile invertebrates) closer to the sea surface where light availability is greater.

IMS pose a major threat to the Australian environment, economy and social amenity by disrupting ecological processes. Disruption can occur via two pathways:

- Directly – through predation or competing with native marine plants and animals
- Indirectly – through habitat alteration (DAWR, 2018).

Once established, marine pests can rarely be eradicated, and their negative effects are often long lasting. IMS have the potential to outcompete and displace native species and subsequently alter ecosystem functioning and fisheries.

The anticipated number of vessel movements during normal operations is one per week during normal operations, with a support vessel spending a limited amount of time within the Operational Area. The longest an accommodation vessel or MODU would spend within the Operational Area is >7 weeks during projects.

Benthic Habitats and Assemblages

It was found that highly disturbed environments (such as marinas) are more susceptible to colonisation than open-water environments (Paulay et al., 2002). As noted above, most IMS are concentrated in port areas. Modelling conducted by the Bureau of Rural Sciences (BRS) of ballast water found that the risk of IMS colonisation decreases with an increased distance from shore (BRS, 2007), with only 2% chance of colonisation at 24 nm (44.5 km) offshore or beyond.

Benthic habitats within the Operational Area as described in Section 3.4.1.1, are defined by assemblages associated with subtidal soft sediments. ROV studies at similar depths within the NWS found that although sediments showed various levels of bioturbation, benthic communities were generally sparse with low densities of organisms (e.g. crustaceans, molluscs, and polychaetes). Further, no key ecological features, often associated with hard substrate habitats are located within the Operational Area.

The Operational Area is located in a deep-water (50–60 m) open-ocean environment with a lack of hard substrate and is approximately 38 km from the nearest shoreline (i.e. islands of the Dampier Archipelago). Therefore, it is considered that the Operational Area does not provide a location conducive to marine pest establishment and survival and that there is little potential for invasive organisms to accumulate and multiply.

Industry

Th establishment of IMS has the potential to cause changes to the functions or interests of the commercial fishing industry through impact to target fish species. IMS can impact fisheries through competition with target species, fouling of fishing equipment, acting as parasites on fish stock (Gollasch, 2011) and rendering fisheries toxic for human consumption (DAWE, 2015).

Although the Operational Area overlaps with several commercial fishery management areas, fishing effort is low in the Operational Area. As described in Section 3.5.1, two WA-managed fisheries recorded catch-effort within the 10 nm reporting CAES blocks that overlap the Operational Area, however the Operational Area is within the permanent PSZ, which excludes fishing vessels.

IMS identified as being most likely to establish in Australia inhabit shallow waters with hard substrate (Marine Pest Sectoral Committee, 2018). Given the offshore location, water depth, intermittent and relatively short duration of support activities, and limited contact between support vessels (conducive for IMS transfer), the potential for IMS introduction affecting commercial fisheries is low.

The greatest potential for the establishment of IMS resulting from Wandoo operations is associated with the potential for colonisation of subsea infrastructure which provide attachment points for sessile invertebrates or marine algae closer to the sea surface where light is more available.

The Operational Area currently contains the WNB platform, the WNA monopod, and a variety of subsea systems. The TL1 and TL2 export pipelines from the North Rankin Complex to the Karratha Gas Plant and the Devil Creek Development Project pipeline connecting the offshore Reindeer gas field to the onshore Devil Creek gas processing plant are in proximity to the Operational Area. The closest these are located to the proposed Operational Area are 4.6 km east (TL1) and 10 km west (TL2). The Operational Area is approximately 38 km from the nearest shoreline (in the Dampier Archipelago).

Water depths within the Operational Area range from approximately 50–60 m. At these depths, light penetration is significantly reduced, limiting photosynthetic activity. If IMS are introduced and establish on Wandoo infrastructure, their spread is expected to remain localised due to the facility's physical isolation and limited connectivity with surrounding habitats.

5.9.4 Risk Ranking

The offshore open waters of the Operational Area are not conducive to the settlement and establishment of IMS, due to the lack of light and suitable habitat to sustain growth and survival. Therefore:

- A consequence ranking of '4' (Major) was assigned to benthic habitats and assemblages, and industry. A likelihood of 'B' (Unlikely) was considered appropriate, resulting in a risk ranking of Medium (RRIII).

5.9.5 ALARP Demonstration

Table 5-64 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with the introduction of IMS. No additional controls were identified that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with the introduction of IMS are assessed as low as reasonably practicable.

5.9.6 Acceptability Demonstration

Table 5-65: Acceptability demonstration – Introduction of IMS

ACCEPTABLE LEVEL OF IMPACT/RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant Principles of ESD not compromised given proposed controls (Table 5-64).
External context – objections or claims considered	N/A – No external objections or claims received.
Internal context – VOGA HSE policy/procedure met	Yes – Risk managed in accordance with VOGA HSE policy.
Other requirements met	Yes – including: • Australian Ballast Water Management Requirements (DAWE, 2020) and the Australian Biofouling Management Requirements (DAFF, 2023a) give effect to the Biosecurity Act 2015 and associated regulations; International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Convention) and relevant guidelines or procedures adopted by the Marine Environment Protection Committee of the IMO • National Biofouling Management Guidelines for the Petroleum Production and Exploration Industry (MPSC, 2018) It is considered that the petroleum activity is consistent with the objectives and actions of the following EPBC management plans that identify IMS as a threat (Table 1-3): • Approved Conservation Advice for *Pristis zijsron* (green sawfish) (DEWHA, 2008b) • Approved Conservation Advice for *Pristis clavata* (dwarf sawfish) (DEWHA, 2009) • Sawfish and River Sharks Multispecies Recovery Plan: (*Pristis pristis*, *Pristis zijsron*, *Pristis clavata*, *Glyphis glyphis* and *Glyphis garricki*) (DoE, 2015c).
RR < High (RRII)	Yes – Medium (RRIII)
EPO(s) manage impacts to acceptable levels	Yes – the following relevant EPOs will be maintained: • EPO-OP-04 See 07 for further details.

Acceptability summary:

The potential risks of the introduction of IMS have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-64), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.7).

5.10 Accidental Discharge of Waste and Solid Objects

5.10.1 Hazard Report

Table 5-66: Hazard report – Non-hazardous and hazardous waste

HAZARD	Non-hazardous and hazardous waste
EP risk no.	EP-OP-R14
Activity/cause	Waste generated through routine operations.
Potential impacts	Impacts to benthic habitats and assemblages. Injury/mortality to marine fauna. Impacts to submerged cultural heritage.
Extent and duration	Localised impact of short duration.

PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Waste generation.	Non-hazardous and hazardous wastes are managed in accordance with VOGA's Waste Management Procedure [WPA-7000-YH-0009]	Administrative	Prevention	EPO-OP-05 No unplanned overboard loss of waste or solid objects to the marine environment.	Hazardous and non-hazardous wastes shall be segregated into recyclable and non-recyclable.	VOGA audit or inspection confirms hazardous and non-hazardous wastes are segregated into recyclable and non-recyclable wastes.
					Waste shall be stored in clearly marked containers, and hazardous wastes bunded, in accordance with the relevant Safety Data Sheet (SDS).	VOGA inspection or audit confirms compliance.
					Wastes for onshore disposal shall be transported in suitable containers.	Inspection or audit confirms waste is transported onshore in relevant containers.
					All non-hazardous (except putrescible waste and waste-water) and hazardous waste shall be transported to shore and disposed of in appropriately licensed facilities.	Waste disposal receipts confirm appropriate disposal of wastes (type and volume).
Generation of hazardous waste.	Slop crude oil is reprocessed through WNB process.	Engineering	Reduction		Slop crude oil is reprocessed through WNB process.	Platform visual inspection checks and waste manifests.
Generation of waste.	Facility and vessel procedures are compliant with MARPOL Convention Annex V, Prevention of Pollution by Garbage from Ships and Marine Order 95.	Administration	Reduction		The facility and all vessels licensed to carry more than 15 persons or over 400 gross tonnage shall have and implement a Waste Management Plan and maintain a Garbage Record Book in accordance with MARPOL Convention Annex V, Prevention of Pollution by Garbage from Ships and Marine Order 95.	VOGA inspection or audit of facility and vessels to ensure compliance with Waste Management Plan. Garbage Record Book details the wastes (type and volume) disposed.

PREVENTION						
Dropped objects	Facility and vessel inductions include control measures and training for crew in dropped object prevention.	Administration	Reduction		Crew training/inductions, and job safety analyses where relevant, will include a component on preventing dropped objects to increase awareness of requirements in accordance with Section 0.	Records show training to minimise the potential for dropped objects is provided to the facility and vessel(s) crew.
	Facility work procedures for lifts, bulk transfers and cargo loading.	Administration	Reduction		Facility work procedures require: • The security of loads to be checked prior to commencing lifts • Loads to be covered if there is a risk of losing loose materials • Lifting operations to be conducted using systems to manage the specific risks of that lift, including consideration of weather and sea state.	Completed handling and transfer procedure checklist, Permit to Work and/or risk assessments verify that the procedure is implemented prior to each transfer.

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Recovery of dropped objects where practical to do so.	Engineering	Mitigation	EPO-OP-05 No unplanned overboard loss of waste or solid objects to the marine environment.	Any hazardous solid waste dropped to the marine environment will be recovered where safe and practicable to do so. Where safe and practicable for this activity, consider: • Risk to personnel to retrieve object • Whether the location of the object is in recoverable water depths • The object's proximity to subsea infrastructure • Ability to recover the object (i.e. nature of object, lifting equipment or ROV availability, and suitable weather).	Incident reports detail the recovery attempt consideration and status of any hazardous waste lost to the marine environment.

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Minor (2)	Unlikely (B)	Low risk

ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
A low risk is defined as tolerable on demonstration of ALARP under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		
Additional management controls	**Assessment of option**	**Adopted/Not adopted**
Install processing facilities on the facility, capable of very high temperature incineration of all wastes, including hazardous wastes.	Installation of waste processing facilities on the platform is not feasible considering personnel and equipment safety and space allocation. This would also involve significant cost, for a negligible reduction in environmental risk and potential environmental impact.	Not adopted

RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**

RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Minor (2)	Unlikely (B)	Low risk

5.10.2 Description of Hazard

Wastes generated at the Wandoo Facility are divided into two streams:

- Non-hazardous waste (general and recyclable)
- Hazardous waste.

Recyclable waste generated at the Facility includes aluminium cans, glass, paper and recyclable scrap metal.

General waste includes general waste material (including wood) and putrescible waste which comprises galley waste, sewage and greywater. The discharge of putrescible waste is assessed in Section 5.16.

Hazardous wastes generated at the Facility may include:

- Solid hazardous waste such as insulation waste, batteries, empty paint cans, empty drums, and hydrocarbon-contaminated materials such as oil filters
- Liquid hazardous waste such as liquid hydrocarbon wastes (oily water, grease, etc.) and miscellaneous chemical waste such as acids and solvents
- Produced sands which are generated on the Wandoo Platform from the reservoir, consisting of fine sand and glauconite containing oil and some heavy metals. The sands have a median particle size of approximately 120 µm and settle out in the separators where they are regularly flushed. The dry sands are transported back to the mainland.

Waste associated with the Wandoo operations is managed according to the Waste Management Procedure [WPA-7000-YH-0009] which is aimed at appropriately managing waste streams to limit the impact to the environment. All waste will be segregated, stored in sealed containers and labelled. It will then be returned to the mainland for disposal or recycling via support vessels in closed containers/skips/bins, tanks or 'bulky-bags'.

Where equipment or large items are planned to be transferred from vessels to the platform (e.g. during maintenance, repair or replacement activities), there is potential for those materials to be accidentally lost overboard.

There may be accidental releases/discharges to the marine environment of non-hazardous and hazardous solid wastes, or dropped equipment from the Facilities or vessels during operational activities due to deviation from procedures, poor equipment maintenance, inadequate staff training, or adverse weather conditions (e.g. storm that results in goods rolling or blowing off decks).

Accidental loss of containment of sand into the ocean may also occur from equipment failure, incorrect handling and/or transport and overfilling of sands tanks.

The build-up of scale, which is the precipitation of solid minerals from the PFW potentially containing Naturally Occurring Radioactive Materials (NORMs), may occur in flowlines and process equipment. This build-up is removed periodically and is transferred to shore for appropriate disposal.

5.10.3 Impact and Risk Evaluation

Potential risks caused by the accidental loss of waste or solid objects include:

- Impacts to benthic habitats and assemblages
- Injury/mortality to marine fauna
- Impacts to submerged cultural heritage.

The following receptors within the Operational Area may be impacted by accidental loss of waste or solid materials:

- Benthic habitats
- Marine fauna
- Cultural heritage.

5.10.3.1 Risk Assessment

Benthic Habitats

Change to Benthic Habitats and Assemblages

Unplanned disturbance to benthic habitats and assemblages may occur due to dropped waste or objects overboard during facility operations or support vessel operations. These receptors may be smothered or disturbed due to sediment suspension and re-settlement. Benthic habitats within the Operational Area are likely to consist of fine silt and sandy substrates with sparse benthic communities (Section 3.4.1). There are no seagrass, coral or macroalgal communities in the Operational Area.

Should the occurrence of dropped objects occur, the impact would be localised with limited disturbance to benthic habitats..

The potential impacts of hazardous solid wastes are contamination of the marine environment including localised changes to water quality and toxic effects on marine species.

Items of solid hazardous waste, such as paint cans containing paint residue, or batteries, would settle on the seabed if dropped overboard. Over time, this would result in the leaching of hazardous materials to the seabed, which is likely to result in a small area of substrate becoming toxic and unsuitable for colonisation by benthic fauna. As the seafloor in the Operational Area only has sparse communities colonising it, changes to a small area of seafloor would be unlikely to impact these communities significantly.

Marine Fauna

Injury/Mortality

Accidental discharge of waste into the marine environment can cause injury or death to marine fauna through ingestion or entanglement. Waste or marine debris encompasses all plastics and other types of debris that can harm vertebrate marine wildlife. This includes plastic garbage (e.g. bags, bottles or ropes) and solid non-biodegradable materials lost or disposed of at sea. These

impacts will be limited in exposure and quantity, affecting individual animals rather than population levels.

Threatened and/or migratory species potentially affected by the loss of waste overboard are discussed in Section 3.4.3. Recovery plans and species conservation advice for these species including albatrosses and giant petrels, seabirds, marine turtles and whale shark (Table 1-3) identify marine debris as a threat for the species. The Operational Area does not overlap any feeding or foraging areas for seabirds or marine turtles.

The Operational Area overlaps the Foraging BIA for the whale shark (Figure 3-16). The high-density aggregation area for the species is approximately 270 km southwest of the Operational Area at the Ningaloo Marine Park and they are known to migrate further offshore along the 200 m depth contour. The Operational Area does not feature any upwelling or regions of high productivity. Therefore, whale shark presence in the area is likely to consist of individuals rather than any feeding aggregations.

Any accidental released of waste to the marine environment will be limited and managed with waste management procedures and compliance with Marine Orders. Should any waste be lost to the sea during the activities, impacts are expected to be short term, not affecting species at a population level.

Submerged Cultural Heritage

Impacts to Submerged Cultural Heritage

Dropped objects may disrupt submerged cultural heritage, although there no known cultural heritage artefacts, shipwrecks or registered Aboriginal Cultural Heritage sites within the Operational Area (Section 3.6.4 and 3.7.5).

Therefore, any impact to submerged cultural heritage is expected to be incidental.

5.10.4 Risk Ranking

An accidental loss of waste or solid objects is expected to result in a highly localised and temporary change to benthic habitats within the immediate vicinity of the release. Any impacts to marine fauna are expected to be short-term and not effect species at a population level. There are no known underwater cultural heritage sites in the Operational Area. Therefore:

- The consequence ranking of ‘2’ (Minor) was assigned to benthic habitat, and a likelihood of ‘B’ (Unlikely) was considered appropriate, resulting in a risk ranking of ’Low’ (RRIV).
- The consequence ranking of ‘1’ (Incidental) was assigned to marine fauna and submerged cultural heritage, and a likelihood of ‘A’ (Rare) was considered appropriate, resulting in a risk ranking of ’Low’ (RRIV).

5.10.5 ALARP Demonstration

Table 5-66 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and

the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with the accidental discharge of waste and solid objects. No additional controls were identified that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with the accidental discharge of waste and solid objects are assessed as low as reasonably practicable.

5.10.6 Acceptability Demonstration

Table 5-67: Acceptability demonstration – Accidental discharge of waste and solid objects

ACCEPTABLE LEVEL OF IMPACT/RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant Principles of ESD not compromised given proposed controls.
External context – objections or claims considered	N/A no external objections or claims received.
Internal context – VOGA HSE policy/procedure met	Yes – Risk managed in accordance with VOGA HSE policy.
Other requirements met	Yes – including: • AMSA Marine Order 95. It is considered that the petroleum activity is consistent with the objectives and actions of the following EPBC management plans that identify marine pollution as a threat (Table 1-3): • Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Wildlife of Australia's Coasts and Ocean (DEE, 2018) • National Recovery Plan for albatrosses and petrels (2022) (DCCEEW, 2022a) • Approved Conservation Advice for *Rhincodon typus* (whale shark) (TSSC, 2015b) • Approved Conservation Advice for *Pristis zijsron* (green sawfish) (DEWHA, 2008b) • Sawfish and River Sharks Multispecies Recovery Plan: (*Pristis pristis*, *Pristis zijsron*, *Pristis clavata*, *Glyphis glyphis* and *Glyphis garricki*) (DoE, 2015c) • Conservation Advice for *Pristis clavata* (dwarf sawfish) (DEWHA, 2009) • Conservation Advice for *Orcaella heinsohni* (Australian snubfin dolphin) (DCCEEW, 2025b) • Conservation Advice for *Sousa sahulensis* (Australian humpback dolphin) (DCCEEW, 2025c) • Recovery Plan for Marine Turtles in Australia, 2017-2027 (Commonwealth of Australia, 2017) • Approved Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle) (DEWHA, 2008c).
RR < High (RRII)	Yes – Low (RRIV)

EPO(s) manage impacts to acceptable levels	Yes – The following relevant EPOs will be maintained: • EPO-OP-05 See Section 7 for further details.
Acceptability summary: The impacts and potential risks of waste and solid object discharge have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-66), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.7).	

5.11 Planned Maintenance, Inspection and Repair Discharges

5.11.1 Hazard Report

Table 5-68: Hazard report – Planned maintenance, inspection and repair discharges

HAZARD	Planned Maintenance, inspection and repair discharges
EP risk no.	EP-OP-R15
Activity cause	Pigging, flushing, hydrotesting/pressure testing, leak testing, chemical cleaning, helideck emergency, epoxy wrap repairs, cathodic protection depletion, and backflush operations.
Potential impacts	Change in water quality. Change in sediment quality. Injury/mortality to marine fauna.
Extent and duration	Water-quality impacts are confined to the immediate near-field around the discharge point due to rapid dilution, degradation and dispersion. Inert solids (paint flakes, garnet, aluminium oxide) settle directly beneath or adjacent to the release point, creating a very small, localised footprint on the seabed. Chemical discharges are short-term and intermittent, occurring only during specific MIR activities.

PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Pigging, flushing, testing, well intervention discharges (hydro/ pressure/leak testing) using biocide.	Routine pigging procedures.	Administrative	Elimination	EPO-OP-06 No serious or irreversible change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	Biocide treated water is degraded and/or diluted prior to discharge via routing to storage (CGS) or PWTS where feasible, or assessed via MOC process to reduce to ALARP in accordance with the Wandoo Platform Operations Manual [VOG-7000-MN-0001].	Records of dilution of pigging discharges to baseline levels prior to discharge.
	Biocide treated water management.	Administrative	Elimination			Records of approved procedure developed prior to activity includes environmental assessment via MOC.
Use of chemicals for maintenance and inspection activities.	Chemical assessment and selection process.	Administrative	Substitution		Chemicals used in the production process that will be discharged to the marine environment are selected in accordance with the VOGA chemical assessment process.	Chemical changes/new chemical to have approved MoC. Assessment of existing chemicals is outlined in the review of current process chemicals.
					AFFF shall not be routinely used during testing of the firefighting system. AFFF utilised at the Wandoo Facility is selected to exclude Persistent Organic Pollutants (POPs) such as PFOS and PFOA, in alignment with the Stockholm Convention.	Assessment of existing chemicals is outlined in the review of current process chemicals.
	All hazardous liquid chemicals are stored in bunded areas/chemical cradles.	Engineering	Prevention		Bunds show no visible sign of damage or deterioration that would impair their ability to contain spills.	Visual inspection during operator walk-around show no sign of bund impairment.
	Sulphamic acid neutralisation.	Administrative	Prevention		Sulphamic acid used for chemical cleaning is neutralised and tested prior to discharge.	Testing records demonstrate sulphamic acid is neutralised prior to discharge.

PREVENTION						
	Non-routine discharge management.	Administrative	Prevention		Non routine discharges with chemical additives are assessed via MOC process to reduce risk to ALARP prior to discharge in accordance with the Wandoo Platform Operations Manual [VOG-7000-MN-0001].	Management of change records show assessment of non-routine discharges.

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
None identified.	N/A	N/A	N/A	N/A	N/A

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Incidental (1)	Almost Certain (E)	Medium risk

ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
A medium risk is defined as tolerable on demonstration of ALARP under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		
Additional management controls	**Assessment of option**	**Adopted/Not adopted**
Firefighting systems (portable or in built), to be consistent with IMO SOLAS Chapter 11-2, Part C, Regulation 10 amendments related to the use and storage of firefighting foams containing perfluoroctane sulfonic acid (PFOS), as outlined in MSC.532(107), including: • For vessels constructed on or after 1 January 2026, no use or storage of extinguishing media containing PFOS. • For vessels constructed before 1 January 2026, no use or storage of extinguishing media containing PFOS, beyond the date of first survey on or after 1 January 2026.	Consistency with IMO SOLAS Chapter 11-2, Part C, Regulation 10 amendments, as outlined in MSC.532(107) may reduce the presence of PFOS-containing firefighting foams on vessels and the MODU. While not yet incorporated into ratified in relevant Australian domestic Legislation (Marine Order 15), implementing contemporary IMO requirements for the use and storage of fire extinguishing media is consistent with international best practice. Benefit outweighs cost/sacrifice.	Adopted (refer to CM-6.6).
RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Incidental (1)	Almost Certain (E)	Medium risk

5.11.2 Description of Hazard

Maintenance, inspection and repair activities produce a range of non-routine discharges to the marine environment including:

- Chemicals discharged during pigging, flushing, hydrotesting/pressure testing, leak testing, chemical cleaning.
- Release of paint flakes and garnet particles.
- Aluminium oxide released from depleted cathodic protection materials.
- Residual oil discharged as part of backflush.

Chemicals

A summary of the indicative chemicals used for the various maintenance and inspection activities is provided in Table 5-69.

Table 5-69: Chemicals used for inspection and maintenance activities

Activity	Chemical	Estimated volume	Frequency	Product toxicity value
Pigging and flushing	Biocide	300 L	Annual	EC50 0.16 mg/L
Leak testing	Fluorescein dye	20 L	Annual	LC50 337 mg/L and LC90 721 mg/L

Biocides may be used during pigging operations to enhance biofilm removal and to inhibit microbial activity within pipework and process fluids. Biocides may also be added to seawater used for flushing, leak testing, and where operationally required during well intervention activities.

Fluorescein dye is added to water used for leak testing to facilitate leak detection.

Water generated from routine pigging activities that contains biocide is preferentially routed to Shaft 4 of the CGS to allow residence time for dilution and breakdown prior to discharge to the marine environment via the ballast water system (in accordance with WNB-010-500 Guidelines for Biocide Treated Water Discharge in the Wandoo Platform Operations Manual [VOG-7000-MN-0001]). Direct discharge of pigging fluids in volumes ≤ 300 L may occur where operationally required, subject to prior environmental risk screening and approval through the Management of Change (MOC) process.

Other non-routine treated water discharges are also preferentially directed to Shaft 4 before eventual discharge via the ballast water system.

Where storage of treated water is not feasible due to system capacity or volume constraints, treated water is routed via the process facilities and discharged through the Produced Water Treatment System (PWTS) to achieve effective dilution and dispersion.

During well intervention activities, biocide-treated water is used within wells, risers and the blowout preventer to protect reservoir integrity. Following completion of well intervention works,

storage of treated water may not be feasible due to the volumes involved, requiring processing through the facilities and discharge via the PWTS following treatment.

Sulphamic acid used during chemical cleaning activities is neutralised with caustic soda prior to discharge via the hazardous open drainage system. Neutralised water is tested to confirm pH within the neutral range prior to discharge.

Any non-routine discharges containing chemical additives are assessed through the Management of Change (MOC) process, including environmental risk screening and approval prior to discharge, to ensure risks are reduced to ALARP, in accordance with the Wandoo Platform Operations Manual [VOG-7000-MN-0001].

Overall, inspection and maintenance activities result in short-term, localised discharges of treated water, with chemical constituents expected to rapidly dilute, degrade or disperse within the receiving marine environment, consistent with the impact assessment and discharge modelling presented in this EP.

Epoxy Wrap

Topside and subsea surfaces may be repaired using application of epoxy composite wraps. Epoxy materials are mixed on the topsides. When applying the wraps subsea, soluble chemicals may leach from the epoxy materials while curing (1-30 hours). Surface preparation prior to application may result in the release of paint flakes (~500-600 g) and garnet particles (~25 kg) to the marine environment.

Cathodic Protection

Metal surfaces throughout the Wandoo Facility and infrastructure are maintained using cathodic protection. During this process, aluminium oxide is released to the marine environment. The expected depletion rate, based on the design of the cathodic protection is 2,281 kg/yr. However, measurements have shown the actual depletion rate is 1,112 kg/yr.

Backflush

This activity could result in the discharge of 5 m^3 of seawater to the marine environment no more than once per year. The seawater may contain residual oil.

5.11.3 Impact and Risk Evaluation

Potential impacts from planned maintenance, inspection and repair discharges include:

- Change in water quality
- Change in sediment quality
- Injury/mortality to marine fauna.

The following receptors within the Operational Area may be impacted by the planned maintenance, inspection and repair discharges:

- Water quality
- Sediment quality

- Marine fauna.

5.11.3.1 Impact Assessment

Water Quality

Change in Water Quality

Potential impacts to water quality from planned maintenance, inspection and repair discharges result from the introduction of trace concentrations of biocide, fluorescein dye, sulphamic acid, and residual oil into the water column. These discharges occur during pigging, flushing, hydrotesting, chemical cleaning, leak testing, helideck fire emergency and backflush discharges.

The biocide THPS (Tetrakis Hydroxymethyl Phosphonium Sulphate) can be harmful to aquatic organisms due to its toxicity levels, however in most instances the chemical has rapid biodegradation to inert THPO (Tris (Hydroxymethyl) Phosphine Oxide) and no bioaccumulation resulting in a minor impact in extent and duration (United States Environmental Protection Agency, 2014).

The USA EPA classifies fluorescein as non-toxic and has approved it for use in public drinking water supplies. Fluorescein is biodegradable and photodegradable with decomposition products of carbon dioxide, water and a trace amount of sodium (Farmer and Blew, 2009). While extreme dosages (>300 mg/L) can elicit toxic effects, operational concentrations are maintained at 1–2 mg/L—at least two orders of magnitude below the LC50 for sensitive species like *Daphnia pulex*. Investigations of the ecological implications of using fluorescein dye have concluded that impacts are negligible at usage concentrations (Field et al., 1995, as reported in Farmer and Blew 2009; Walthall and Stark, 1999).

Sulphamic acid is used for chemical cleaning, and is harmful in its raw state (LC50 70.3 mg/L). However, operational controls require neutralisation with caustic soda prior to discharge. All neutralized acid is pH-tested to ensure a neutral value of 7, resulting in a discharge consisting primarily of water and low-concentration salts that disperse rapidly upon release.

The potential environmental impact from trace hydrocarbons in a 5 m^3 of backflush is predicted to be negligible and localised. The volume is insufficient to create a persistent plume, and concentrations will remain well below concentrations with the potential for impact to the marine environment beyond the immediate point of release.

The majority of maintenance, inspection and repair chemicals are routed through the CGS for degradation or the PWTS to ensure high-ratio dilution.

As these discharges are intermittent, small-volume, and involve chemicals with low persistence or high dilution ratios, no measurable impact to marine fauna individuals or populations is expected. Overall, maintenance, inspection and repair discharges are assessed as having no lasting or ecologically significant impact, with potential effects to water quality expected to be localised and non-persistent.

Sediment Quality

Change in Sediment Quality

Potential impacts to sediment quality from maintenance, inspection and repair discharges are primarily associated with the release of inert solid materials, including epoxy paint flakes, garnet abrasive particles from epoxy wrap activities, and aluminum oxide particles from depleted cathodic protection materials.

These inert solid materials are characterised by their inert nature such that paint flakes, garnet abrasive particles and aluminum oxide are chemically inert and insoluble in the marine environment. These particles possess high settling velocities due to their density and structural integrity. Upon release, they are expected to descend rapidly through the water column and deposit on the seafloor within the immediate vicinity of the discharge/release.

The physical footprint of these deposits is limited to a small, localised area directly beneath or adjacent to the maintenance site. While the deposition of these particles may cause a minor, localised change in sediment grain size or composition, the impacted area is negligible relative to the surrounding seabed environment. Given that the surrounding seabed is characterised by high-energy hydrodynamic conditions typical of the North West Shelf, any fine particles would likely be dispersed over time, preventing long-term accumulation or burial of benthic habitats.

Planned maintenance, inspection and repair discharges to the seafloor are categorised as low-risk, physical events rather than toxicological risks. The release of paint flakes, garnet, and aluminum oxide is assessed as having no lasting or ecologically significant impact on sediment quality.

Marine Fauna

Toxic Effects on Marine Fauna

The potential impacts to marine fauna from planned maintenance, inspection, and repair discharges are assessed as negligible, primarily due to the intermittent nature, small volumes, and rapid dilution of the chemicals and hydrocarbons involved.

Marine megafauna, including humpback whales, flatback turtles, and whale sharks, may seasonally transit the Operational Area during these discharge activities. However, the potential for toxicological impact is mitigated by the rapid dilution of trace chemicals and short duration of exposure to the highly localised discharge plumes.

The potential environmental impact from trace hydrocarbons in a 5 m^3 of backflush is predicted to be negligible and localised. The volume is insufficient to create a persistent plume, and concentrations will remain well below concentrations with the potential for impact to the marine environment beyond the immediate point of release. No lasting or ecologically significant impacts to marine fauna are expected.

The majority of maintenance, inspection and repair chemicals are routed through the CGS for degradation or the PWTS to ensure high-ratio dilution. Where direct discharge is required, the trace concentrations of the chemicals and hydrocarbons will result in no measurable impact to marine fauna.

Chemicals such as biocides and neutralised sulphamic acid are either routed through the CGS for degradation or the PWTS for high-ratio dilution. For any direct discharges, it is expected that any change to water quality from these low-volume discharges will return to background levels within the immediate near-field.

As a result, any potential effects to marine fauna are predicted to be localised, short-lived, and non-persistent. Overall, planned maintenance, inspection, and repair discharges are assessed as having no lasting or ecologically significant impact on marine fauna.

5.11.4 Risk Ranking

Maintenance, inspection, and repair discharges—including treated pigging fluids, neutralised cleaning acids, trace hydrocarbons from backflushing, and inert solids—are expected to result in highly localised and transient changes to water and sediment quality.

The use of rapidly biodegradable biocides (THPS), neutralized and pH-tested sulphamic acid significantly limits the toxicological profile of these discharges. Furthermore, the routing of MIR fluids through the CGS for degradation or the PWTS for high-ratio dilution ensures that any constituents reaching the marine environment are at trace levels. Inert solids (paint flakes, garnet, and aluminum oxide) possess high settling velocities, confining physical seafloor changes to the immediate vicinity of subsea structures.

Due to the offshore oceanographic conditions and the intermittent, small-volume nature of these events, any exposure for plankton and marine megafauna (whales, turtles, and whale sharks) will result in negligible impacts. Therefore:

- The consequence ranking of ‘1’ (Incidental) was assigned to water and sediment quality, and a likelihood of ‘E’ (Almost Certain) was considered appropriate, resulting in a risk ranking of ‘Medium’ (RRIII).
- The consequence ranking of ‘1’ (Incidental) was assigned to plankton and marine fauna, and a likelihood of ‘C’ (Possible) was considered appropriate, resulting in a risk ranking of ‘Low’ (RRIV).

5.11.5 ALARP Demonstration

Table 5-68 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with IMR discharges.

One additional control was identified and adopted that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with IMR discharges are assessed as low as reasonably practicable.

5.11.6 Acceptability Demonstration

Table 5-70: Acceptability demonstration - Planned maintenance, inspection and repair discharges

ACCEPTABLE LEVEL OF RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant principles of ESD not compromised given proposed controls.
External context – objections or claims considered	N/A – no external objections or claims received.
Internal context – VOGA HSE policy/procedure met	Yes – Risk managed in accordance with VOGA HSE policy.
Other requirements met	Yes – • IMO SOLAS Chapter 11-2, Part C, Regulation 10 amendments. Yes, it is considered that the petroleum activity is consistent with the objectives and actions of the following EPBC management plans that identify marine pollution as a threat (Table 1-3): • Approved Conservation Advice for *Balaenoptera borealis* (Sei Whale) (TSSC, 2015c) • Conservation Advice for *Sousa sahulensis* (Australian humpback dolphin) (DCCEEW, 2025h) • Conservation Advice for *Orcaella heinsohni* (Australian snubfin dolphin) (DCCEEW, 2025d) • Approved Conservation Advice for *Balaenoptera physalus* (Fin Whale) (TSSC, 2015d) • National Recovery Plan for the Southern Right Whale (*Eubalaena australis*) (DCCEEW, 2024) • Conservation Management Plan for the Blue Whale, 2015-2025 (DoE, 2015).
RR < High (RRII)	Yes – Medium (RRIII).
EPO(s) manage impacts to acceptable levels	Yes – The following relevant EPOs will be maintained: • EPO-OP-06 See Section 7 for further details.
Acceptability summary: The impacts and potential risks of planned maintenance, inspection and repair discharges have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-68), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.7).	

5.12 Noise Emissions

5.12.1 Hazard Report

Table 5-71: Hazard report – Underwater noise

HAZARD	Underwater noise
EP risk no.	EP-OP-R07
Activity cause	Platform machinery. Vessel and helicopter operations. Geophysical surveys.
Potential impacts	Change in fauna behaviour. Injury/mortality to marine fauna.
Extent and duration	Platform machinery - low level emissions, local to Wandoo. Vessel operations - transient biologically relevant noise extending up to 17 km from the source. Helicopter operations - transient, low-frequency airborne noise with very limited underwater transmission. Geophysical surveys - high-frequency, short-duration, highly directional pulses that attenuate rapidly and propagate only short distances.

PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Operation of cooling water (and fire water pumps).	No management measures identified.	N/A	N/A	N/A	N/A	N/A
Vessel operation.	The interaction of vessels with cetaceans within the Wandoo Field and Operational Area will be consistent with the EPBC Regulations (2000) to minimise exposure of marine fauna to noise impacts where practicable.	Administrative	Reduction	EPO-OP-07 Impacts to marine fauna from noise emissions will be limited to temporary behavioural change localised to the noise source, with no species population-level impacts.	Compliance with EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.05 and 8.06) which requires that: A vessel will not travel greater than 6 knots within 300 m of a whale or turtle (caution zone) and not approach closer than 100 m from a whale. • A vessel will not approach closer than 50 m of a dolphin or turtle or 100 m of a whale. • A vessel will not approach closer than 300 m to a calf (whale or dolphin) (the caution zone). • If a calf appears in the caution zone the vessel must be immediately stopped and must: • Turn off the vessel's engines, or disengage the gears, or withdraw the vessel from the caution zone at a constant speed of less than 6 knots.	Cetacean interactions and vessel response incidents reported to VOGA.

PREVENTION						
	Vessel engines and power generation equipment maintained to optimise smooth running.	Engineering	Reduction		All MODU and vessel engines and power generation equipment shall be serviced in accordance with the relevant Contractor's PMS to limit excessive noise generation.	VOGA inspection or audit confirms application of contractor's PMS. Contractor's servicing and maintenance records are up to date.
Helicopter operation.	No management measures identified	N/A	N/A	N/A	N/A	N/A
Geophysical and hydrographic surveys such as: side scan sonar, sub-bottom profiling; multi beam and single beam echo sounder surveys.	For geophysical and hydrographic surveys, the interaction of vessels with cetaceans within the Wandoo Field will be consistent with the EPBC Regulations (2000) where practicable.	Administrative	Reduction	EPO-OP-07 Impacts to marine fauna from noise emissions will be limited to temporary behavioural change localised to the noise source, with no species population-level impacts.	Records demonstrate no breaches of EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans.	Cetacean incidents reported to VOGA.

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
None identified.	N/A	N/A	N/A	N/A	N/A

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Incidental (1)	Almost Certain (E)	Medium risk

ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
A medium risk is defined as tolerable on demonstration of ALARP under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		
Additional management controls	**Assessment of option**	**Adopted/Not adopted**
Helicopter contractors to ensure that helicopters comply with EPBC Regulations 8.07.	Helicopters will comply with the following elements of EPBC Regulations 2000 Regulation 8.07, except during take-off / landing, during an emergency or when action is required to maintain safe operations: • A helicopter will not operate at a height lower than 1,650 feet or within a horizontal radius of 500 m of a cetacean • A helicopter will not deliberately approach a cetacean from head-on. • Helicopter operators are required to report any instances where these standards are breached, and any event involving injury to or death of marine fauna due to helicopter operations.	Adopted (refer CM-7.4)
Valid Flag State (Class Issued) Certificate indicates vessel engines and equipment is maintained.	Vessel machinery is maintained in accordance with Flag State (Class) certification requirements.	Adopted (refer CM-7.5)

ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
Bird Management Plan for Wandoo offshore facilities (VOG-1100-YH-0013) implemented.	Devices implemented in the Bird Management Plan reduce the risk to birds from helicopter strike. There are costs associated with procedure implementation, maintenance and management of devices and related reporting. The benefits of reducing bird strike and bird injury outweigh costs. Reducing bird presence on the Facility also reduces health and safety risks to personnel from hazardous helicopter landings, exposure to guano from direct contact or inhalation, or guano loading causing slips, trips and falls or deterioration of infrastructure.	Adopted (refer CM-12.7)
Dedicated Marine Fauna Observer on vessels.	Improved ability to spot and identify marine fauna at risk of impact from vessel noise (that may cause harm). Additional cost of contracting specialist Marine Fauna Observers while the risk to all EPBC Act–listed marine fauna cannot be reduced due to unpredictable presence of some species. Vessel masters are keeping watch for potential hazards. Cost disproportionate to increase in environmental benefit.	Not adopted
Eliminate use of support vessels.	May reduce the amount of noise emissions from vessels, although acoustic disturbances to marine fauna due to vessel activities are expected to be negligible as the number of vessel activities required are minimal. Elimination of support vessels from the field would not achieve VOGA legal requirements for petroleum production or its work-plan objectives for oil and gas production and may compromise safety standards for other marine users.	Not adopted
Implementation of pre-start visual observations for whales.	Any localised, short-term change in behaviour to whales caused by the exploration drilling activities would not affect feeding, breeding or aggregation activities. Individuals could easily move away from the noise source. This control would reduce the likelihood of individuals being within proximity of the acoustic source. However, as the potential impact to whales is already limited, the benefits of this control are not significant.	Not adopted
Adopt newly updated NMFS (2024) marine mammal thresholds.	Adopting the newly updated NMFS (2024) marine mammal thresholds would include re-running the underwater noise modelling, and using the new modelling results to update the impact assessment where required. VOGA anticipates that distances to impact threshold will increase using the newly published thresholds, however, a conservative estimate has already been applied to the impact assessment by using the noise criteria thresholds for behavioural impacts (Section 5.12.4.1). There are no regionally significant feeding, breeding or aggregation areas for marine mammals in the Operational Area. Overlap with existing migration BIA may change, however, the overlap would still be a small fraction of the area. As such, the consequence is not expected to change as a result of adopting the new thresholds. Considerable time and cost would be required to re-run the modelling, which is disproportionate to the potential gains given that a highly conservative approach has already been adopted in the impact assessment and no change to consequence is expected as a result of revised modelling results.	Not adopted

ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
Adopt Accomando et al. (2025) marine turtle thresholds.	Adopting the Accomando et al. (2025) marine turtle thresholds would require undertaking new underwater noise modelling and using the new modelling results to update the impact assessment where required. VOGA anticipates that distances to impact threshold will increase using the newly published thresholds, however, a conservative estimate has already been applied to the impact assessment by using the criteria thresholds for LF cetaceans (Section 5.12.4.1). Although the Operational Area overlaps with only 0.004% of the internesting buffer for flatback turtles, by taking a conservative approach to the impact assessment VOGA does not expect that revised modelling would result in a change in consequence. The Operational Area does not overlap with any other habitats critical to the survival of marine turtle species. As such, the consequence is not expected to change as a result of adopting the new thresholds. Considerable time and cost would be required to re-run the modelling, which is disproportionate to the potential gains given that a highly conservative approach has already been adopted in the impact assessment and no change to consequence is expected as a result of revised modelling results.	Not adopted
RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Incidental (1)	Almost Certain (E)	Medium risk

5.12.2 Description of Hazard

During Wandoo Facility activities, noise emissions will be generated from:

- Geophysical surveys:
  - Side-scan sonar surveys (Section 2.8.3)
  - Sub-bottom profiling surveys (seismic reflection; Section 2.8.4)
  - MBES and SBES (Section 2.8.5).
- Platform machinery – operation of cooling water and firewater pumps
- Platform machinery – bird deterrent devices
- Maintenance, inspection and project activities (on facility) – CALM Buoy replacement
- Support activities for operations:
  - Vessel operations
  - Helicopter operations.

5.12.2.1 Platform machinery – Operation of Cooling Water and Firewater Pumps

Monitoring programs have consistently shown that underwater noise from fixed platforms is generally very low and often undetectable (McCauley, 2002). Because production platforms house most mechanical equipment on elevated decks, much of the associated noise is released into the air rather than directly into the water. Any underwater noise typically reaches the marine environment indirectly, transmitted through structural elements such as jacket legs or risers, which can act as pathways for vibration.

Gales (1982) investigated underwater noise from 18 offshore oil and gas platforms, including 11 fixed, bottom-supported structures comparable to WNA and WNB. The study reported that platform noise was dominated by low-frequency components (<100 Hz, predominantly between 4 and 38 Hz), with measured levels ranging from 110 to 130 dB re 1 µPa at 100 m. Importantly, these levels were lower than those produced by nearby support vessels, which increased overall underwater noise by approximately 20-30 dB when operating in proximity to a platform (Gales 1982). Riser platforms typically generate even less noise than larger processing facilities due to their smaller footprint and absence of major processing equipment, meaning the Gales (1982) range is likely conservative for this facility. The conservative sound source level and frequency are listed below in Table 5-72.

Overall, underwater noise emissions from the facility are expected to be minimal.

Table 5-72: Sound source levels and frequencies for platform machinery operations

Source	Sound source levels (sound pressure level – SPL)	Frequency (kHz)	Reference
Riser platform	110-130 dB re 1 µPa @ 100 m	<100	Gales, 1982

5.12.2.2 Platform Machinery – Bird Deterrent Devices

The potential effects of noise from auditory bird-deterrent devices on marine fauna depend on the frequency and intensity of the sound produced. The deterrent devices operate at high

frequencies that fall outside the hearing sensitivity range of marine species. In addition, sound waves lengthen as they travel so high frequency noise dissipates quickly over distance. The system functions with a maximum source level of 110 dB. Since the equipment is mounted on the helideck well above sea level, the amount of noise that reaches underwater environments will be substantially reduced.

Any effects on birds are expected to be limited to short-term, intermittent avoidance behaviour affecting only a small portion of local populations. All deterrent devices will be used in line with the Bird Management Plan (VOG-1100-YH-0013). Noise impacts of deterrent devices will not be assessed further.

5.12.2.3 Support Activities – Vessel and Helicopter Operations

Vessel Operations

Continuous underwater noise generated from vessel operations is expected from support vessel activities.

Infield vessel movements are estimated to be one per week for approximately one day during normal operations. Tanker movements occur approximately 6-10 times per year, and offtake typically takes <72 hours. If an accommodation vessel or MODU is required during a project, it may be onsite for up to 7 weeks.

During some project activities (e.g. infrastructure replacement) the number of support vessels will increase to up to 4 vessels per day for up to 7 weeks. The maximum number of vessels that will be in the Operational Area concurrently is 4, potentially consisting of 2 tow tugs, a crew transfer vessel and a diving support vessel (Section 2.6.2).

Sources of noise from offtake tankers and support vessels include propeller cavitation, hydrodynamic flow around the hull and operation of machinery and equipment. Most of the vessels working in the Wandoo field use DP systems. Offtake tankers use bow thrusters to move into and maintain position during berthing. If a MODU is used for accommodation, it will be a jack-up rig only (i.e. is not on DP).

Noise levels depend on the size of the vessel/tanker and the speed at which it is travelling. Noise levels generated by vessels are broadband and typically increase with increasing vessel size, with smaller vessels (<50 m) having source levels 160-175 dB re 1 µPa at 1 m, medium size vessels (50-100 m) 165-180 dB re 1 µPa at 1 m and large (>100 m) 180-190 dB re 1 µPa at 1 m (OSPAR, 2009; Richardson et al., 1995). Gotz et al. (2009) also lists tugboats, crew boats, supply ships and research vessels in the 50-100 m size class as having similar levels of 165-180 dB re 1 µPa at 1 m.

Sound source levels of around 181.2 dB re 1 µPa at 1 m, as measured on the MMA Leeuwin under DP (Esso and ExxonMobil, 2021), are expected to be conservatively representative of support vessels and tankers for these activities.

Table 5-73: Sound source levels and frequencies for support vessel operations

Source	Sound source levels (sound pressure level – SPL)	Frequency (kHz)	Reference
Support vessels using DP	181.2 dB re 1 µPa @ 1 m	Broadband	Esso and ExxonMobil, 2021

Helicopter Operations

Helicopters are predominantly used for crew transfers. The number of helicopter movements engaging in Wandoo Facility activities is estimated to be 4 per week, however, historical data indicates an average of 7 flights per week. Their presence and associated noise emissions are highly transient.

During approach and landing on the helideck, sound transmission into the water column is greatest near the sea surface and decreases rapidly with depth. Helicopter noise typically occurs at frequencies below 500 Hz (Richardson et al., 1995). For example, Richardson et al. (1995) found that a Bell 214 helicopter was audible in air for about four minutes before passing overhead, but underwater detection lasted only 38 seconds at 3 m depth and 11 seconds at 18 m depth. Consequently, underwater exposure is limited to depths of 3–18 m for short periods (11–38 seconds) during each landing and take-off. The angle at which the sound path meets the surface influences the transmission of noise energy from the atmosphere through the sea surface, angles more than 13° from vertical being almost entirely reflected (Richardson et al., 1995). Given this, and the typical characteristics of helicopter flights for the facility (duration, frequency, altitude and air speed), it is not considered credible for underwater noise levels to exceed the behavioural thresholds and therefore is not assessed further.

5.12.2.4 Geophysical Surveys

Side-scan sonar, sub-bottom profilers, and MBES/SBES techniques employ impulsive acoustic sources which produce high-energy signals at relatively high frequencies to characterise seabed topography, bathymetry, potential geohazards and other seafloor features. The resulting noise emissions are high-energy, high-frequency, impulsive noise.

Sub-bottom profilers typically operate with compact, low-power systems which emit shallow-penetrating and high-resolution pulses across a range of frequencies. Alternatively, side-scan sonar and MBES/SBES function at very high frequencies to generate short-duration, micro-second pulses, achieving high-resolution seafloor imagery (Jiménez-Arranz *et al.,* 2017). The anticipated sound sources generated by each geophysical survey equipment are detailed below in Table 5-74.

Table 5-74: Sound source levels and frequencies for geophysical survey techniques

Source	Sound source levels (sound pressure level – SPL)	Frequency (kHz)	Reference
Side-scan sonar	200–234 dB re 1 µPa @ 1 m	>110	Seiche, 2020
Sub-bottom profiling	161–230 dB re 1 µPa @ 1m	2-16	Seiche, 2020
SBES	200-210 dB re 1 µPa @ 1 m	100-200	Seiche, 2020
MBES	210–247 dB re 1 µPa @ 1 m	>200	Seiche, 2020

The very high-frequency, short-duration pulses generated by the MBES, SBES and side-scan sonar systems propagate only limited distances horizontally due to their narrow, highly directional beams and rapid attenuation of acoustic energy outside those beams (MacGillivray et al., 2013; Zykov, 2013). Additionally, based on their respectively high frequencies provided in Table 5-74, their acoustic output primarily occurs above the hearing range of most marine fauna species. Studies of sub-bottom profilers also show that their acoustic energy attenuates rapidly outside the primary beam, resulting in limited horizontal propagation (MacGillivray et al., 2013; Zykov, 2013; McPherson and Wood, 2017).

5.12.3 Noise Modelling

5.12.3.1 Continuous Noise

To determine the spatial extent of continuous underwater noise emissions for impact and risk evaluation, a review of comparative analogue underwater sound propagation studies was undertaken:

- Stroot, D. H., Koessler, M. W. and McPherson, C.R. 2022. Acoustic Modelling for Assessing Marine Fauna Sound Exposures. Woodside NWS MODU Drilling Operations. Jasco Applied Sciences (Australia) Pty Ltd.
- Wecker, H., Koessler, M. W., Connel, S. J. and McPherson, C.R. 2022. Acoustic Modelling for Assessing Marine Fauna Sound Exposures. Woodside Pluto Drilling Campaign. Jasco Applied Sciences (Australia) Pty Ltd.
- Warren, V. E., M.W. Koessler, A. M. Muellenmeister, D. H. Stroot and C.R. McPherson. 2023. Gorgon Gas Development: Backfill Fields: Acoustic and Animal Movement Modelling for Assessing Marine Fauna Sound Exposures. Jasco Applied Sciences for Chevron Australia Pty Ltd.

The above listed analogue studies were conducted by Jasco using 3 sound propagation models (MON-BELLHOP, FWRAM and VSTACK). Results of these studies define the spatial extent for potential impact to fish including eggs and larvae, marine turtles and marine mammals.

These studies are considered appropriate and defensible analogues for predicting sound propagation for support vessel operations for the Wandoo Facility based on the comparable environmental modelling parameters used. The support vessels used for the activity are yet to be contracted, as a result, the specifications are not known. However, general specifications suitable for the activity are detailed in Section 2.6.1.7. Based on these specifications, the sound source levels for the support vessels are expected to be analogous to those used in the studies listed below:

- Woodside drilling operations at Julimar South 1 (Stroot et al., 2022):
  - Water depth: ~160 m
  - Support vessel (under DP): 187.6 dB re 1 µPa² m² s.
- Woodside drilling operations at XNA02 (Wecker et al., 2022):
  - Water depth: ~180 m
  - Support vessel (under DP): 187.6 dB re 1 µPa² m² s.
- Chevron drilling operations at Area 5 (Warren et al., 2023):
  - Water depth: ~140 m
  - Support vessel (under DP): 181.2 dB re 1 µPa² m² s.

Underwater sound propagation is primarily governed by bathymetry, the underwater sound-speed profile, and the geoacoustic properties of the seabed. Each analogue study was undertaken within the Northern Carnarvon Basin in shallow coastal waters (defined as <200 m; DOSITS 2025), directly aligning with the Wandoo Facility's water depth of approximately 54 m. This ensures that the bathymetric context of the analogue studies aligns closely with conditions of the Operational Area.

In all analogue studies, the underwater sound-speed profiles were derived using temperature and salinity data from the US Generalized Digital Environmental Model (GDEM v3.0; Teague et al. 1990; Carnes 2009), for areas within the Carnarvon Basin. These profiles reliably capture the stratification patterns characteristic of continental shelf waters in this region. Similarly, geoacoustic properties in the analogue models reflect sediment compositions typical of shelf environments—conditions that are consistent with those present within the Operational Area and therefore appropriate for predicting propagation loss.

Collectively, the analogue studies provide a comparative and scientifically valid basis for predicting broadband sound levels for support vessel operations in the Carnarvon Basin. As a result, the predicted sound fields from these analogues are expected to overestimate rather than underestimate actual activity-related underwater noise, providing further confidence in their suitability for use in impact assessment.

The modelling scenario selected from the analogues as most applicable to this assessment is:

- Warren et al. (2023) – Scenario 36: Offshore construction vessel with 2 offshore support vessels and 1 tug, all under DP.

This scenario is considered to be a conservative representation of the loudest possible concurrent support vessel activities for the Wandoo Facility, including the replacement of significant infrastructure. Review of sound source values of vessels with active thrusters for manoeuvring (168.9 – 187.6 re 1 $\mu Pa^2 \cdot m^2 \cdot s$) are generally lower than the offshore construction vessel source level applied in the adopted scenario (194 re 1 $\mu Pa^2 \cdot m^2 \cdot s$), confirming that the adopted modelling scenario for worst-case support activities is conservative (Centre for Marine Acoustics, 2023; Stroot et al., 2022; Wecker et al., 2022; Warren et al., 2023).

Noise Effect Criteria and Results

Different species groups perceive and respond to sound differently, and so a variety of exposure criteria for the different types of impacts and species groups are considered. The following continuous noise effect thresholds were used in the impact and risk assessment:

- Frequency-weighted accumulated Sound Exposure Levels (SEL_{24h}) from Southall et al. (2019) for the onset of Permanent Threshold Shift (PTS) and Temporary Threshold Shift (TTS) in marine mammals
- Un-weighted Sound Pressure Level (SPL) for behavioural threshold for marine mammals based on NOAA (2024)
- Sound exposure guidelines for fish, fish eggs, and larvae (Popper et al., 2014)
- Frequency-weighted accumulated sound exposure levels (SEL_{24h}) from Finneran et al. (2017) for the onset of PTS and TTS in marine turtles.

Recent Commonwealth guidance has defined “injury to blue whales” as both PTS and TTS hearing impairment, as well as any other form of physical harm arising from anthropogenic sources of underwater sound (DAWE, 2021).

The NOAA (2024) behavioural threshold for marine mammals of a SPL at 120 dB re 1µPa is current best available science. This is based on Southall et al. (2007) and Southall et al. (2021) literature

reviews and studies in relation to marine mammal behavioural response to continuous sound emissions.

New, more conservative thresholds for auditory injury (which includes PTS)[3] and TTS to marine mammals have recently been published within the *Update to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 3.0): Underwater and In-Air Criteria for Onset of Auditory Injury and Temporary Threshold Shifts* (NMFS, 2024). The updated thresholds now consider both the weighting function shape and the weighted threshold value. As the changes to these auditory weightings are more conservative than those previously proposed by Southall et al. (2019), VOGA anticipates that the updated auditory weighting functions, exposure function parameters, and received level thresholds for auditory injury and TTS may result in larger predicted spatial areas of auditory injury and TTS to marine mammal hearing groups.

Given the very short distances reached by the previous injury thresholds (PTS and TTS) (<4.58 km), any potential increase to the extent using the new thresholds are not expected to surpass the extents predicted for the behavioural threshold for marine mammals (17.3 km), which has substantially lower received levels. Furthermore, due to the nature and scale of the activity, the noise exposure extents are expected to only intersect with one BIA for marine mammals; a humpback whale migration BIA, which has no associated recovery plan or conservation advice (Figure 3-18). Considering there are no regionally significant feeding, breeding or aggregation areas for marine mammals in the Operational Area, impacts are anticipated to be low and likely to be limited to transient individuals only. As such, even in the event that the new NMFS (2024) thresholds were to be modelled the impact evaluation for marine mammals is likely to remain unchanged. The adopted measures in Section 5.12.1 are developed based on the maximum ranges to the behavioural threshold (17.3 km), therefore, they will continue to protect marine mammals from auditory injury (which includes PTS) and TTS to marine mammals, in doing so meeting EPO-ED-03 and the acceptable level of impact. As such, the use of the updated NMFS (2024) thresholds is very unlikely to indicate unacceptable impacts to noise-sensitive receptors in or near the Operational Area, including migrating humpback whales.

Accomando et al. (2025) has suggested updates to the underwater sound exposure thresholds for marine turtles within the 2024 *Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase 4*). These thresholds were not used within the analogue modelling studies, and subsequently have not been incorporated into impact assessment. VOGA anticipates that the updated auditory weighting functions, exposure function parameters, and received level thresholds for PTS and TTS may result in larger predicted spatial areas exposure than the thresholds previously suggested by Finneran et al. (2017). The received sound level thresholds for the behavioural thresholds have remained unchanged.

To account for the scientific uncertainty from the absence of predictions using the Accomando et al. (2025) thresholds, VOGA have chosen to use the PTS and TTS thresholds for low-frequency

[3] The updated technical guidance (NMFS, 2024) details the inclusion of the term “auditory injury (AUD INJ)” to replace “PTS”. AUD INJ is defined as ‘damage to the inner ear that can result in destruction of tissue, such as the loss of cochlear neuron synapses or auditory neuropathy. Auditory injury may or may not result in a permanent threshold shift (PTS)’ (NMFS, 2024). Given the new, more conservative threshold for AUD INJ has not been incorporated into the impact assessment within this EP, the use of AUD INJ instead of PTS has been deemed as inappropriate for the level of assessment within this EP. As such, the term “PTS” has been used throughout.

cetaceans as a proxy for the potential PTS and TTS for marine turtles within the impact assessment within Section 5.12.4.1. This is considered a highly conservative and precautionary approach, given the PTS and TTS thresholds for low frequency cetaceans are lower than those for marine turtles and the weighting function applied is based on low-frequency cetaceans which have a more sensitive and broader hearing frequency range than marine turtles.

Current available literature on sound exposure impacts to marine invertebrates from continuous noise is limited and inconclusive and is not discussed further in this section.

There are no thresholds for underwater sound impacts to either seabirds or shorebirds. Therefore, the impacts to birds has not been assessed further.

A summary of the noise effect criteria used in the impact assessment for fish, marine reptiles and marine mammals and the relevant literature is provided in the analogue study (Warren et al., 2023) and below in Table 5-75 to Table 5-78.

Table 5-75: Continuous noise criteria threshold for fish

Receptor	Behaviour	Mortality and potential mortal injury	Impairment		
			Recoverable injury	TTS	Masking
Fish: No swim bladder (particle motion detection)	(N) Moderate (I) Moderate (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate
Fish: Swim bladder not involved in hearing (particle motion detection)	(N) Moderate (I) Moderate (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate
Fish: Swim bladder involved in hearing (primarily pressure detection)	(N) High (I) Moderate (F) Low	(N) Low (I) Low (F) Low	170 dB SPL for 48h	158 dB SPL for 12h	(N) High (I) High (F) High
Fish eggs and fish larvae	(N) Moderate (I) Moderate (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low

Source: Popper et al. (2014)
Note: Relative risk (high, moderate, low) is given for animals at three distances from the source defined in relative terms as near (N), intermediate (I), and far (F).

Table 5-76: Continuous noise criteria threshold for marine turtles

Receptor	Masking	Behaviour	Finneran et al. (2017)		Accomando et al. (2025)	
			PTS	TTS	PTS	TTS
			Weighted SEL_{24h} (LE,24h; dB re 1µPa^2s)		Weighted SEL_{24h} (LE,24h; dB re 1µPa^2s)	
Marine turtle	(N) High (I) High (F) Moderate	(N) High (I) Moderate (F) Low	220	200	198	178

Source: Popper et al. (2014); Finneran et al. (2017); Accomando et al. (2025)
Note: Relative risk (high, moderate, low) is given for animals at three distances from the source defined in relative terms as near (N) – tens of meters, intermediate (I) - hundreds of meters, and far (F) – thousands of meters.

Table 5-77: Continuous noise criteria threshold for marine mammals

Receptor	Hearing group	Behavioural	NMFS (2018)		NMFS (2024)	
			PTS	TTS	AUD INJ	TTS
		SPL (L_p; dB re 1µPa)	Weighted SEL_{24h} (L_E,24h; dB re 1µPa^2s)		Weighted SEL_{24h} (L_E,24h; dB re 1µPa^2s)	
Marine mammals	Low-frequency (LF) cetaceans	120	199	179	197	177
	High-frequency (HF) cetaceans		198	178	201	181
	Very High-frequency (VHF) cetaceans		173	153	181	161

Source: NMFS (2018; 2024); Southall et al., (2019)
Note: Lp denotes sound pressure level period and has a reference value of 1 µPa.
LE denotes cumulative sound exposure over a 24h period and has a reference value of 1 µPa^2s.

Table 5-78: Distances to PTS, TTS and behaviour effects from continuous noise from facility activities on the North West Shelf (Warren et al., 2023)

Hearing Group	Noise Effect Criteria	Scenario 36 R_{max}	Reference
Fishes: (swim bladder): recoverable injury	>170 dB SPL for 48 h	0.03 km	Popper et al. (2014)
Fishes: (swim bladder): TTS	>158 dB SPL for 12 h	0.09 km	Popper et al. (2014)
Marine mammals: behavioural	120 dB SPL	17.3 km	NMFS (2024)
Low-frequency cetaceans: PTS	197 dB SEL_{24h}	0.21 km	NMFS (2018)

Hearing Group	Noise Effect Criteria	Scenario 36 R_{max}	Reference
(humpback and pygmy blue whales)			
Low-frequency cetaceans: TTS (humpback and pygmy blue whales)	177 dB SEL_{24h}	4.58 km	NMFS (2018)
High-frequency cetaceans: PTS (dolphins, beaked whales, sperm whales)	201 dB SEL_{24h}	Not reached	NMFS (2018)
High-frequency cetaceans: TTS (dolphins, beaked whales, sperm whales)	181 dB SEL_{24h}	0.19 km	NMFS (2018)
Very High-frequency cetaceans: PTS (pygmy and dwarf sperm whales)	181 dB SEL_{24h}	0.21 km	NMFS (2018)
Very High-frequency cetaceans: TTS (pygmy and dwarf sperm whales)	161 dB SEL_{24h}	2.8 km	NMFS (2018)

5.12.3.2 Impulsive Noise

Wood and McPherson (2019) modelled impulsive noise sources of a geophysical survey for the Beach Energy geophysical and geotechnical seabed survey campaign, which was undertaken in a similar shallow-water carbonate shelf environment, characterised by cemented calcarenite with coarse carbonate sediment in water depths at a minimum of 72 m. The benthic habitat of the Operational Area is comprised of calcareous gravel, sand and silt at approximately 54 m depth (see Section 3.4.1 for further information). These seabed types, though geographically distant, are both carbonate-dominated and acoustically reflective at the high operating frequencies of side-scan sonar, sub-bottom profilers, and MBES/SBES systems. As such, the Wood and McPherson (2019) modelling is considered an appropriate analogue for assessing the short-range propagation and impact distances of these high frequency sources in the Operational Area.

The analogue modelling predicted the distances at which noise-effect criteria for plankton, fish, turtles and marine mammals may be exceeded and found that noise-effect thresholds for plankton, fish, turtles and marine mammals may be exceeded only within approximately 10 m of the sound source during side-scan sonar, sub-bottom profiling, and MBES/SBES operations. In contrast, thresholds for invertebrates, lobsters and squid were not exceeded (Wood and McPherson, 2019).

Therefore, potential impacts from side-scan sonar, sub-bottom profiling, and MBES/SBES systems are expected to be limited to fauna occurring within ~10 m of the sound source. The Wood and McPherson (2019) study was based on marine mammal injury thresholds current at the time of publication. More conservative auditory injury (PTS) and TTS thresholds have since been published (NMFS, 2024) (refer to Section 5.12.3). Given the low noise emissions associated with side-scan sonar, sub-bottom profiling, and MBES/SBES systems, as well as the very short distances predicted under previous thresholds, any moderate increase in these distances under the updated criteria is unlikely to indicate unacceptable impacts to noise-sensitive receptors within or near the Operational Area.

Warren et al. (2023) modelled a single continuous noise source of equivalent to support vessel noise sources and found that effect criteria could be reached at distances of up to 3.76 km (Scenario 34). When compared to the very limited propagation ranges of high-frequency systems described above, it is evident that underwater noise from side-scan sonar, sub-bottom profiling, and MBES/SBES systems would be largely indistinguishable from vessel noise at lower frequencies. Additionally, because these systems produce tightly focused, short-range acoustic pulses, they are not expected to contribute meaningfully to cumulative underwater noise.

Underwater noise produced by side-scan sonar, sub-bottom profiling, and MBES/SBES systems will therefore be considered as part of the vessel operations of the activity (Section 5.12.3.1).

5.12.4 Impact and Risk Evaluation

Noise emissions in the underwater environment from Wandoo Facility activities has the potential to impact marine fauna through (Richardson *et al.,* 1995; Southall *et al.,* 2007):

- Change in fauna behaviour, including:
  - masking - interfering with other biologically important sounds, including vocal communication, echolocation, signals, and sounds produced by predators or prey.
- Injury/mortality to marine fauna, such as:
  - recoverable injury
  - mortality or potential mortal injuries
  - TTS
  - PTS.

The following receptors may be impacted by noise emissions:

- Fish, sharks and rays (including eggs and larvae)
- Marine mammals
- Marine reptiles.

5.12.4.1 Impact Assessment

Continuous underwater noise generated by the activity will impact ambient sound levels in the NWS continental shelf.

Significant commercial shipping activity occurs across the NWS, the majority of which is associated with the WA oil and gas and mining industries. The closest AMSA shipping fairway is ~9 km south

of the Operational Area (Figure 3-49). Shipping fairways provide a significant and continuous contribution to the ambient sound levels in the Operational Area.

Oil and gas activities, and strong weather conditions (cyclonic events) also contribute to the ambient sound levels in the Operational Area. The temporary generation of underwater sound from the activity will introduce and replicate existing oil and gas activities' contributions to ambient sound levels.

Fish, Sharks and Rays (including eggs and larvae)

Several species of fish, sharks, and rays may be present within the Operational Area and surrounds. Many species of fish, sharks, and rays are expected to be transient individuals due to the absence of critical habitats found within the Operational Area (Section 3.4.1). However, the WNA and WNB facilities provide artificial hard substrate which can form the basis of relatively high biodiversity communities and have been shown to support more diverse fish assemblages in comparison to the surrounding seabed (McLean et al., 2017; Bond, 2018).

There is a moderate risk of behavioural effects to fish eggs and larvae within tens of metres of the source (Popper *et al.*, 2014). It is possible that zooplankton, including free-swimming larvae, could move either vertically or horizontally within the water column in response to a stimulus such as underwater noise. These impacts are likely to be limited to a range of a few tens of metres from the source.

A foraging BIA for the whale shark is overlapped by the Operational Area (Section 3.4.4). This species is known to aggregate at Ningaloo between March and July each year to feed. This species is found in coastal and oceanic environments making them potentially vulnerable to noise emissions.

Change in Behaviour

Fish, sharks, and rays have been identified to be susceptible to behavioural change, such as avoidance, in response to continuous noise emissions generated by vessel operations (Chapius et al., 2019; Popper et al., 2014). During normal operations there is typically only one vessel movement per week. During some project activities the number of support vessels will increase to up to 4 vessels per day, but for a relatively short duration (up to 7 weeks). Only machinery noise from the Wandoo Facility is present long-term in the Operational Area.

Currently, quantitative threshold criteria for behavioural responses of fishes from continuous sound do not exist (Popper et al., 2014). Fishes are highly likely to exhibit behavioural disturbances within tens of metres from continuous sound sources (Popper et al., 2014). Behavioural disturbances to fishes from underwater sound are therefore localised and limited to within the Operational Area. There are no habitats or features within the Operational Area that would restrict fish, sharks, and rays from moving away from vessel operations and drilling activities.

Fish, sharks, and rays in the Operational Area are likely to exhibit avoidance responses from continuous sounds generated and radiated by the activity (Carroll et al., 2017). Fish, sharks, and rays that do not avoid underwater sound radiated by the activity are likely to exhibit changes to schooling patterns and distribution from continuous sound (McPherson et al., 2016). Behavioural changes for some fish species are temporary and short-lived (i.e. nuisance factor), and displacement of pelagic or migratory fish populations is unlikely (McCauley, 1998).

A foraging BIA for the whale shark was the only BIA for fish, shark, and ray species to be overlapped by the Operational Area. The Operational Area does not overlap the high-density prey foraging BIA for whale sharks. The closest aggregation area for Whale Sharks is Ningaloo, located ~300 km from the Operational Area. The Whale Shark Recovery Plan 2005-2010, which has not been superseded, does not list noise disturbance as a threat to whale sharks (DCCEEW, 2005). Whale sharks are found year-round in the wider NWS, not just during their peak aggregation in April and May at Ningaloo's foraging BIA. Temporary and localised behavioural changes to whale sharks may occur within the Operational Area, these changes are not expected to result in ecologically significant impacts at a population level.

Behavioural disturbance to fish, sharks, and rays is expected to be limited to temporary and localised changes within the vicinity of support vessels within the Operational Area and will not impact population or ecosystem functioning.

Injury/Mortality

Popper et al. (2014) found no direct evidence of fish mortality or potential mortal injury from ship sound emissions. Based on this observation, it is inferred that continuous noise from support vessel activities will also not result in fish mortality or potential mortal injury. For fish lacking swim bladders or with swim bladders not used for hearing (e.g. sharks), the risks of lethal or recoverable injuries are low, with temporary threshold shifts (TTS) in hearing posing a moderate risk within tens of meters of the vessel. For fish using swim bladders for hearing, mortality risks remain low, though, quantitative thresholds for potential recoverable injury and TTS were proposed for fish using swim bladders for hearing, i.e. 170 dB SPL (48h) and 158 dB SPL (12h), respectively (Table 5-75) (Popper et al., 2014).

The impact of noise emission to fish is based on the classification of fish into 2 categories based on the presence or absence of a swim bladder; which is known to aid in hearing by transmitting vibrations to the inner ear (Popper et al., 2014). There is limited research that has been conducted on the response of sharks to noise emissions. In comparison to bony fish, sharks lack a swim bladder, and therefore are unlikely to respond to acoustic pressure. Due to an overall lack of observational data on impacts to fish from continuous sources, Popper et al. (2014) proposed qualitative indicators of relative risk of effects indicating that 170 dB SPL (48h) has the potential to result in a recoverable injury and 158 dB SPL (12h) has the potential to result in TTS impacts to fish that have a swim bladder involved in hearing (Table 5-75).

Table 5-78 shows the noise modelling conducted by Warren et al. (2023) for Scenario 36 predicted the following distances for these threshold criteria:

- 12h TTS criteria was reached within 0.09 km
- 48h recoverable injury criteria was reached within 0.03 km.

No habitats likely to support site-attached fish have been identified within the Operational Area, therefore it is unlikely that fish species would be present within 90 m of continuous sound sources for a period of 12 hours to experience the onset of TTS, or 30 m of continuous sound sources for a period of 48 hours to experience recoverable injury. Therefore, recoverable injury or TTS due to continuous underwater noise within the Operational Area are not considered credible.

Marine Mammals

Several species of marine mammals may be present within the Operational Area and surrounds (Section 3.4.3.5). No breeding, foraging or calving areas for EPBC Act-listed marine mammals were identified within the Operational Area.

A Migration BIA for the humpback whale was the only BIA identified to overlap the Operational Area (Section 3.4.3.5).

Change in Behaviour

Marine mammals are sensitive to noise in the marine environment. Their use of sound for communication, prey capture, predator avoidance, navigation and their physiological features (i.e. large gas-filled organs) make them vulnerable to both disturbance and physiological damage from underwater noise of sufficient magnitude.

Continuous underwater noise may interfere with the ability of marine animals to detect natural sounds. This effect is termed 'auditory masking' and has the potential to interfere with animals' communication and socialisation, the detection of predators and prey, and navigation and orientation. For masking to occur, the noise must be loud enough and have a similar frequency to the communication signal, and both must occur at the same time. Therefore, the probability of masking increases with decreasing distance to the noise source due to the higher levels overlap of the vocalisations frequencies. Clark et al. (2009) classified the potential for masking and communication impacts as high near the vessel (within tens of metres), moderate within hundreds, and low within thousands of metres. Therefore, impacts of masking will be highly localised.

Behavioural responses to noise emissions by marine mammals such as cetaceans are generally highly variable and dependant on the context and individual. A wide range of behavioural responses to anthropogenic noise emissions have been observed, including avoidance, altered swimming direction, increased swimming speed, 'startle' reactions, and alteration to surfacing, breathing and diving patterns (Erbe et al., 2019). Vessel noise has also been shown to reduce foraging efficiency for specific species, such as sperm whales (Erbe et al., 2019).

Table 5-77 shows the marine mammal behavioural threshold (NMFS, 2024) was reached for the noise modelling conducted by Warren et al. (2023), predicting a distance of 17.3 km from the continuous sound sources to the marine mammal behavioural threshold. This scenario, where a fourth support vessel may be used to undertake additional support activities, is not considered typical for the activity however will be adopted as a conservative approach. Based on this threshold, a distance of 18 km will be adopted for impact assessment. During normal operations there is typically only one vessel movement per week. During some project activities the number of support vessels will increase to up to 4 vessels per day, but for a relatively short duration (up to 7 weeks). Only machinery noise from the Wandoo Facility is present long-term in the Operational Area.

This continuous noise exposure is expected to overlap only a comparatively small portion of the migration BIA for the humpback whale (Figure 3-18), and there is no recovery plan or conservation advice associated with this BIA. Considering there are no regionally significant feeding, breeding or aggregation areas for marine mammals in the Operational Area, change in behaviour of marine mammals is expected to be limited to transient individuals only.

Given the temporary duration of support activities requiring additional vessels, the localised extent of potential behavioural changes (e.g. a maximum distance of <18 km), the lack of habitat critical to the survival of the species, the consequence has been evaluated to potentially result in localised short-term impacts to individuals of conservation value, however, not affect local ecosystem or population functioning.

Injury/Mortality

Literature provides quantitative TTS and PTS SEL_{24h} thresholds for assessing auditory impairment in marine mammals. TTS and PTS SEL_{24h} thresholds is a cumulative metric that requires a receptor to be consistently exposed at this noise effect criteria for a 24-hour period for injury to occur.

Table 5-78 shows TTS and PTS SEL_{24h} threshold criteria for marine mammals were reached for noise modelling conducted by Warren et al. (2023) which predicted the following distances to marine mammal TTS and PTS thresholds:

- TTS:
  - LF cetaceans - within 4.58 km
  - HF cetaceans - within 0.19 km
  - VHF cetaceans - within 2.8 km.
- PTS:
  - LF cetaceans - within 0.21 km
  - HF cetaceans – not reached
  - VHF cetaceans - within 0.21 km.

To account for the new thresholds for auditory injury and TTS (NMFS, 2024) (Section 5.12.3), and scientific uncertainty with regards to using previous injury thresholds (Koessler and McPherson, 2020), the range to behavioural change threshold will also conservatively consider the potential for auditory injury and TTS, i.e. behavioural change, auditory injury and TTS to occur within <18 km of the sound source.

The potential of injury (TTS and PTS) to marine mammals during Wandoo Facility activities requires an individual to be consistently exposed to vessel operations for a 24-hour period for injury to occur. As a very conservative approach, marine mammals are required to remain within 18 km of a vessel for at least a 24-hour period for injury to occur.

The area within a 18 km buffer of the Operational Area overlaps a comparatively small portion of the migration BIA for the humpback whale (Figure 3-18), and there is no recovery plan or conservation advice associated with this BIA. Considering there are no regionally significant feeding, breeding or aggregation areas for marine mammals in the Operational Area, potential injury to marine mammals are limited to transient individuals only.

The area within the 18 km buffer of the Operational Area does not contain habitats that encourage high-site fidelity for marine mammals given the area does not overlap reproduction, known foraging area, foraging annual high use area BIAs for marine mammals. Marine mammals in this area are not expected to remain for extended periods and are instead expected to be present while in transit.

During normal operations there is typically only one vessel movement per week. During some project activities the number of support vessels will increase to up to 4 vessels per day, but for a relatively short duration (up to 7 weeks). Only machinery noise from the Wandoo Facility is present long-term in the Operational Area.

Given the short-term duration of continuous underwater sound generated by vessels/MODU, the limited spatial area (within a 18 km buffer of the Operational Area) where injury may occur, and that marine mammals within this area are expected to transit through and not remain in the area for extended periods, potential injury to marine mammals from continuous underwater sound is not considered to be credible and therefore is not considered further.

Marine Reptiles

Several species of marine turtles may be present within the Operational Area and surrounds; however, the internesting BIA buffer for the flatback turtle was the only BIA identified to overlap the Operational Area (Section 3.4.3.6). The flatback turtle is the only species of marine turtle with habitat critical to the survival of the species overlapping the Operational Area.

Change in Behaviour

There is a paucity of data regarding how marine turtles respond to underwater noise. Studies have indicated that marine turtles use noise for navigation, to avoid predators and to find prey (Dow Piniack, 2012) and electro-physical studies have indicated that marine turtle detect a limited frequency range of sounds between 200–700 Hz (Bartol and Musick, 2003).

Specific data on behavioural response thresholds, such as avoidance or masking, of marine turtles to continuous sound emissions do not exist (Popper et al., 2014). Using semi-quantitative analysis, Popper et al. (2014) suggests there is low risk of masking and behavioural change to marine turtles from continuous sound within thousands of metres from the sound source. This suggests avoidance behaviours may occur within the Operational Area.

The Recovery Plan for Marine Turtles in Australia 2017-2027 lists noise disturbance from acute and chronic sources as a threat (Commonwealth of Australia, 2017). Continuous noise, which is identified as ‘chronic noise’ within the plan, is considered a threat to marine turtles as it may lead to avoidance of important habitats.

The Operational Area overlaps the internesting buffer for the flatback turtle which extend 60 km seawards from the nesting locations at the Dampier Archipelago, including Delambre Island and Hauy Island (Table 3-7). The continuous noise exposure is expected to only overlap a comparatively small portion, approximately 1.2%, of the total area of flatback turtle internesting buffers (Figure 3-22). Similarly, only 0.3% of the total area of habitat critical to the survival of the species for flatback turtles is overlapped by the worst-case continuous noise exposure area (18 km).

The closest nesting locations to the Operational Area are the significant rookeries located on Barrow Island (DSEWPaC, 2012a), Montebello Islands, Thevenard Island, Varanus Island, Lowendal Islands, King Sound and Dampier Archipelago (Pendoley, 2005; Limpus, 2007; Pendoley Environmental, 2011), which are located at least 40 km away. Given the Operational Area is over 40 km from the nearest turtle nesting beach, it is expected that only transient individuals,

opportunistically foraging, or the few individuals transiting to nesting beaches are expected to be present within the Operational Area.

During normal operations there is typically only one vessel movement per week. During some project activities the number of support vessels will increase to up to 4 vessels per day, but for a relatively short duration (up to 7 weeks). Only machinery noise from the Wandoo Facility is present long-term in the Operational Area.

Temporary and localised avoidance behaviours to individual marine turtles within the Operational Area are not expected to result in population or ecosystem level affects. Furthermore, the Recovery Plan for Marine Turtles in Australia states that potential behavioural changes to individual marine turtles are not expected to impact turtle populations (DEE, 2017a). As such, any impact will be short-term, with impacts temporary and localised.

Injury/Mortality

To account for the new thresholds for PTS and TTS (Accomando et al., 2025), and scientific uncertainty with regards to using previous injury thresholds (Finneran et al., 2017), the assessment has conservatively adopted the strategy to use the noise threshold criteria for LF cetaceans as discussed in Section 5.12.3. As such, the greatest modelled distance from noise modelling by Warren et al. (2023) for the relevant scenario predicted (Table 5-78):

- 24h TTS criteria was reached within 4.58 km
- 24h PTS criteria was reached within 0.21 km.

Given the Operational Area is over 40 km from the nearest turtle nesting beach, as discussed previously, it is expected that only transient individuals, opportunistically foraging, or the few individuals transiting to nesting beaches are expected to occur within the Operational Area.

The onset of TTS and PTS requires chronic exposure (over 24 hours). Transient individual marine turtles are not expected to remain within 4.58 km and 210 m of a continuous sound source for 24 hours for the onset of TTS and PTS to occur. Given the temporary nature and the localised extent of potential injury / mortality (e.g. a maximum distance of 4.58 km and 210 m of a continuous sound source for 24 hours for the onset of TTS and PTS to occur), the consequence of, injury/mortality to marine reptiles from continuous noise emissions associated with the exploration drilling activities has been evaluated to potentially result in localised short-term impacts to individuals of conservation value, however, not affect local ecosystem or population functioning.

5.12.5 Risk Ranking

Continuous noise emissions are expected to result in only highly localised and short-term behavioural changes in marine fauna, such as temporary displacement from the immediate vicinity of the noise source. These impacts may occur when transient individuals pass through the limited ranges at which behavioural thresholds are predicted to be exceeded (Section 5.12.3.1). Given the transient nature of most marine fauna found with the Operational Area, the absence of significant feeding, breeding or aggregation areas for marine fauna, and the temporary duration of continuous noise emissions, impacts are expected to be localised, short-term and limited to few transient individuals of conservation value that may occur within the area. These impacts are not expected to affect local ecosystem or population functioning. Therefore:

- A consequence ranking of '1' (Incidental) was assigned, reflecting localised and short-term behavioural impacts to potential transient individuals of fish, sharks and rays, marine reptiles, and marine mammals that have no effect on local ecosystem or population functioning.
- A likelihood of 'E' (Almost Certain) was assigned, as transient individuals may pass through the small area within which behavioural thresholds could be exceeded.
- Together, these result in a risk ranking of 'Medium' (RRIV).

5.12.6 ALARP Demonstration

Table 5-71 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with noise emissions.

Two additional controls were identified and adopted that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with noise emissions are assessed as low as reasonably practicable.

5.12.7 Acceptability Demonstration

Table 5-79: Acceptability demonstration – Noise emissions

ACCEPTABLE LEVEL OF RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant Principles of ESD not compromised given proposed controls (Section 5.12.1).
External context – objections or claims considered	N/A – no external objections or claims received.
Internal context – VOGA HSE policy/procedure met	Yes – Risk managed in accordance with VOGA HSE policy.

Other requirements met	Yes – including: • Vessels comply with Part 8 of EPBC Regulations 2000 It is considered the petroleum activity is consistent with the objectives and actions of the following EPBC Act management plans that identify noise emissions as a threat (Table 1-3): • Approved Conservation Advice for *Balaenoptera borealis* (Sei Whale) (TSSC, 2015c) • Approved Conservation Advice for *Balaenoptera physalus* (Fin Whale) (TSSC, 2015d) • Conservation Management Plan for the Blue Whale, 2015-2025 (DoE, 2015) • Conservation Advice for *Orcaella heinsohni* (Australian snubfin dolphin) (DCCEEW, 2025b) • Conservation Advice for *Sousa sahulensis* (Australian humpback dolphin) (DCCEEW, 2025c) • Recovery Plan for Marine Turtles in Australia, 2017-2027 (Commonwealth of Australia, 2017) • Approved Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle) (DEWHA, 2008c).
RR < High (RRII)	Yes – Medium (RRIII).
EPO(s) manage impacts to acceptable levels	Yes – The following relevant EPOs will be maintained: • EPO-OP-07 See Section 7 for further details.
Acceptability summary: The impacts and potential risks of noise emissions have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-71), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.7).	

5.13 Atmospheric and Greenhouse Gas Emissions

5.13.1 Hazard Report

Table 5-80: Hazard report – Atmospheric and GHG emissions

HAZARD	Atmospheric emissions
EP risk no.	EP-OP-R08
Activity cause	General operations.
Potential impacts	Localised and temporary decrease in air quality. Minor contribution to GHGs and global climate change.
Extent and duration	Localised and temporary.

PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
General operations.	The sulphur content of diesel fuel complies with Regulation 14 of MARPOL 73/78 Annex IV and AMSA Marine Order 97.	Engineering	Substitution	EPO-OP-08 Air emissions requirements from vessels within the Operational Area are consistent with Marine Order 97 requirements. EPO-OP-09 The Wandoo Facility will not interfere with Australia's GHG commitments to the Paris Agreement under the *Climate Change Act 2022.*	Fuel purchased in Australia shall meet Australian standards.	Fuel bunkering records showing low sulphur fuel usage.
	VOGA will review emissions performance and emissions reduction opportunities to improve emissions intensity. This process involves the screening of emissions reduction opportunities, assessing these against a range of parameters including an internal cost of carbon, and implementing those that are practicable.	Administrative	Reduction	EPO-OP-09 The Wandoo Facility will not interfere with Australia's GHG commitments to the Paris Agreement under the *Climate Change Act 2022.*	Emissions performance is reviewed and emissions reduction opportunities are identified, assessed, and implemented where reasonably practicable to ensure emissions intensity is managed to ALARP.	Records demonstrate the emissions performance of the Wandoo Facility has been conducted annually and emissions reduction opportunities identified, assessed, and implemented where reasonably practicable to ensure emissions intensity is managed to ALARP.
	When gas production exceeds fuel gas demand, surplus gas will be re-injected during routine operations and therefore reducing flaring of surplus gas during routine production operations.	Engineering	Reduction		During routine operations, when fuel gas demand exceeds gas production, surplus gas will be re-injected.	Records show maintenance of gas re-injection equipment is conducted in accordance with procedures and maintenance system requirements.
	Routine maintenance on turbines and replacement based on service life which will maintain the efficiency of the turbines.	Engineering	Reduction		Maintenance program is in place for the turbines.	Records show maintenance of turbines and replacement based on service life which will maintain the efficiency of the turbines.

PREVENTION						
	During normal operation, the operating philosophy of the flare is to minimise flare gas and to operate with the pilot light burning (which is a critical safety function), i.e. flare load is intermittent based on operations and maintenance activities.	Administrative	Reduction		No flaring (except pilot light) during normal operations.	Records showing gas consumption by the flare.
	Vessels comply with Regulation 14 of MARPOL 73/78 Annex VI and AMSA Marine Order Part 97.	Administrative	Reduction	EPO-OP-08 Air emissions requirements from vessels within the Operational Area are consistent with Marine Order 97 requirements.	Marine diesel engines meet NO_x emission requirements and limits as set out by MARPOL 73/78, Annex VI, Regulation 13, and have an International Air Pollution Prevention (IAPP) certificate. Onboard incinerators (if present) will meet IMO standards and are identified in the vessels' IAPP certificate. Equipment and systems that contain ODS comply with MARPOL 73/78, Annex VI, Regulation 12, are identified in the vessels' IAPP certificate and an ODS record book is maintained (where applicable). Vessels >400 GT have a Ship Energy Efficiency Management Plan (SEEMP).	Vessel IAPP certificate. ODS Record Book. Records of SEEMP.
	Contractor PMS in place to maintain power generation systems and ancillary diesel engines.	Administrative			All vessel engines and power generation equipment shall be serviced in accordance with the relevant Contractor's PMS. Contractor's servicing and maintenance records shall be validated by VOGA to ensure they are up to date.	VOGA inspection or audit confirms application of contractor's PMS. Contractor's servicing and maintenance records are up to date.
	Contractor PMS in place to maintain refrigeration systems within the use of ODS.	Administrative			Refrigeration systems shall be maintained in accordance with contractor's PMS to ensure refrigerant emissions are minimised. Contractor's servicing and maintenance records shall be validated by VOGA to ensure they are up to date.	VOGA inspection or audit confirms application of contractor's PMS. Contractor's servicing and maintenance records are up to date.

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
None identified.	N/A	N/A	N/A	N/A	N/A

OTHER					
	Control type	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Product generated from the Wandoo Facility will only be sold to customers (first sale) from countries that are signatories to the Paris Agreement or have a net zero commitment, as at the date of the relevant contract of sale.	Administrative	N/A	EPO-OP-10 Product generated from the Wandoo Facility will only be sold to customers (first sale) from countries that are signatories to the Paris Agreement or have a net zero commitment, as at the date of the relevant contract of sale	Wandoo Facility sales contracts limited to customers from countries that are signatories to the Paris Agreement or have a net zero commitment.	Records demonstrate that customer countries are current signatories to the Paris Agreement or have a net-zero commitment.
Report atmospheric pollutant emissions as required under the NPI.	Administrative	N/A	EPO-OP-08 Air emissions requirements from vessels within the Operational Area are consistent with Marine Order 97 requirements.	Submit annual reports where required by NPI.	NPI reports
Report GHG emissions and energy used and produced as required under the NGER scheme.	Administrative	N/A	EPO-OP-09 The Wandoo Facility will not interfere with Australia's GHG commitments to the Paris Agreement under the *Climate Change Act 2022.*	Submit annual reports where required by the NGER scheme.	NGER reports

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Incidental (1)	Almost Certain (E)	Medium risk

ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
A medium risk is defined as tolerable on demonstration of ALARP under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		
Additional management controls	**Assessment of option**	**Adopted/Not adopted**
Low emissions vessels.	There is a limited availability of low emissions vessels (e.g. LNG, or battery powered), limited bunkering infrastructure (e.g. methanol), or the fuel technology readiness is not adequate (e.g. ammonia or hydrogen), such that it is not practicable to use these technologies.	Not adopted
Redesign the Wandoo Facility to redirect all non-safety flaring streams to reinject the gas.	Significant additional cost associated with the re-design and installation of associated equipment and pipework to allow for the reinjection of streams which are currently flared. Small environmental benefit from reducing atmospheric emissions from flaring. The current contribution from these streams are low and reinjection of excess fuel gas is in place. Given the small environmental benefit, the significant cost in redesigning and installing associated equipment and pipework, and the other controls already in place to minimise flaring, it is grossly disproportionate to the environmental benefit that it would provide.	Not adopted

RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Incidental (1)	Almost Certain (E)	Medium risk

5.13.2 Description of Hazard

Atmospheric emissions are gases released into the air from human and natural activities that can lead to reduction in local air quality. These emissions include non-greenhouse gases, such as nitrogen oxides (NO_x), sulphur oxides (SO_x), particulate matter (PM), nitrogen (N_2), volatile organic compounds (VOCs) and greenhouse gases (GHGs), such as carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). The GHGs reported under the National Greenhouse and Energy Reporting (NGER) Scheme include CO_2, CH_4. N_2O, sulphur hexafluoride (SF_6), and specified kinds of hydrofluorocarbons and perfluorocarbons (CER, 2024), and are measured in the units of carbon dioxide equivalent (CO_2-e).

The activities can generate atmospheric and GHG emissions from the following sources:

- Power generation and gas lift compressor
- Flaring, blowdown and venting
- Operation of WNA chemical pump (pneumatic) and instrument gas system
- Use of refrigerants (in HVAC systems)
- Nitrogen gas purging
- Diesel-powered equipment on WNA and WNB (non-turbine equipment, e.g. crane, firewater pumps, emergency diesel generator and portable equipment)
- Vessels and helicopter operations.

5.13.3 Impact and Risk Evaluation

Potential impacts caused by atmospheric and GHG emissions include:

- Localised and temporary decrease in air quality
- Minor contribution to GHGs and global climate change.

The following receptors may be impacted by atmospheric and GHG emissions:

- Ambient air quality.

Given rapid dispersion of any air emissions is expected, impacts to fauna such as birds have not been evaluated.

5.13.3.1 GHG Emissions Assessment

A GHG emissions assessment was conducted to estimate the GHG emissions generated from all planned activities that will occur (Appendix G). The GHG emissions assessment covers all emission scopes—Scopes 1, 2 and 3, defined as:

- Scope 1: The GHG emissions released as a direct result of VOGA's Wandoo Facility activities. These are emissions from sources owned or controlled by the company. For example, fuel combustion, flaring and venting on the Wandoo Facility.

- Scope 2: The indirect GHG emissions from the generation of electricity, steam, heating, and cooling purchased, not owned or controlled by the company. Scope 2 will be zero as there is no electricity/energy involved.
- Scope 3: The indirect GHG emissions from VOGA Wandoo Facility activities, not including scope 2, not owned or controlled by the company, e.g., fuel use by helicopters and vessels, and transport and use of sold products (Clean Energy Regulator (CER), 2024).

To quantify potential GHG emissions, the metric CO_2-e is used to standardise the different GHG emissions (CO_2, CH_4, N_2O) based on their global warming potential, by converting amounts of GHG emitted to the equivalent amount of CO_2 with the same global warming potential.

The calculation methodology models GHG emissions based on activity input data and industry standard data. The methods used in this modelling align with the relevant Australian and international legislation, regulations, standards and guidelines, being:

- National Greenhouse and Energy Reporting (NGER) (Measurement) Determination 2008
- International Organisation for Standardisation (ISO) 14064 Greenhouse gases – Part 1: Specification with guidance at the organisation level for quantification and reporting of greenhouse gas emissions and removals
- ISO 14040: 2006 Environmental management – Life Cycle Assessment – Principles and Framework.

The total representative annual GHG emissions resulting from the activities are expected to be ~1,121 kt CO_2-e, consisting of ~92 ktpa CO_2-e of scope 1 emissions (8.2%) and ~1,029 ktpa CO_2-e of scope 3 emissions (91.8%).

The support operations (vessels and helicopter) are expected to generate approximately 53 ktpa CO_2-e, ~4.7% of the total GHG emissions. The vessel emissions have included a contingency factor of 15% to account for the potential delays from the schedule and weather.

Table 5-81 provides an outline of the forecast GHG emissions from the Wandoo Facility over the 5 year life of the EP.

Table 5-81: Summary of representative annual GHG emissions estimate over the 5-year period

ACTIVITIES	REPRESENTATIVE ANNUAL GHG EMISSIONS	
	Tonnes/Year CO_2-e	%
Scope 1 emissions:	**92,000**	**8.21%**
Fuel Combustion	**61,500**	**5.49%**
Diesel combustion	*43,500*	*3.88%*
UNG combustion	*18,000*	*1.61%*
Produced water	**14,000**	**1.25%**
Crude oil production – flare	**10,000**	**0.89%**
Crude oil production – fugitive vent	**6,000**	**0.54%**
Crude oil production – fugitive leak	**500**	**0.04%**
Scope 3 emissions:	**1,028,600**	**91.79%**
End use of crude oil	**942,100**	**84.07%**

ACTIVITIES	REPRESENTATIVE ANNUAL GHG EMISSIONS	
	Tonnes/Year CO_2-e	%
Vessel operations	**52,500**	**4.69%**
Bunkering vessel	*9,500*	*0.85%*
MODU tow tugs during project activities	*8,700*	*0.78%*
Diving support vessel during project activities	*6,200*	*0.55%*
Accommodation vessel during operations	*5,900*	*0.53%*
Tow tugs during project activities	*5,800*	*0.52%*
Infield vessel during operations	*5,200*	*0.46%*
Hyperbaric rescue vessel during operations	*3,200*	*0.29%*
Crew transfer vessel during project activities	*3,000*	*0.27%*
Saturation diving vessel during operations	*2,600*	*0.23%*
MODU during project activities	*2,400*	*0.21%*
Crude oil transport	**33,400**	**2.98%**
Helicopter operations	**600**	**0.05%**
Representative annual total GHG emissions:	**1,120,600**	**100.00%**

5.13.3.2 Impact Assessment

Air Quality

Atmospheric emissions including NO_x, SO_x, PM, N_2 and VOCs are released from the Wandoo Facility, helicopters, and vessels. These emissions may result in a decline in local air quality within the immediate vicinity of the source.

The volume of atmospheric emissions is low. Atmospheric emissions will be similar to other vessels operating in the region for both oil and gas activities and other activities.

The extent of the area of impact is predicted to be localised and short term to the emission point as offshore winds will rapidly disperse atmospheric emission to background levels while the activities are undertaken. As the activities are in a remote location, any temporary change to air quality will not impact coastal towns.

While accidental release of ODS has the potential to contribute to ozone layer depletion, routine maintenance of refrigeration systems and controls make accidental releases rare.

Given the low volume of atmospheric emissions and the offshore location of the Operational Area, biodiversity, ecological integrity and social amenity will not be impacted and any impact to air quality is negligible.

Contribution to Atmospheric GHGs

The release of GHG emissions will result in an increase in atmospheric GHG.

As reflected in Australia's Nationally Determined Contribution (NDC) under the Paris Agreement and the *Climate Change Act 2022* (Cth), Australia is committed to:

- A single year target to reduce GHG emissions to 43% below 2005 levels by 2030
- A multi-year emissions budget from 2021-2030.

Based on a 43% reduction by 2030 and a 62% to 70% reduction by 2035, Australian emissions budget for this period is between 4,555 Mt CO_2-e and 5,046 Mt CO_2-e (DCCEEW, 2025g).

The following approach was used to calculate an Australian carbon budget for the duration of the Wandoo Facility (2026-2031):

- Using the Australia's emissions projections 2025 conducted by DCCEEW under the 'with additional measures' scenario (DCCEEW, 2025f) to determine the Australian annual projected emissions for the years where the Wandoo Facility activities and the DCCEEW forecast overlap (assuming the in-force period is 2027-2031 for conservatism).
- The annual emissions budgets for the above periods are summed together to create the total Australian carbon budget for the duration of the Wandoo Facility, estimated to be between 4,555 Mt CO_2-e and 5,046 Mt CO_2-e for 70% reduction by 2035 and 65% reduction by 2035 respectively.

The Wandoo Facility's Scope 1 and Scope 3 GHG emissions equate to 0.0250% to 0.2793% (for the 62% reduction target and 70% reduction target respectively) and 0.0251% to 0.2808% (for the 62% reduction target and 70% reduction target respectively) of Australian emissions budget, respectively.

The Wandoo Facility's combined scope 1 and scope 3 GHG emissions (excluding use of product, which occur exclusively outside of Australia's jurisdiction) equate to between 0.0487% and 0.0490% (for the 62% reduction target and 70% reduction target respectively) of Australian emissions budget the duration of this EP (2027-2031).

The vast majority of the GHG emissions (87.05%) is attributed to downstream emissions (transportation and end use of sold products).

On a global scale, the United Nations International Panel on Climate Change (IPCC) in its Sixth Assessment Report (AR6) forecast the remaining carbon budgets of 500 Gt CO_2-e and 1,350 Gt CO_2-e from 1 January 2020 for a 50% likelihood to limit global warming to 1.5°C and 2.0°C, respectively, based on pre-industrialised levels (IPCC, 2023). The Wandoo Facility's overall emissions equate to 0.0011% and 0.0004% of the total carbon budgets to limit global surface temperature change of 1.5°C and 2.0°C, respectively.

Emissions from the Wandoo Facility are minor in comparison to national and global carbon budgets and so Vermillion Australia cannot reasonably conclude that the Wandoo Facility will substantially contribute to global atmospheric GHG concentrations.

GHG Emissions – Global and Australian Context

Climate science is a rapidly evolving field in which new observations continue to deepen understanding of the current and potential impacts of global warming, and the possible pathways for mitigation and adaptation.

The IPCC is the United Nations body for assessing the science related to climate change and finalised the Sixth Assessment Report (AR6) in 2023. This consists of three Working Group

contributions and a Synthesis Report. A summary of outcomes of the working group's contributions comprises a range of matters, which among others include:

- The AR6 Working Group I report stated that it is unequivocal that there is human-induced warming. It also stated that increased atmospheric CO_2 levels, generated by human activity, are the largest driver of warming over the longer term, and that there are a range of factors, including emissions of methane, which increase warming in the short-term.
- The AR6 Working Group II report stated that human-induced climate change, including more frequent and intense extreme events, has caused widespread adverse impacts and related losses and damages to nature and people, beyond natural climate variability. It stated that global warming, reaching 1.5°C in the near-term, would cause unavoidable increases in multiple climate hazards and present multiple risks to ecosystems and humans. The report noted that societal choices and actions implemented in the next decade will determine the extent to which medium- and long-term pathways will deliver climate resilient development.
- The AR6 Working Group III report provided an updated global assessment of climate change mitigation progress and pledges and examined the sources of global emissions. It explained developments in emissions reduction and mitigation efforts and assessed the impact of national climate pledges in relation to long-term emissions goals. More than 2,000 quantitative emissions pathways were submitted to the IPCC, of which 1,202 scenarios included sufficient information for assessing the associated warming. The report found that there are many pathways in the literature that likely limit global warming to 2°C with no overshoot, or to 1.5°C with limited overshoot. These variations occur because, while climate science is able to calculate a 'carbon budget' of net emissions before any particular temperature outcome is reached, the allocation of this budget between different human activities requires additional judgements about for example technology, economics, consumer preferences and policy choices The AR6 Working Group I report stated that climate change is a global phenomenon, but manifests differently in different regions (IPCC, 2021). IPCC projections for climate change in Australia from the AR6 Working Group II report include:
  - further climate change is inevitable, with the rate and magnitude largely dependent on the emission pathway (very high confidence)
  - ongoing warming is projected, with more hot days and fewer cold days (very high confidence)
  - further sea level rise, ocean warming, and ocean acidification are projected (very high confidence)
  - less winter and spring rainfall is projected in southern Australia, with more winter rainfall in Tasmania, less autumn rainfall in southwestern Victoria and less summer rainfall in western Tasmania (medium confidence), with uncertain rainfall changes in northern Australia.
  - more extreme fire weather is projected in southern and eastern Australia (high confidence)
  - increased drought frequency is projected for southern and eastern Australia (medium confidence)
  - increased heavy rainfall intensity is projected, with fewer tropical cyclones and a greater proportion of severe cyclones (medium confidence) (Lawrence et al. 2022).

- The AR6 Working Group II report identified nine key climate risks for the Australasian region:
  - loss and degradation of coral reefs and associated biodiversity and ecosystem service values in Australia due to ocean warming and marine heatwaves (very high confidence)
  - loss of alpine biodiversity in Australia due to less snow (high confidence)
  - transition or collapse of alpine ash, snowgum woodland, pencil pine and northern jarrah forests in southern Australia due to hotter and d rier conditions with more fires (high confidence)
  - loss of kelp forests in southern Australia due to ocean warming, marine heatwaves, and overgrazing by climate-driven range extensions of herbivore fish and urchins (high confidence)
  - loss of natural and human systems in low-lying coastal areas due to sea level rise (high confidence)
  - disruption and decline in agricultural production and increased stress in rural communities in south-western, southern and eastern mainland Australia due to hotter and drier conditions (high confidence)
  - increase in heat-related mortality and morbidity for people and wildlife in Australia due to heatwaves (high confidence)
  - cascading, compounding and aggregate impacts on cities, settlements, infrastructure, supply-chains and services due to wildfires, floods, droughts, heatwaves, storms and sea level rise (high confidence)
  - inability of institutions and governance systems to manage climate risks (high confidence) (Lawrence et al., 2022).

The State of the Climate 2024 (BOM and CSIRO, 2024) reported that:

- Australia's climate has warmed by an average of 1.51 ± 0.23 ^{o}C since national records began in 1910; and
- Sea surface temperatures have increased by an average of 1.08 ^{o}C since 1900.

An earlier report by Australia's Biodiversity and Climate Change Advisory Group summarised the potential impacts of climate change to marine and terrestrial species, habitats and ecosystems across Australia (Steffen et al., 2009). The 2009 report identified examples of observed changes in Australia's biota that were considered consistent with the emerging climate change 'signal', as genetic constitution, geographic ranges, life cycles, populations, ecotonal boundaries, ecosystems, and disturbance regimes (Steffen et al., 2009). The report also stated:

- "Biodiversity is one of the most vulnerable sectors to climate change".
- "Australia's biodiversity is not distributed evenly over the continent but is clustered in a small number of hotspots with exceptionally rich biodiversity", and that these "include the Great Barrier Reef, south-west Western Australia, the Australian Alps, the Queensland Wet Tropics and the Kakadu wetlands".

Further, it was stated that "many of the most important impacts of climate change on biodiversity will be the indirect ones at the community and ecosystem levels, together with the interactive effects with existing stressors" (Steffen et al., 2009). Future climate change (e.g. increased

temperature and decreased, but more variable, rainfall) has the potential to have a range of impacts on ecological factors and threaten biodiversity in the Australian mediterranean ecosystem (Commonwealth Scientific and Industrial Research Organisation (CSIRO), 2017).

Extensive modelling and monitoring studies over the last twenty years provide considerable evidence that global climate change is already affecting and will continue to affect species (Hoegh-Guldberg et al., 2018) however these impacts are likely to be highly species-dependent and spatially variable. The most frequently observed and cited ecological responses to climate change include species distributions shifting towards the poles, upwards in elevation and shifts in phenology (earlier and later autumn life-history events) (Dunlop et al., 2012). Climate change may not only change species distribution patterns but also life-history traits such as migration patterns, reproductive seasonality and sex ratios (Steffen et al., 2009).

Impacts of climate change such as altering temperature, rainfall patterns and fire regimes, are likely to lead to changes in vegetation structure across all terrestrial ecosystems within Australia (Dunlop et al., 2012; Steffen et al., 2009). Increases in fire regimes will impact Australian ecosystems altering composition structure, habitat heterogeneity and ecosystem processes. Changes in climate variability, as well as averages, could also be important drivers of altered species interactions, both endemic and invasive species (Dunlop et al., 2012). Climate change could result in significant ecosystem shifts, as well as alterations to species ranges and abundances within those ecosystems (Hoegh-Guldberg et al., 2018).

The 'loss of climatic habitat caused by anthropogenic emissions of greenhouse gases' has been listed as a key threatening process under the EPBC Act (DCCEEW, 2021). The threatening process consists of reductions in the bioclimatic range within which a given species or ecological community exists due to emissions induced by human activities of greenhouse gases (DCCEEW, 2021). The process is considered to have a continental distribution, including both terrestrial and marine areas. Ecosystems in which the process occurs include alpine habitats, coral reefs, wetlands and coastal ecosystems, polar communities, tropical forests, temperate forests, and arid and semi-arid environments (DCCEEW, 2021).

Coral reefs were recognised by both IPCC and the Australian Government as being at risk of climate change (Lawrence et al., 2022; DCCEEW, 2021). Protected coral reef areas in Australia include those within World Heritage listed sites, such as Ningaloo Coast, Shark Bay, or the Great Barrier Reef. Climate change has been identified as a threat for each of these World Heritage areas, with potential risks to coral reef as well as other environmental values (such as marine fauna) within these ecosystems (IUCN, 2020b; 2020c; 2020a).

Climate variability and change have been identified as threats to some EPBC Act protected species, including marine turtles, whales, seabirds and migratory shorebirds:

- The Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia, 2017) states that "climate change is of particular concern to marine turtles because it is likely to have impacts across their entire range and at all life stages. Climate change is expected to cause changes in dispersal patterns, food webs, species range, primary sex ratios, habitat availability, reproductive success and survivorship".
- The Conservation Management Plan for the Blue Whale (Commonwealth of Australia, 2015a) states that "climate change is expected to cause changes in migratory timing and destinations,

population range, breeding schedule, reproductive success and survival of baleen whales, including blue whale species and subspecies".

- The Wildlife Conservation Plan for Seabirds (Commonwealth of Australia, 2022b) states that "consequences to seabirds could include negative impacts from an increase in extreme weather events, reduced or changed prey abundance and distribution, and decrease in nesting habitat".
- the Wildlife Conservation Plan for Migratory Shorebirds (Commonwealth of Australia, 2015) states that "such changes have the potential to affect migratory shorebirds and their habitats by reducing the extent of coastal and inland wetlands or through a poleward shift in the range of many species".

The North-west Marine Parks Network Management Plan 2018 (DNP, 2018) identifies climate change as a pressure that may impact marine park values. The management plan states that "the impacts of climate change on the marine environment are complex and may include changes in sea temperature, sea level, ocean acidification, sea currents, increased storm frequency and intensity, species range extensions or local extinctions, all of which have the potential to impact on marine park values" (DNP, 2018).

Within the Marine Bioregional Plan for the NWMR (DSEWPaC, 2012a), pressures related to climate change are assessed as 'of potential concern' for species of marine turtle, inshore dolphins, sawfish, sea snakes, whale shark, dugong, and seabird and shorebird, as well as the KEFs and shipwrecks known to occur in the NWMR.

5.13.4 Risk Ranking

The ambient air quality of the Operational Area is expected to be high, but emissions will rapidly disperse to background levels close to the emission source and impacts to fauna are not predicted. Therefore:

The consequence ranking of '1' (Incidental) was assigned to air quality and contribution to GHGs, and a likelihood of 'E' (Almost Certain) was considered appropriate, resulting in a risk ranking of 'Medium' (RRIII).

5.13.5 ALARP Demonstration

Table 5-80 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with atmospheric and GHG emissions. No additional controls were identified that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with atmospheric and GHG emissions are assessed as low as reasonably practicable.

5.13.6 Acceptability Demonstration

Table 5-82: Acceptability demonstration – Atmospheric and greenhouse gas emissions

ACCEPTABLE LEVEL OF RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant Principles of ESD not compromised given proposed controls (Table 5-80).
External context – objections or claims considered	N/A – No external objections or claims received.
Internal context – VOGA HSE policy/procedure met	Yes – Impact managed in accordance with VOGA HSE policy and PMS.
Other requirements met	Yes – MARPOL 73/78, OPGGS(E)R, *Navigation Act 2012* (Cth), Marine Order 97, NGER Act. Atmospheric emissions have not been identified as a threat in any recovery plans or conservation advice for EPBC Act listed threatened and migratory species.
RR < High (RRII)	Yes – Medium (RRIII).
EPO(s) manage impacts to acceptable levels	Yes – The following relevant EPOs will be maintained: • EPO-OP-08 • EPO-OP-09 • EPO-OP-10 See Section 7 for further details.
Acceptability summary: The impacts and potential risks of atmospheric and greenhouse gas emissions have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-80), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.7).	

5.14 Light Emissions

5.14.1 Hazard Report

Table 5-83: Hazard report – Light emissions

HAZARD	Artificial light
EP risk no.	EP-OP-R09
Activity cause	WNA,WNB, vessels and tankers. Flaring.
Potential impacts	Change in fauna behaviour. Change in ecosystem dynamics.
Extent and duration	Localised, short term.

PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
WNA,WNB, vessels and tankers.	Lighting will be limited to the minimum required for navigational and safety requirements, with the exception of emergency events.	Engineering	Reduction	EPO-OP-11 Impacts to marine fauna from light emissions will be limited to temporary behavioural change localised to the light source, with no species population-level impacts.	Reduce unnecessary vessel lighting to only those required for safe work and navigational use, in accordance with the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023c).	Inspection verifies no unnecessary excessive light other than usage for safe work and navigation.
Flaring.	No controls identified.	N/A	N/A	N/A	N/A	N/A

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
None identified.	N/A	N/A	N/A	N/A	N/A

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Incidental (1)	Almost Certain (E)	Medium risk
ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
A medium risk is defined as tolerable on demonstration of ALARP under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		
Additional management controls	**Assessment of option**	**Adopted/Not adopted**
No flaring.	Flaring is only used for separator pressure control and safety reasons and is a key component of the Emergency Shutdown and blowdown systems. It is safety critical equipment. Fuel gas is used to power the generators and compressor, and excess gas is reinjected. Flaring is only used to maintain pressure control.	Not adopted

INITIAL RISK WITH EXISTING CONTROLS		
Reducing lighting levels.	Current lighting levels are as required to provide a safe working environment for facility and vessel personnel, as well as to provide for navigational safety in the area. This reduction could be implemented by limiting or excluding night time operations of impacts. However, this is not considered feasible as it would increase the duration of the activity and the impacts, or potential impacts, in other areas, e.g. waste, air emissions, risk of vessel collision, etc. A minimum level of lighting will also still be required on the vessel on a 24-hour basis for safety reasons. Given the minimal impact to EPBC Act-listed marine species (e.g., turtles) occurring due to lighting, the financial and environmental costs incurred by requiring all works to be undertaken during daylight hours only (therefore disrupting operational activities) is unfeasible and grossly disproportionate to any environmental benefit.	Not adopted
Bird Management Plan for Wandoo offshore facilities (VOG-1100-YH-0013) implemented	Devices implemented in the Bird management plan reduce the risk to birds of helicopter strike. There are costs associated with procedure implementation, maintenance and management of devices and related reporting. The benefits of reducing bird strike and bird injury outweigh costs. Reducing bird presence on the Facility also reduces health and safety risks to personnel from hazardous helicopter landings, exposure to guano from direct contact or inhalation, or guano loading causing slips, trips and falls or deterioration of infrastructure.	Adopted (refer CM-12.7)

RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Incidental (1)	Almost Certain (E)	Medium risk

5.14.2 Description of Hazard

Sources of light emissions include:

- WNA and WNB facilities
- Vessels, MODU and tankers (when connected to the Facility)
- Flaring
- Bird deterrent devices.

A minimum level of lighting is required 24-hours a day on the Wandoo Facility and support vessels and MODU to ensure maritime safety in accordance with requirements of the *Navigation Act 2012* (Marine Order Part 30 (Prevention of Collisions). The anticipated number of vessel movements during normal operations is one per week. Tanker movements occur approximately 6-10 times per year, and offtake typically takes <72 hours. If an accommodation vessel or MODU is required during a project, it may be onsite for up to 7 weeks.

During some project activities (e.g. infrastructure replacement) the number of support vessels will increase to up to 4 vessels per day for up to 7 weeks. The maximum number of vessels that will be in the Operational Area concurrently is 4, potentially consisting of 2 tow tugs, a crew transfer vessel and a diving support vessel.

Non-routine flaring is required only used for separator pressure control and safety reasons and is a key component of the Emergency Shutdown and blowdown systems. Flare volumes or rates are monitored, and the platform aims to minimise flaring as far as possible. Generally, the WNB flare is low enough that it is only visible at night. The flare ignition pilot is continuously lit. The duration of non-routine flaring varies but is assumed to be 15 minutes for the purposes of impact assessment.

The distance that the light emissions will be visible from the source depends on the lighting type and the environmental conditions. Monitoring undertaken by Woodside (2014a) indicated that light density from navigational lighting on vessels attenuated to below 1.0 lux and 0.03 lux at distances of ~300 m and ~1.4 km, respectively from the source. These light densities are comparable to natural light densities experienced during deep twilight and during a quarter moon. A conservative 20 km assessment boundary has been applied around the Operational Area to assess impacts from vessel, MODU and Facility light emissions. This aligns with the recommendations in the National Light Pollution Guidelines (DCCEEW, 2023b) as a precautionary limit based on observed effects of skyglow on marine turtle hatchlings demonstrated to occur at 15 km to 18 km (Kamrowski et al., 2014; Hodge, Limpus and Smissen, 2007), and fledgling seabirds grounded in response to artificial light 15 km away (Rodríguez et al., 2014).

The maximum flare rate is expected to be approximately 51 MMscfd. As the potential impact area increases proportionally with the light intensity (i.e. the flare rate), by applying extrapolation of the analogues in Table 5-84, the spatial extent from the flaring scenario is estimated to be approximately 57 km. Therefore, the flaring scenario is considered the greatest spatial extent for the purposes of assessing impacts from light emissions.

Bird deterrent devices will not emit light that penetrates the sea surface. The light acts to trigger a bird's fear response and is expected to cause short-term, intermittent avoidance behaviour. The

devices will effect a small portion of local populations. All deterrent devices will be used in line with the Bird Management Plan (VOG-1100-YH-0013). Light impacts of deterrent devices will not be assessed further.

Table 5-84: Flaring light analogues

Project	Infrastructure	Height (m above sea level[1])	Flare Rate	Potential Impact Area
Nigeria Obigbo (Ishichei, 1976; Xodus, 2020)	Flare stack	9.5 m	30 MMscfd	42 km
Corowa Development (Xodus, 2020)	MODU flare	105 m	17 MMscfd	34 km
Otway Development (Xodus, 2021)	MODU flare	85 m	40 MMscfd	50 km

[1] *The maximum height of the infrastructure*

5.14.3 Impact and Risk Evaluation

Potential impacts caused by light emissions include:

- Change in fauna behaviour
- Change in ecosystem dynamics.

The following receptors within the Operational Area may be impacted by light emissions:

- Marine fauna, including plankton, fish, marine reptiles, seabirds and shorebirds
- Protected areas.

5.14.3.1 Impact Assessment

Marine Fauna

Change in Fauna Behaviour

Artificial lighting has the potential to disrupt marine fauna by altering the use of visual cues for orientation, navigation or other purposes. This results in behavioural responses which can alter migration, foraging and breeding activity. It can also create competitive advantages for some species and reduce reproductive success and/or survival in others.

There is no evidence to suggest that artificial light sources adversely affect the migratory, feeding or breeding behaviours of cetaceans. Cetaceans predominantly utilise acoustic senses to monitor their environment rather than visual cues (Simmonds et al., 2004). Therefore, light is not considered to be a significant factor in cetacean behaviour or survival and has not been evaluated in the following sections.

Plankton

The National Light Pollution Guidelines for Wildlife does not identify plankton as sensitive species to light pollution (DCCEEW, 2023c). However, studies have shown zooplankton to demonstrate avoidance, descending away from the surface light pollution caused by research vessels at depths of up to 200 m, and dispersing up to 200 m horizontally from the light source (Berge et al., 2020). Zooplankton naturally ascend at night to forage on phytoplankton that are found near the water's surface. Conversely, studies by Meekan et al. (2001) found that some zooplankton species were attracted to light sources, suggesting species specific response to light pollution.

The increase of zooplankton in an area has been shown to result in a subsequent increase in predators (Shaw et al., 2002). Therefore, light emissions produced from the vessel activities has the potential to lead to a localised change in zooplankton density which may lead to indirect impacts to predators and the food chain.

Fish

The National Light Pollution Guidelines for Wildlife does not identify fish, sharks or rays as sensitive species to light pollution (DCCEEW, 2023c). However, studies have found that fish species can be attracted to light sources, similar to zooplankton (Meekan et al., 2001). The attraction of organisms to the light results in an increased food source for marine predators that aggregate around the edges of the visible light.

Seven threatened fish species have been identified by the PMST report for the 57 km light assessment boundary: dwarf sawfish, green sawfish, freshwater sawfish, scalloped hammerhead, grey nurse shark, white shark and whale shark. A foraging BIA for the whale shark also overlaps with this assessment area. However, relevant Conservation Advice and Recovery Plans for these species do not identify light emissions as a threat (Table 1-3).

The localised increase in fish activity, including opportunistic predation, to the immediate vicinity of the vessels is not considered to represent a significant impact to the local and regional food web. Therefore, impacts are expected to be incidental.

Marine Reptiles

Marine reptiles include sea snakes and marine turtles. The National Light Pollution Guidelines for Wildlife do not specifically identify light sea snakes as sensitive species to light pollution, however, for some nocturnal terrestrial snake species, artificial light may affect behaviour (i.e. attraction or avoidance) (DCCEEW, 2023c).

There are two threatened sea snakes that are known to occur within the light assessment boundary: the short-nosed sea snake and the leaf-scaled sea snake. There are no BIAs identified for these species. While there is potential for sea snake behaviour to be impacted (similar to terrestrial snake species), the species' Conservation Advice (Table 1-3) does not recognise light as a threat.

The Recovery Plan for Marine Turtles in Australia (CoA, 2017) and National Light Pollution Guidelines for Wildlife (DCCEEW, 2023c) identifies light pollution as a threat to marine turtles. Artificial lighting along or adjacent to turtle nesting beaches has the potential to alter or disrupt

nocturnal behaviours of nesting adult females and emerging hatchlings as they make the passage from the beach to the sea (DCCEEW, 2023c).

Female turtles nest on sandy tropical and sub-tropical beaches predominantly at night where they rely on visual cues to select nesting beaches and orient on land (DCCEEW, 2023c). Artificial light has been shown to impact these nesting behaviours of adult females (Witherington and Martin, 2003), such as influencing site selection, with females typically selecting beaches not exposed to artificial light (Price et al., 2018).

Studies have shown that hatchlings are particularly vulnerable to artificial light emissions. Most turtle hatchlings emerge at night and rely on a combination of topographic and brightness cues to rapidly orient themselves and find the ocean in order to avoid predation (Mrosovsky, 1968). Disorientation of hatchlings as they emerge has the potential to direct hatchlings away from the ocean (Limpus, 2009), leading to mortality from predation, exhaustion, dehydration, or interaction with human activities (Erb and Wyneken, 2019). Hatchlings have been observed to respond to artificial light emission up to 18 km away from the source whilst emerging on the beach (Kamrowski et al., 2014). Artificial lights can also disrupt hatchlings within nearshore waters by attracting hatchlings back to the shoreline (Truscott et al., 2017). Alternatively, hatchlings have also been reported to be found swimming around lights on vessels out at sea (Limpus et al., 2003). In the event that the light emissions attract fish, sharks, and rays, it may result in a higher level of predation.

Five marine turtle species may be present within the worst-case flaring light assessment boundary (57 km from the Operational Area):

- Leatherback turtle
- Loggerhead turtle
- Flatback turtle
- Green turtle
- Hawksbill turtle.

The worst-case flaring light assessment boundary (57 km) for the Wandoo Facility overlaps the following flatback turtle BIAs/habitat critical:

- Foraging BIA (0.8% overlap)
- Mating BIA (39.5% overlap)
- Nesting BIA (0.7% overlap)
- Internesting BIA (0.1% overlap)
- Internesting buffer BIA (7.1% overlap)
- Migration corridor BIA (82.4% overlap)
- Habitat critical to the survival of the species (2.2% overlap).

The worst-case flaring light assessment boundary (57 km) for the Wandoo Facility overlaps the following green turtle BIAs/habitat critical:

- Foraging BIA (0.5% overlap)

- Mating BIA (31.2% overlap)
- Nesting BIA (4.9% overlap)
- Internesting BIA (0.4% overlap)
- Internesting buffer BIA (8.9% overlap)
- Migration corridor BIA (82.4% overlap)
- Habitat critical to the survival of the species (1.3% overlap).

The worst-case flaring light assessment boundary (57 km) for the Wandoo Facility overlaps the following hawksbill turtle BIAs/habitat critical:

- Foraging BIA (9.4% overlap)
- Mating BIA (36% overlap)
- Nesting BIA (3.1% overlap)
- Internesting BIA (0.6% overlap)
- Internesting buffer BIA (11.1% overlap)
- Migration corridor BIA (82.4% overlap)
- Habitat critical to the survival of the species (3.8% overlap).

The worst-case flaring light assessment boundary (57 km) for the Wandoo Facility overlaps the following hawksbill turtle BIAs:

- Nesting BIA (0.2% overlap)
- Internesting buffer BIA (14.6% overlap).

The worst-case flaring light assessment boundary for the Wandoo Facility does not overlap any loggerhead foraging, migration or mating BIAs, or habitat critical to the survival of the species.

The flaring light assessment boundary also overlaps habitat critical to the survival of the flatback, green and hawksbill turtles. The flatback turtle has a 60 km buffer established seawards from known nesting sites such as those in the Dampier Archipelago (~39 km from the Operational Area). This buffer is identified as internesting habitat which is critical to the species during nesting activities which occur between October and March each year (CoA, 2017). Both the green and hawksbill turtles have defined habitat critical to the survival associated with nesting sites in the Dampier Archipelago, the buffer for these species extends 20 km from nesting sites (CoA, 2017). The nesting season for the green turtle occurs between November and March, while hawksbill turtle nesting occurs between October and February each year (CoA, 2017).

As activities associated with the Facility operations are proposed to be undertaken at any time of year (Section 2.3), there is potential that artificial light from flaring, and navigational/operational lighting from vessels, the Facility and the MODU will be emitted during marine turtle nesting seasons. However, the worst-case spatial extent of flaring is intermittent and of short duration (15 mins).

As activities associated with the facility operations are proposed to be undertaken at any time of year (Section 2.3), there is potential that artificial light from flaring and vessels will be emitted

during marine turtle nesting seasons. With the implementation of controls, light emissions are considered to have an incidental impact on marine turtles.

Seabirds and Shorebirds

Several conservation plans and national guidelines have identified light pollution as a threat to birds, including the Wildlife Conservation Plan for Seabirds (CoA, 2020), Wildlife Conservation Plan for Migratory Shorebirds (DoE, 2015b) and the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023c). Previous studies have shown artificial light to cause disruption to seabird and shorebird behaviours, such as disorientation resulting in collision, entrapment, stranding, grounding, and interference with navigation (DCCEEW, 2023c). There are a range of conflicting reports on the attractiveness of different light wavelengths to seabirds. In general, very bright light, regardless of colour, has been shown to attract seabirds (Raine et al., 2007), indicating that the light intensity may be a more important cue than colour for seabirds (DCCEEW, 2023c). Bright white lights on vessels have been shown attract seabirds at night, particularly on nights with little moonlight or low visibility (Merkel and Johansen, 2011).

The impact that artificial light has depends on the species and has been known to be exacerbated by the phase of the moon (Deppe et al., 2017), wind direction and strength (Syposz et al., 2018), precipitation, cloud cover, and the proximity of nesting sites or migrating sites to artificial light sources (Rodríguez et al., 2015).

Several studies have examined both the benefits and drawbacks of light pollution for migratory shorebirds (DCCEEW, 2023c). Artificial lighting can assist some species, particularly those that forage at night, by increasing access to food (Rogers et al., 2006; Dwyer et al., 2013). Conversely, bright lights can disrupt birds in flight by attracting airborne migrants (Longcore et al., 2013) and influencing stopover site selection in long-distance migrants, which may reduce migration success and overall fitness (McLaren et al., 2018). Additionally, Ronconi et al. (2013) reported that interactions between offshore oil and gas platforms and birds in the North Sea likely involve migratory shorebirds, estimating that hundreds of thousands of birds die annually in these encounters, with artificial light being a probable contributing factor (DCCEEW, 2023c).

Seabird species which are active at night, such as procellariforms (i.e. petrels, shearwaters, and albatross species) have been shown to be more vulnerable to impacts from artificial light (DCCEEW, 2023c). The fledgling phase for procellariforms is considered a critical phase in the life cycle of the species (Rodriquez et al., 2017). The fledging season may vary between species; however, it is known to occur over a short period of time with the first flight typically occurring within the first 2 hours after sunset (Chevillion et al., 2022). Artificial light has been shown to disrupt fledgling sea-finding cues during their emergence from the nesting sites. Studies note this disorientation has the potential to lead to seabird fledgling grounding in response to a light source at least 15 km away (Rodriguez et al., 2014).

A recent study demonstrated that artificial light disrupts adult nest attendance, subsequently affecting the weight gain and potential survival of the chicks (Cianchetti-Benedetti et al., 2018). Adult seabirds are less vulnerable to artificial light than fledglings. Adult procellariforms are the most vulnerable when returning to and leaving the nesting colony (CoA, 2020).

Thirty-three threatened and/or migratory seabird and shorebird species may be present within the light assessment boundary. There are no habitats critical to the survival of threatened albatross and petrel species within this area, this includes known foraging and nesting sites.

However, the worst-case flaring light assessment boundary (57 km) overlaps with breeding BIAs for the following:

- Fairy tern
- Roseate tern
- Wedgetail shearwater.

The fairy tern is Marine listed under the EPBC Act, and the subspecies Australian fairy tern (Sterna nereis nereis) is listed as vulnerable. The Australian fairy tern has a National Recovery Plan (CoA, 2020), however light emissions are not identified as a threat. While the light assessment boundary overlaps with breeding colonies, the species is diurnal, meaning they are active at day and rest at night. Therefore, any impacts from artificial light emissions associated with facility operations are anticipated to be negligible and have not been assessed further.

The roseate tern is EPBC Act listed marine and migratory species that does not have a recovery plan or conservation advice but is included in the Wildlife Conservation Plan for Seabirds (CoA, 2020). While the light assessment boundary overlaps with breeding colonies, the species is also diurnal (DCCEEW, 2025), therefore any impacts from artificial light emissions associated with facility operations are anticipated to be negligible and have not been assessed further.

The wedge-tailed shearwater is EPBC Act listed marine and migratory species that does not have a recovery plan or conservation advice but is covered by the Wildlife Conservation Plan for Seabirds (CoA, 2020). As a procellariform the wedge-tailed shearwater may be active at night. Diving seabirds, particularly petrels, are sensitive to artificial light emissions, and can be disoriented during flying and foraging (Marangoni et al., 2022). It is anticipated that artificial light at night may increase prey concentration in the localised area increasing the opportunity for seabird foraging activities. Although no foraging BIA for the species is identified within the light assessment boundary, the wedge-tailed shearwater would be expected to forage within this area during the breeding season (August to April) when it can be found along the coast between Exmouth and Port Headland. Therefore, artificial light emissions associated with facility operations may increase foraging opportunities.

As discussed above, a critical phase of life for shearwaters is at fledgling when dependence on parents and life on land shifts to independence at sea. Fledglings are vulnerable to becoming disorientated during their first flight when exposed to artificial light, with some fledglings leaving the nest but become attracted towards artificial lighting. This disorientation can lead to injury or fatality from fallouts over the ocean, groundings or collisions with infrastructure (Rodríguez et al., 2017; Marangoni et al., 2022). Studies have shown that some fledglings will not make their first flight due to light emissions if the nesting habitat does not become dark (DCCEEW, 2023c). The worst-case flaring light assessment boundary overlaps with breeding colonies for the wedge-tailed shearwater. Breeding birds typically arrive in the NWMR in md-August and depart in April, migrating north of the equator in the non-breeding season (DSEWPaC, 2012).

The worst-case spatial extent for Wandoo operations is from non-routine flaring, which is intermittent and of short duration (15 mins).

Given the lack of natural roosting sites or foraging areas for seabirds and migratory shorebirds within the worst-case impact areas, artificial light is unlikely to impact the biologically important behaviours of seabirds and migratory shorebirds.

The wedge-tailed shearwater reproduction BIA is based on buffer areas surrounding the offshore islands (e.g. within Dampier Archipelago) that are used for nesting by this species (Section 3.4.3.3). Given the Dampier Archipelago coastline is ~39 km from the Operational Area, lighting from the MODU and support vessels is unlikely to impact fledgling wedge-tailed shearwaters, as grounding is predicted in response to a light source 15 km away (Rodriguez et al., 2014). Therefore, artificial light emissions from the activity only have the potential to temporarily attract individuals to nocturnally forage within the area which will not result in negative impacts to seabird populations, biologically important activities, or ecosystem function.

Protected Areas

Change in Ecosystem Dynamics

The worst-case flaring light assessment boundary overlaps with two AMPs: Montebello AMP and Dampier AMP. As discussed in the previous assessment sections, receptors sensitive to light emissions, such as marine turtle, fish and seabirds, are identified as conservation values for the AMPs. Both AMPs provides habitat critical to the survival of marine turtles, including internesting habitats, foraging BIAs for marine turtles, and range of species, including protected fish and seabird species, listed as threatened, migratory, marine or cetacean under the EPBC Act (Section 3.6.5).

Therefore, a change in ecosystem dynamics and conservation values, may occur from artificial light emissions. As discussed in the relevant subsections within Section 5.14.3, a change in marine fauna behaviour, such as avoidance or attraction, may occur during facility operations. However, any impact to marine fauna receptors is expected to be limited to individuals, and not affect population or ecosystem functioning, or impede biologically important activities from occurring. Furthermore, the potential impact areas only overlap a small portion of each of the AMPs full extent with any impacts to the values of the AMPs localised to the area of the respective AMP closest to the Operational Area.

Therefore, the any impacts to the conservative values of the AMPs are considered to be incidental and limited to a the spatial area that may be intersected by the light assessment boundary.

5.14.4 Risk Ranking

Routine cooling water discharges are expected to result in highly localised and short-term changes to water quality. Due to the offshore oceanographic nature of the environment and low toxicity of the discharges, impacts to plankton present within the immediate vicinity of the discharge release are expected to be localised and not affect population functioning. Any impacts to marine fauna are expected to be incidental. Therefore:

- The consequence ranking of ‘1’ (Incidental) was assigned to water quality, and a likelihood of ‘E’ (Almost Certain) was considered appropriate, resulting in a risk ranking of ‘Medium’ (RRIII).

5.14.5 ALARP Demonstration

Table 5-83 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and

the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with light emissions. No additional controls were identified that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with light emissions are assessed as low as reasonably practicable.

5.14.6 Acceptability Demonstration

Table 5-85: Acceptability demonstration – Light emissions

ACCEPTABLE LEVEL OF RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant principles of ESD not compromised given proposed controls (Table 5-83).
External context – objections or claims considered	N/A – no external objections or claims received.
Internal context – VOGA HSE policy/procedures met	Yes – Risk managed in accordance with VOGA HSE policy.
Other requirements met	Yes, including: • MARPOL 73/78 Annex VI • AMSA Marine Order 97 • *Navigation Act 2012.* It is considered the petroleum activity is consistent with the objectives and actions of the following EPBC management plans that identify light as a threat (Table 1-3): • National Light Pollution guidelines for Wildlife (DCCEEW, 2023c) • National Recovery Plan for albatrosses and petrels (2022) (DCCEEW, 2022a) • Wildlife Conservation Plan for Seabirds (CoA, 2020) • Wildlife Conservation Plan for Migratory Shorebirds (DoE, 2015b) • National Recovery Plan for the Australian Fairy Tern (*Sternula nereis nereis*) (DAWE, 2020) • Recovery Plan for the White Shark (*Carcharodon carcharias*) (DSEWPC, 2013) • Recovery Plan for the Grey Nurse Shark (*Carcharias Taurus*) west coast population (DoE, 2014) • Recovery Plan for Marine Turtles in Australia, 2017-2027 (Commonwealth of Australia, 2017) • Approved Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle) (DEWHA, 2008c) Recovery Plans/Conservation Advice for other species that may occur in the 57 km worst-case flaring light assessment area do not identify light emissions as a key threat or have explicit relevant objectives or management actions related to light emissions.
RR < High (RRII)	Yes – Medium (RRIII).
EPO(s) manage impacts to acceptable level(s)	Yes – The following relevant EPOs will be maintained: • EPO-OP-11 See Section 7 for further details.

ACCEPTABLE LEVEL OF RISK DEMONSTRATED
Acceptability summary: The impacts of light emissions have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-83), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.7).

5.15 Discharge of Cooling Water

5.15.1 Hazard Report

Table 5-86: Hazard report – Discharge of cooling water from Facility

HAZARD	Discharge of cooling water from Facility
EP risk no.	EP-OP-R10
Activity cause	Production operations.
Potential impacts	Change in water quality. Change in marine fauna behaviour. Injury/mortality to plankton.
Extent and duration	Localised, short term.

PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Use of seawater for cooling compressors and turbines.	No controls identified. Seawater is used to provide cooling to machinery to ensure safe and fuel-efficient operation.	N/A	N/A	N/A	N/A	N/A
Use of marine growth prevention chemical in the seawater system.	Chemical assessment and selection process.	Administrative	Substitution	EPO-OP-06 No serious or irreversible change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	Chemicals used in the production process that will be discharged to the marine environment are selected in accordance with the VOGA chemical assessment process (Section 8.11).	Chemical assessment records.

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
None identified.	N/A	N/A	N/A	N/A	N/A

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Incidental (1)	Almost certain (E)	Medium risk
ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
A medium risk is defined as tolerable on demonstration of ALARP under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		
Additional management controls	**Assessment of option**	**Adopted/Not adopted**
Increased cooling water flow rate.	The total heat load transferred to the sea is determined by process cooling requirements. Whilst an increased cooling water flow rate would reduce the discharge temperature, this would require an increase to the seawater lift pump capacity (with increase in emissions) and changes to the cooling system (with significant associated cost) which is grossly disproportionate to any environmental benefit.	Not adopted

INITIAL RISK WITH EXISTING CONTROLS		
RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Incidental (1)	Almost certain (E)	Medium risk

5.15.2 Description of Hazard

Seawater is used as a heat exchange medium for the cooling of compressors and turbines. Seawater is drawn from the ocean and flows through a circuit absorbing heat from engines and machinery, effectively cooling the system.

The seawater is then discharged back to the sea (at the surface). The maximum discharge rate from the Wandoo Facility is 1,000 m^3/hr. The return temperature is typically 2-3°C above ambient conditions.

To prevent marine growth within the cooling water system, seawater is treated using a Marine Growth Preventing System that generates chlorine electrically and continuously doses sodium hypochlorite at 2 mg/L.

Cooling water is also discharged from support vessels and the MODU. The anticipated number of vessel movements during normal operations is one per week. Tanker movements occur approximately 6-10 times per year, and offtake typically takes <72 hours. If an accommodation vessel or MODU is required during a project, it may be onsite for up to 7 weeks.

During some project activities (e.g. infrastructure replacement) the volume of vessels will increase to up to 4 vessels per day for up to 7 weeks. The maximum number of vessels that will be in the Operational Area concurrently is 4, potentially consisting of 2 tow tugs, a crew transfer vessel and a diving support vessel.

5.15.3 Impact and Risk Evaluation

Potential impacts caused by discharge of cooling water include:

- Change in water quality
- Injury/mortality to plankton and marine fauna.

The following receptors within the Operational Area may be impacted by discharge of cooling water:

- Water quality
- Marine fauna.

5.15.3.1 Impact Assessment

Water Quality

Change in Water Quality

Temperature

Cooling water will be discharged at a temperature above ambient seawater temperature. Upon discharge, it will be subjected to turbulent mixing and transfer of heat to the surrounding waters, dropping swiftly with distance.

The Environmental Health and Safety Guidelines for Offshore Oil and Gas Development recommend a temperature increase of no more than 3˚C within 100 m of the discharge point (IFC, 2015). Modelling produced for Woodside in the Kimberley region found that discharged water temperature decreases quickly as it mixes with the receiving waters, with the discharge water temperature being <1°C above ambient conditions within 100 m (horizontally) of the discharge point, and 10 m vertically (Woodside, 2008).

Given that the temperature of the discharge is only marginally higher than that of the receiving waters (i.e. 2–3°C higher) and the receiving waters of the offshore environment location is subject to strong currents, a localised increase in temperature is expected to be negligible and within the immediate area of the discharge point.

Chemicals

The cooling water will be treated with a sodium-hypochlorite solution (10-15%) to prevent marine growth in the system. Sodium-hypochlorite is highly reactive, therefore only a low concentration of 2mg/L is needed to react with organic matter.

On discharge, the low volume of the chemical is expected to rapidly disperse and further dilute due to turbulent mixing in the receiving waters. The cooling water additive is also controlled via the chemical selection process to ensure that the lowest toxicity chemicals practicable are selected. Therefore, a change to water quality from the sodium-hypochlorite solution is considered incidental and prolonged negative impacts from the additive are not expected.

Marine Fauna

Injury/Mortality

Marine fauna, such as plankton, fish, marine turtles, marine mammals and seabirds, may encounter the cooling water discharge plume for a short period should they move through the Operational Area.

There are potential thermal impacts to marine organisms that may cause a variety of effects ranging from behavioural response (including attraction and avoidance), to minor stress, to potential mortality if exposure is prolonged.

Fish and plankton are likely to be at greatest risk from cooling water discharge impacts since they are most likely to be attracted to the discharge location (fish) or entrained within the discharge plume (plankton). Fish and plankton are also relatively small, cold-blooded organisms that may experience increased body temperature and altered physiological processes (e.g. increased respiration rate and oxygen demand). However, given that the area of raised water temperature will be highly localised and within the range of temperature on the NWS significant impacts on a larger ecosystem or population level to fish or plankton are not expected to occur.

Turtles, seabirds or marine mammals may contact the discharge plume for a short period should the transit through the Operational Area. There are several BIAs that overlap the Operational Area, including:

- Wedge-tailed shearwater – breeding (and buffer area)
- Whale shark – foraging

- Humpback whale – migration
- Flatback turtle – internesting buffer (60 km).

However, the benthic environment in the Operational Area primarily comprises bare sediments that does not support areas of high productivity that would encourage the long-term presence of marine fauna. Therefore, the presence of marine fauna in the Operational Area is considered to be transitory in nature and any changes to marine fauna behaviour are not expected beyond the immediate vicinity of the discharge point and are not anticipated to result in impacts at the ecosystem or population level.

The only biota that may be exposed to the thermal discharge for long periods are fouling species (e.g. barnacles) in the immediate vicinity of the discharge. The heated water will also prevent species that are less tolerant to elevated temperatures from settling and becoming established in close proximity to the discharge point. However, the area where increased water temperature will occur is highly localised and within the range of natural temperature variability observed on the NWS. As such, significant impacts on a larger ecosystem or population level, including to fish or plankton, are not expected to occur.

The sodium-hypochlorite solution added to the cooling water to control marine growth in the system can cause acute and chronic toxic effects on aquatic fauna (48-hour exposure LC_{50} 0.07 – 5.9 mg/L for fish). However, only a low concentration (2 mg/L) is used in the cooling water and prolonged exposure is not likely given the small volume released and the dynamic nature of the marine environment within the vicinity of the discharge point. Therefore, chemical toxicity impacts to marine fauna are not expected.

5.15.4 Risk Ranking

Routine cooling water discharges are expected to result in highly localised and short-term changes to water quality. Due to the offshore oceanographic nature of the environment and low toxicity of the discharges, impacts to plankton and marine fauna present within the immediate vicinity of the discharge release are expected to be localised and not affect population functioning. Any impacts to marine fauna are expected to be incidental. Therefore:

- The consequence ranking of ‘1’ (Incidental) was assigned to water quality, and a likelihood of ‘E’ (Almost Certain) was considered appropriate, resulting in a risk ranking of ‘Medium’ (RRIII).
- The consequence ranking of ‘1’ (Incidental) was assigned to plankton and marine fauna, and a likelihood of ‘C’ (Possible) was considered appropriate, resulting in a risk ranking of ‘Low’ (RRIV).

5.15.5 ALARP Demonstration

Table 5-86 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with discharge of cooling water.

No additional controls were identified that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with discharge of cooling water are assessed as low as reasonably practicable.

5.15.6 Acceptability Demonstration

Table 5-87: Acceptability demonstration – Discharge of cooling water

ACCEPTABLE LEVEL OF RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant principles of ESD not compromised given proposed controls (Table 5-86).
External context – objections or claims considered	N/A – no external objections or claims received.
Internal context – VOGA HSE policy/procedure met	Yes – Risk managed in accordance with VOGA HSE policy.

Other requirements met	Yes – Marine Order 96. It is considered that the petroleum activity is consistent with the objectives and actions of the following EPBC management plans that identify marine pollution or habitat degradation as a threat (Table 1-3): • Approved Conservation Advice for *Balaenoptera borealis* (Sei Whale) (TSSC, 2015c) • Conservation Advice for *Sousa sahulensis* (Australian humpback dolphin) (DCCEEW, 2025h) • Conservation Advice for *Orcaella heinsohni* (Australian snubfin dolphin) (DCCEEW, 2025d) • Approved Conservation Advice for *Balaenoptera physalus* (Fin Whale) (TSSC, 2015d) • National Recovery Plan for the Southern Right Whale (*Eubalaena australis*) (DCCEEW, 2024) • Conservation Management Plan for the Blue Whale, 2015-2025 (DoE, 2015). • National Recovery Plan for albatrosses and petrels (DCCEEW, 2022a) • Wildlife Conservation Plan for Migratory Shorebirds – 2015 (DoE, 2015b) • Wildlife Conservation Plan for Seabirds (CoA, 2022) • Approved Conservation Advice for *Calidris canutus* (Red Knot) (DCCEEW, 2024k) • Approved Conservation Advice for *Calidris frruginea* (Curlew sandpiper) (DCCEEW, 2023e) • National Recovery Plan for the Australian Fairy Tern *Sternula nereis nereis* (DAWE, 2020) • Sawfish and River Sharks Multispecies Recovery Plan: (*Pristis pristis, Pristis zijsron, Pristis clavata, Glyphis glyphis* and *Glyphis garricki*) (DoE, 2015c) • Recovery Plan for the Grey Nurse Shark (*Carcharias Taurus*) west coast population (DoE, 2014) • Recovery Plan for the White Shark (*Carcharodon carcharias*) (DSEWPC, 2013 • Approved Conservation Advice for *Pristis clavata* (dwarf sawfish) (DEWHA, 2009) • Approved Conservation Advice for *Pristis pristis* (largetooth sawfish) (DoE, 2014c) • Approved Conservation Advice for *Pristis zijsron* (green sawfish) (DEWHA, 2008b) • Approved Conservation Advice for Rhincodon typus (whale shark) (TSSC, 2015b) • Recovery Plan for Marine Turtles in Australia, 2017-2027 (Commonwealth of Australia, 2017).
RR < High (RRII)	Yes – Medium (RRIII).

EPO(s) manage impacts to acceptable levels	Yes – The following relevant EPOs will be maintained: • EPO-OP-06 See Section 7 for further details.
Acceptability summary: The impacts and potential risks of cooling water discharges have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-86), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.7).	

5.16 Discharge of Deck Drainage, Bilge Water, Sewage, Greywater and Putrescible Waste from Facility and Vessels

5.16.1 Hazard Report

Table 5-88: Hazard report – Discharge of deck drainage, bilge water, sewage, greywater and putrescible waste from facility and vessels

HAZARD	Discharge of deck drainage, bilge water, sewage, greywater and putrescible waste from Facility and vessels
EP risk no.	EP-OP-R12
Activity cause	Planned discharges from WNA, WNB and vessels.
Potential impacts	Change in water quality. Change in marine fauna behaviour. Injury/mortality to plankton.
Extent and duration	Continual discharges but only localised, low magnitude effect (within 100 m).

PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Deck drainage containing oil, grease and other hazardous chemicals.	Secondary containment – bunds and drip trays managed in accordance with the Wandoo Work Management Manual [WPA 7000 YG 0021].	Engineering	Prevention	EPO-OP-06 No serious or irreversible change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	Deck drainage must be managed in accordance with the Wandoo Work Management Manual [WPA-7000-YG-0021]. • Any damage or defeat of the bunding and containment integrity must be repaired at the earliest opportunity, unless appropriate alternative controls are put in place. • Portable equipment fitted with combustion engines (e.g., welders, temporary air compressors, generator packages) must be fitted with adequate containment—such as drip trays or integrated drainage systems—to ensure spills during routine operation or refuelling are captured. • Drip trays must be inspected at regular intervals and maintained at minimum levels to prevent overflow during washdown or rainfall. • Contaminated liquids are collected, and managed in accordance with the Waste Management Procedure [WPA-7000-YH-0009].	A0001131-1010 ‘Mechanical Bunding Inspection – 12 Month PM’ has been executed. Worksite inspections verify portable equipment is fitted with drip trays or equivalent containment. Worksite inspections confirm drip trays are checked regularly and maintained at minimum levels. Any accumulated liquids are disposed of in accordance with facility drainage and waste-management procedures. Non-conformances are recorded and corrective actions implemented prior to continuation of work.
Bilge discharge from vessels.	Bilge must be discharged outside 500 m restricted zone, as per the Marine Operations Manual [WNB-1000-YV-0001].	Administrative	Elimination	EPO-OP-06 No serious or irreversible change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	No vessel bilge water shall be discharged inside the 500 m restricted zone.	VOGA Marine Operations Manual [WNB-1000-YV-0001] provided to all vessels contracted.

PREVENTION						
Greywater discharged from the Facility and vessels.	Facility and support vessels are required to comply with MARPOL 73/78 Annex I, Annex IV, Annex V, and AMSA Marine Orders 91, 95 and 96.	Engineering	Reduction	EPO-OP-06 No serious or irreversible change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	Vessel contractor procedures include the requirements to comply with MARPOL 73/78 (Annex IV; Regulation 8) as required by class: • Equipped with either a sewage treatment plant or sewage comminuting and disinfecting system or a sewage holding tank. • Wastes shall be macerated to <25 mm prior to discharge. • Untreated sewage will be stored on-board in suitable holding tanks and disposed of onshore at reception facility or to carrier licenced to receive the waste or discharged at a distance of more than 12 nm from the nearest land. Vessel contractor procedures include the requirements to comply with MARPOL 73/78 (Annex I; Regulation 15) as required by class: • Deck drainage and bilge water will be treated in an oil water separator and discharged.	Vessel international Sewage Pollution Prevention Certificate.
	Maintenance of sewage and food waste macerator systems.	Engineering	Reduction		Sewage and food waste systems are maintained in accordance with maintenance procedures.	Maintenance records.
Drainage from vessel decks may contain oil, grease, spilled chemicals, detergent.	Bulk hazardous chemicals are transported in chemical cradles.	Engineering	Reduction		Bulk hazardous chemicals on vessels are transported in chemical cradles.	Visual inspection.
Deck drainage containing oil, grease and other hazardous chemicals.	Chemical assessment and selection process	Administrative	Substitution		Chemicals that will be discharged to the marine environment are selected in accordance with VOGA's Chemical Assessment Process (Section 8.11).	Completed chemical assessments show chemicals discharged to the marine environment meet the criteria of VOGA's Chemical Assessment Process.

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
None identified.	N/A	N/A	N/A	N/A	N/A

INITIAL RISK WITH EXISTING CONTROLS:		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Incidental (1)	Almost Certain (E)	Medium risk
ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP:		
A medium risk is defined as tolerable on demonstration of ALARP under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		

INITIAL RISK WITH EXISTING CONTROLS:		
Additional management controls	**Assessment of option**	**Adopted/Not adopted**
Onshore disposal	All food scraps, sewage and grey waste transported to shore for land-based disposal. This would result in an increase in transportation requirements (and increased atmospheric emissions, safety risk and cost). Onshore disposal would have environmental impacts that may be greater than those created by offshore disposal, e.g. added energy needed (and associated emissions) for sewage and greywater treatment. It also provides an increased exposure to biological health hazards, and considered grossly disproportionate to any environmental benefit gained.	Not adopted
Enhanced treatment offshore prior to discharge	Considered grossly disproportionate due to the high cost of retrofitting additional treatment packages to the existing drains water treatment systems; and the minor environmental impact of the discharge.	Not adopted
RESIDUAL RISK AFTER ADDITIONAL CONTROLS:		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Incidental (1)	Almost Certain (E)	Medium risk

5.16.2 Description of Hazard

The facilities, tankers and vessels required to support operations will release routine discharges into the marine environment. These discharges will only occur within the Operational Area with volumes dependent on the duration or frequency of activities, number of vessels and the number of POB.

WNA is normally unattended so discharges are limited to deck drainage. There are no other planned discharges to sea.

The anticipated number of vessel movements is one per week and the maximum POB for support vessels is 52. Tanker movements occur approximately 6-10 times per year, and offtake typically takes <72 hours. Tankers typically have a maximum POB of 36. If an accommodation vessel or MODU is required during a project, it will have a maximum POB of 120 and may be onsite for up to 7 weeks.

During some project activities (e.g. infrastructure replacement) the volume of vessels will increase to up to 4 vessels per day for up to 7 weeks. The most vessels that will be in the Operational Area concurrently is 4, potentially consisting of 2 tow tugs, a crew transfer vessel and a diving support vessel. There would only be 4 vessels in the Operational Area for short periods of time, not for the duration of a project.

A description of each discharge stream is provided in Table 5-89. Vessel calculations are based on the largest support vessel (i.e., 52 POB).

Table 5-89: Vessel discharge descriptions

Routine discharge	Description	Estimated volume
Deck drainage	Drainage from the production and deck areas of WNA and WNB mainly consists of wash-down water, seawater spray and rainwater, and may contain small quantities of oil and grease, detergents and dirt from the decks. The volume of drainage depends on rainfall and the frequency of deck washing. Inventory records indicate that an average of 126L of deck wash detergent is used per month. An OIW monitor (WNB) is used to record the oil content in any overboard discharge to ensure that the OIW content is less than 30 mg/L. Small quantities of grease and oil may accumulate on vessel deck surfaces creating potential slip hazards which are required to be washed down with water and detergent. The wash-down process flushes the accumulations into the vessel contained drain systems.	<0.05 m^3 per week.
Bilge	The discharge of contaminated bilge water from vessels is inclusive of deck drainage and may contain water, oil, dispersants, detergents, solvents, chemicals, particles and other liquids, solids or chemicals. VOGA's Marine Operations Manual includes the requirement for no bilge discharge from vessels within the PSZ/Operational Area. Bilge discharge is not assessed further.	No bilge discharge in the Operational Area.

Routine discharge	Description	Estimated volume
Sewage and grey water	Sewage Sewage from the WNB Platform consists mainly of sanitary waste, greywater and a small component of macerated food waste. Once treated sewage will be discharged into the marine environment. The mass of nutrients discharged in sewage effluent from the WNB Platform was estimated to include 1.6 kg per month of nitrogen and 0.38 kg per month of phosphorus. In addition, there is a small volume of biodegradable organics. Grey water Greywater is discharged from the laundry, shower and hand basins from the fixed facility, vessels and tankers. The greywater is comprised of potable water, soaps and detergents and is discharged directly to the marine environment.	Up to 11.8 m^3 for WNB per day; 10.4 m^3 per vessel per day; 7.2 m^3 per tanker per day (based on 60 L/person/day of sewage and 140 L/person/day). Up to 16.8m^3 from the MODU or accommodation vessel per day if required during a project.
Putrescible waste	Putrescible waste is generated from food scraps from the kitchens on the Platform and support vessels. The food scraps are macerated to a size small enough to pass through a 25 mm mesh (as per the requirements of MARPOL) prior to discharge overboard. Scraps that cannot be macerated, or are not readily degradable, such as bones, onion peels and orange rinds are bagged and disposed of onshore with the general rubbish.	Up to 112.1 L/day of putrescible waste will be discharged from WNB. Up to 98.8 L/day per vessel and up to 68.4 L/day per tanker (based on 1.9 L/day/person). A maximum of 228 L from the MODU or accommodation vessel per day if required during a project.

Combined Secondary-Containment Control Summary – Bunds, Drains, IBCs & Portable Equipment

Secondary containment on Wandoo facilities is delivered through an integrated system of bunds, engineered drainage, drip trays, and controlled chemical-handling practices that together prevent oil, grease, hazardous chemicals, and process fluids from entering the marine environment. The integrity of bunded areas is preserved through routine inspections, preventive maintenance, and repair of any defects at the earliest opportunity unless alternative controls are in place. All bunds are connected to the facility's hazardous and non-hazardous open-drain systems, ensuring that contaminated liquids are isolated from the environment and directed to controlled recovery and disposal pathways.

Portable equipment fitted with combustion engines—including welders, temporary air compressors and generator packages—is required to have drip trays or integrated containment systems to capture spills during operation or refuelling. Drip trays are inspected regularly and maintained at minimum levels to prevent overflow during washdown or rainfall, with accumulated liquids managed in accordance with the Waste Management Procedure [WPA-7000-YH-0009].

Chemical handling and decanting activities involving Intermediate Bulk Containers (IBCs) are managed under WNB-025-001, which requires pre-use inspection, safe depressurisation, secure hose connections, continuous supervision during decanting, and immediate containment and cleanup of any spills.

Together, these controls form a cohesive secondary-containment system that prevents uncontrolled releases to deck drains, ensures hazardous liquids are captured and managed appropriately, and maintains compliance with the Wandoo Work Management Manual (WPA-7000-YG-0021) and associated waste-management requirements.

Sewage and Greywater Management – Wandoo Facility and Support Vessels

Sewage and greywater generated at the Wandoo Facility and on support vessels is treated and discharged in compliance with the requirements of MARPOL 73/78 Annex IV and the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*. The Wandoo Facility macerates and treats sewage and greywater to the standards required under Annex IV prior to discharge. Smaller support vessels that do not have on-board sewage treatment systems discharge their macerated blackwater and greywater only beyond the 12-nautical-mile limit from the coast or alternatively retain effluent in sewage holding tanks for disposal at their home port (Port of Dampier). These controls ensure that sewage and greywater discharges do not result in unacceptable impacts to water quality or marine ecological values.

5.16.3 Impact and Risk Evaluation

Potential impacts from routine facility and vessel discharges Include:

- Change in water quality
- Change in marine fauna behaviour
- Injury/mortality to plankton.

The following receptors within the Operational Area may be impacted by routine facility and vessel discharges:

- Water quality
- Marine fauna
- Plankton.

5.16.3.1 Impact Assessment

Water Quality

Change in Water Quality

Deck drainage, sewage, greywater and putrescible waste will result in localised changes to the water quality within the vicinity of the discharge point. These routine discharges may result in increased chemicals, nutrients or salinity within the water column. The planned discharges from the petroleum activity will be relatively small and intermittent.

Chemicals

Deck drainage contains various chemical contaminants such as oil, grease and cleaning chemicals, as well as scale inhibitors and biocides used in deck drainage treatment. To minimise the risk of oil entering the deck drainage system, work areas will be bunded or equipped with drip trays. Prior to any discharge, oily water will be treated through an oily water separator to remove as much hydrocarbon content as possible. Additionally, detergents used during wash-down activities will be biodegradable. These chemicals will likely result in a localised reduction in water quality upon discharge and have potential to create ocean surface sheens. There may also be potential toxicity impacts to marine fauna (discussed below).

Reduction in water quality will affect surface waters (<5 m) only and the discharged water would be rapidly diluted in the dynamic oceanic environment. Modelling by Shell (2009) indicates that upon discharge, hydrocarbon and other chemical concentrations are rapidly diluted within less than 100 m of the discharge point, over a relatively short period of time. Hinwood et al. (1994) further predicted dilution factors in excess of 10,000 within 100 m of the discharge point, and Black et al. (1994) states that potential environmental impacts from deck drainage are considered to be slight given the rates of dilution that are likely offshore. Sewage discharges have been shown to be diluted to 1 in 1,000 within 30 minutes (Costello & Read, 1994).

On discharge to the marine environment, chemical contaminants, including oil, will be localised to the discharge point and subject to rapid dilution due to the open ocean environment in the Operational Area (i.e. water depth, strong ocean currents and metocean conditions). Given the small volume of the discharges, the impact of chemicals on water quality is expected to be incidental.

Nutrients

The primary concerns related to the discharge of sewage, greywater and putrescible waste (wastewater discharges) are nutrient enrichment of the receiving environment and increased biological oxygen demand.

Intermittently elevated nutrient levels from sewage, putrescible waste, and grey water discharges, is expected to either dilute in the receiving waters, settle out of the water column, chemically break down or be consumed by microorganisms (bacteria) (NERA, 2017). In a study of sewage discharge in deep ocean waters, Friligos (1985) reported no appreciable differences in the inorganic nutrient levels between the outfall area and background concentrations, suggesting rapid uptake of nutrients and/or rapid dispersion in the surrounding waters. Further, in an open ocean environment setting such as the Operational Area, the effect of the effluent biological oxygen demand on seawater oxygen concentrations is expected to be negligible (Black et al., 1994).

Wastewater discharges into the open ocean have little potential for impact where the waters are well mixed, and the volume of discharge is relatively small. Any wastewater discharged in the Wandoo field will be dispersed due to the wind-driven surface water currents, and rapidly mixed through the surface layer of water. Sewage and greywater discharge is unlikely to have a significant environmental impact. The small volume of food scraps relative to the total biological productivity of the area means that the environmental effect of their discharge would be insignificant.

On discharge to the marine environment, wastewater will be localised to the discharge point and subject to rapid dilution due to the open ocean environment in the Operational Area (i.e. water depth, strong ocean currents and metocean conditions). Given the volume of wastewater discharged per day is relatively small due to the number of people working at the Wandoo Facility, and any increase of vessel activity is short-term (<7 weeks), the impact of wastewater on water quality is expected to be incidental.

Marine Fauna

Change in Behaviour

As discussed above, Facility and vessel discharges are localised with rapid dilution expected within the dispersive, open ocean environment.

Turtles, seabirds or marine mammals may contact the discharge plumes for a short period should they transit through the Operational Area. There are several BIAs that overlap the Operational Area, including:

- Wedge-tailed shearwater – breeding (and buffer area)
- Whale shark – foraging
- Humpback whale – migration
- Flatback turtle – internesting buffer (60 km).

However, the benthic environment in the Operational Area primarily comprises bare sediments that does not support areas of high productivity that would encourage the long-term presence of marine fauna. Therefore, the presence of marine fauna in the Operational Area is considered to be transitory in nature and any changes to marine fauna behaviour are not expected beyond the immediate vicinity of the discharge points (Facility and vessels/MODU) and are not anticipated to result in impacts at the ecosystem or population level.

If contact does occur with any marine fauna, it will be for a short duration due to the small volumes released to the marine environment and the rapid dispersion of the plume such that any exposure to marine fauna is likely not of sufficient duration to cause a toxic effect. Potential toxicity to marine organisms from trace amounts of dissolved hydrocarbons in deck drainage is similar, but of a smaller scale, compared to the effects of PFW (Section 5.8).

The discharge of sewage and food waste would create a localised, temporary increase in nutrient load in surface waters. This may attract fishes and seabirds, which in turn may attract predatory species. However, this behavioural impact will be localised and temporary as the discharges will be quickly consumed by scavenging fauna, broken down by microbial activity, and/or dispersed by waves and ocean currents. Therefore, any behavioural impacts are expected to be incidental.

Plankton

Injury/Mortality

Plankton are typically considered more vulnerable to the impacts of routine discharges compared to mobile species due to their inability to move away from the discharge plume. Planktonic species may experience toxicity effects from the chemical discharges associated with deck drainage.

However, as discussed above, routine discharges are anticipated to rapidly disperse and dilute into the surrounding water, and any impact is expected to occur within the immediate vicinity of the release. Given the biodegradability/low persistence of the wastes, and the minimal volumes involved, the impact on the surrounding water quality would be temporary and localised. As a result, it is not expected that plankton will be exposed to chemicals or hydrocarbons in quantities that would induce acute or chronic toxicity impacts.

Plankton are known to accumulate rapidly and are generally not found to be sensitive to the impacts of contaminants within the water column (Hook et al., 2016). Changes to water quality that may impact plankton will be localised to the discharge point with discharges subject to rapid dilution due to the open ocean environment in the Operational Area (i.e. water depth, strong ocean currents and metocean conditions). Therefore, routine discharges are not predicted to have ecologically significant effects on planktonic species.

5.16.4 Risk Ranking

Routine Facility, tanker, vessel and accomodation unit discharges are expected to result in highly localised and short-term changes to water quality. Due to the offshore oceanographic nature of the environment, the small volume, and low toxicity of the discharges, impacts to plankton present within the immediate vicinity of the discharge release are expected to be localised and not affect population functioning. Any behavioural impacts to marine fauna are expected to be incidental. Therefore:

- The consequence ranking of ‘1’ (Incidental) was assigned to water quality, and a likelihood of ‘E’ (Almost Certain) was considered appropriate, resulting in a risk ranking of ‘Medium’ (RRIII).
- The consequence ranking of ‘1’ (Incidental) was assigned to plankton and marine fauna, and a likelihood of ‘C’ (Possible) was considered appropriate, resulting in a risk ranking of ‘Low’ (RRIV).

5.16.5 ALARP Demonstration

Table 5-88 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with discharge of deck drainage, bilge water, sewage, greywater and putrescible waste. No additional controls were identified that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with discharge of deck drainage, bilge water, sewage, greywater and putrescible waste are assessed as low as reasonably practicable.

5.16.6 Acceptability Demonstration

Table 5-90: Acceptability demonstration - Discharge of deck drainage, bilge water, sewage, greywater and putrescible waste

ACCEPTABLE LEVEL OF RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant principles of ESD not compromised given proposed controls (Table 5-88).
External context – objections or claims considered	N/A – no external objections or claims received.
Internal context – VOGA HSE policy/procedure met	Yes – Risk managed in accordance with VOGA HSE policy.
Other requirements met	Yes – Marine Orders 91, 95 and 96. It is considered that the petroleum activity is consistent with the objectives and actions of the following EPBC management plans that identify marine pollution as a threat (Table 1-3): • Approved Conservation Advice for *Balaenoptera borealis* (Sei Whale) (TSSC, 2015c) • Conservation Advice for *Sousa sahulensis* (Australian humpback dolphin) (DCCEEW, 2025h) • Conservation Advice for *Orcaella heinsohni* (Australian snubfin dolphin) (DCCEEW, 2025d) • Approved Conservation Advice for *Balaenoptera physalus* (Fin Whale) (TSSC, 2015d) • National Recovery Plan for the Southern Right Whale (*Eubalaena australis*) (DCCEEW, 2024) • Conservation Management Plan for the Blue Whale, 2015-2025 (DoE, 2015).
RR < High (RRII)	Yes – Medium (RRIII).
EPO(s) manage impacts to acceptable levels	Yes – The following relevant EPOs will be maintained: • EPO-OP-06 See Section 7 for further details.
Acceptability summary: The impacts and potential risks of discharge of deck drainage, sewage, greywater and putrescible waste have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-88), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.7).	

5.17 Discharge of Desalination Brine

5.17.1 Hazard Report

Table 5-91: Hazard report – Discharge of desalination brine

HAZARD	Discharge of desalination brine
EP risk no.	EP-OP-R13
Activity cause	Production operations.
Potential impacts	Continual discharge but only localised, low magnitude effect (within 100 m).
Extent and duration	Change in water quality. Change in marine fauna behaviour. Injury/mortality to plankton.

PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Wastewater discharged from the reverse osmosis desalination plant.	No controls identified.	N/A	N/A	N/A	N/A	N/A
Discharge of back flush water from potable water system containing scale inhibitor.	Chemical assessment and selection process.	Administrative	Substitution	EPO-OP-06 No serious or irreversible change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	Chemicals that will be discharged to the marine environment are selected in accordance with VOGA's Chemical Assessment Process (Section 8.11).	Completed chemical assessments show chemicals discharged to the marine environment meet the criteria of VOGA's Chemical Assessment Process.

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
None identified.	N/A		N/A	N/A	N/A

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Incidental (1)	Almost Certain (E)	Medium risk
ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
Medium risk is defined as tolerable on demonstration of ALARP under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		

INITIAL RISK WITH EXISTING CONTROLS		
Additional management controls	**Assessment of option**	**Adopted/Not adopted**
Multi-Port Diffusers	Instead of a single "open pipe," platforms often use diffusers with multiple small nozzles. This increases the exit velocity and surface area of the brine, ensuring it mixes rapidly with the surrounding seawater. The primary receptors are planktonic communities. While saline-intolerant individuals within the immediate plume may be impacted, these populations are characterised by high turnover rates and rapid recruitment from the surrounding open-ocean environment. Given the high-energy metocean conditions (strong currents and deep water) at the facility location, rapid passive dilution already occurs. A multi-port diffuser would only marginally reduce a mixing zone that is already statistically insignificant relative to the open-ocean environment.	Not adopted
RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Incidental (1)	Almost Certain (E)	Medium risk

5.17.2 Description of Hazard

Desalination brine is discharged from the reverse osmosis desalination plant that produces potable water from seawater for use on WNB (approximately 500 m^3/day). The salinity of the discharged desalination brine is slightly higher than seawater and also contains small quantities of scale inhibitor. On average, seawater has a salt concentration of 35,000 ppm, while the desalination discharge has a salt concentration in the range of about 38,500 to 40,000 ppm.

Vessels and the MODU will also discharge much smaller volumes of desalination brine. The anticipated number of vessel movements is one per week. Tanker movements occur approximately 6-10 times per year, and offtake typically takes <72 hours. If an accommodation vessel or MODU is required during a project, it may be onsite for up to 7 weeks.

During some project activities (e.g. infrastructure replacement) the volume of vessels will increase to up to 4 vessels per day for up to 7 weeks. The maximum number of vessels that will be in the Operational Area concurrently is 4, potentially consisting of 2 tow tugs, a crew transfer vessel and a diving support vessel.

5.17.3 Impact and Risk Evaluation

Potential impacts from discharge of desalination brine include:

- Change in water quality
- Injury/mortality to marine fauna (plankton).

The following receptors within the Operational Area may be impacted by discharge of desalination brine:

- Water quality
- Plankton.

5.17.3.1 Impact Assessment

Water Quality

Change in Water Quality

Desalination brine is of greater density than seawater and will sink and disperse in the currents upon discharge. Therefore, the greatest increase of salinity in the receiving environment will be experienced within the immediate vicinity of the discharge point.

Near-field dilution is anticipated to occur rapidly, resulting in a return to ambient salinity levels within 10 m of the discharge (Raventos et al., 2006). This assumption is supported by additional studies which also found that elevated salinity declines rapidly close to the discharge, even where simple diffusers are utilised (Fernandez-Torquemada et al., 2005).

The concentration of scale inhibitor is not expected to contribute to potential environmental impacts as the concentrations are expected to be below the aquatic toxicity levels, similar use and concentration required for PWTS (refer to Table 5-60).

Therefore, any increase in salinity within the marine environment will be localised, and of a short duration, with high dispersion and dilution rates due to the open ocean environment in the Operational Area (i.e. water depth, strong ocean currents and metocean conditions) resulting in an incidental impact to water quality.

Plankton

Injury/Mortality

The discharge of desalination brine is predicted to impact planktonic populations sensitive to increased salinity levels. Whereas it is expected that other larger pelagic marine fauna species in the area would be able to tolerate short-term exposure to the slight increase in salinity caused by discharge of the brine. Most marine fauna are expected to be able to tolerate short-term fluctuations in salinity in the order of 20 to 30% (Walker & McComb, 1990).

The continuous discharge of desalination brine has the potential to impact planktonic populations through decrease in primary productivity, a loss in diversity, and a change in the community structure due to the dominance of saline-tolerant groups (Gomes et al., 2023). These impacts are considered incidental given plankton are known to accumulate rapidly and are generally not found to be sensitive to the impacts of contaminants within the water column (Hook et al., 2016). Changes to water quality that may impact plankton will be localised to the discharge point with discharges subject to rapid dilution due to the open ocean environment in the Operational Area (i.e. water depth, strong ocean currents and metocean conditions). Therefore, discharge of desalination brine is not predicted to have ecologically significant effects on planktonic species.

5.17.4 Risk Ranking

Routine desalination brine discharges are expected to result in highly localised and short-term changes to water quality. Due to the offshore oceanographic nature of the environment and low toxicity of the discharges, impacts to plankton present within the immediate vicinity of the discharge release are expected to be localised and not affect population functioning. Therefore:

- The consequence ranking of ‘1’ (Incidental) was assigned to water quality, and a likelihood of ‘E’ (Almost Certain) was considered appropriate, resulting in a risk ranking of ‘Medium’ (RRIII).
- The consequence ranking of ‘1’ (Incidental) was assigned to plankton, and a likelihood of ‘C’ (Possible) was considered appropriate, resulting in a risk ranking of ‘Low’ (RRIV).

5.17.5 ALARP Demonstration

Table 5-91 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with discharge of desalination brine. No additional controls were identified that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental

impacts associated with discharge of desalination brine are assessed as low as reasonably practicable.

5.17.6 Acceptability Demonstration

Table 5-92: Acceptability demonstration – Discharge of desalination brine

ACCEPTABLE LEVEL OF RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant principles of ESD not compromised given proposed controls (Table 5-91).
External context – objections or claims considered	N/A – no external objections or claims received.
Internal context – VOGA HSE policy/procedure met	Yes – Risk managed in accordance with VOGA HSE policy.
Other requirements met	Yes, it is considered that the petroleum activity is consistent with the objectives and actions of the following EPBC management plans that identify marine pollution as a threat (Table 1-3): • Approved Conservation Advice for *Balaenoptera borealis* (Sei Whale) (TSSC, 2015c) • Conservation Advice for *Sousa sahulensis* (Australian humpback dolphin) (DCCEEW, 2025h) • Conservation Advice for *Orcaella heinsohni* (Australian snubfin dolphin) (DCCEEW, 2025d) • Approved Conservation Advice for *Balaenoptera physalus* (Fin Whale) (TSSC, 2015d) • National Recovery Plan for the Southern Right Whale (*Eubalaena australis*) (DCCEEW, 2024) • Conservation Management Plan for the Blue Whale, 2015-2025 (DoE, 2015).
RR < High (RRII)	Yes – Medium (RRIII).
EPO(s) manage impacts to acceptable levels	Yes – The following relevant EPOs will be maintained: • EPO-OP-06 See Section 7 for further details.
Acceptability summary: The impacts and potential risks of discharge of desalination brine have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-91), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.7).	

5.18 Disturbance to Marine Fauna and Seabirds

5.18.1 Hazard Report

Table 5-93: Hazard report – Disturbance to marine fauna and seabirds

HAZARD	Disturbance to marine fauna and seabirds (from logistics activities)
EP risk no.	EP-OP-R16
Activity cause	Marine operations.
Potential impacts	Injury/mortality to marine fauna individuals.
Extent and duration	Localised and intermittent.

PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Presence of logistical equipment on unstaffed facilities.	Use of coverings on open top storage skips on WNA.	Engineering	Prevention	EPO-OP-12 No serious or irreversible harm to a Threatened or Migratory listed species.	Covers intact and fitted to all open top storage skips on WNA.	Guidelines for visiting WNA Checklist (WNA-014-103) records.
	Inspection for entrapped, injured and deceased birds on WNA.	Administrative	Prevention		Inspection for entrapped, injured and deceased birds on WNA undertaken.	Guidelines for visiting WNA Checklist (WNA-014-103) records.
Marine operations including diving, ROV, supply, bunkering and export activities.	Vessels contracted by VOGA operating in the Operational Area must adhere to Part 8 of EPBC Regulation 2000 to minimise exposure of marine fauna.	Administrative	Reduction	EPO-OP-12 No serious or irreversible harm to a Threatened or Migratory listed species.	Compliance with EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.05 and 8.06) which requires that: • A vessel will not travel greater than 6 knots within 300 m of a whale or turtle (caution zone) and not approach closer than 100 m from a whale. • A vessel will not approach closer than 50 m of a dolphin or turtle, or 100 m of a whale (with the exception of animals bow-riding). • A vessel will not approach closer than 300 m to a calf (whale or dolphin) (the caution zone) • If a calf appears in the caution zone the vessel must be immediately stopped and must: • turn off the vessel's engines, or disengage the gears, or withdraw the vessel from the caution zone at a constant speed of less than 6 knots.	Records demonstrate no breaches of EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans.
	Vessels contracted by VOGA operating in the Operational Area must adhere to separation distances defined by the Biodiversity Conservation Regulations 2018 (WA) to minimise exposure of marine fauna.	Administrative	Reduction		Compliance with Biodiversity Conservation Regulations 2018 (WA) which requires that: • A vessel will maintain a separation distance of 30 m from a whale shark.	Records demonstrate no breaches of the separation distances defined for whale sharks with the Biodiversity Conservation Regulations 2018 (WA).

PREVENTION						
	Speed limit for all vessels inside Wandoo restricted zone.	Administrative	Reduction		All vessels operating within the Wandoo 500 m Restricted Zone must comply with the speed limits specified in the Wandoo Marine Operations Manual [WNB-1000-YV-0001]. Vessel masters must ensure speeds are reduced to safe manoeuvring limits when approaching, operating within, or departing the Restricted Zone to minimise collision risk and maintain safe separation from the Facility.	Wandoo Marine Operations Checklist [WNB-1000-NV-0001] verifies that vessel masters have acknowledged and are complying with Restricted Zone speed limits.

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
None identified.	N/A	N/A	N/A	N/A	N/A

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Incidental (1)	Possible (C)	Low Risk

ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP

A low risk is defined as acceptable and typically do not require special attention outside of normal activities under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.

Additional management controls	Assessment of option	Adopted/Not adopted
Dedicated Marine Fauna Observer on vessels.	Improved ability to spot and identify marine fauna at risk of impact from vessels. However, the additional cost of contracting specialist Marine Fauna Observers is disproportionate to the environmental benefit given potential impacts are low and e the risk to EPBC Act listed marine fauna cannot be reduced further due to the unpredictable presence of some species. Bridge crew will also be keeping watch.	Not adopted
Eliminate use of support vessels.	Disturbances to marine fauna due to vessel activities are expected to be incidental as the number of vessel activities required are minimal. Elimination of support vessels from the field would not achieve VOGA legal requirements for petroleum production or its work-plan objectives for oil and gas production and may compromise safety standards for other marine users.	Not adopted
Environmental induction.	Reduces the risk of collision with megafauna by training key personnel (e.g. bridge crew) to understand and adhere to: • Part 8 of the EPBC Regulations • Separation distance defined for the whale shark within the Biodiversity Conservation Regulations 2018 (WA). • Cost considered proportionate to the environmental benefit.	Adopted (refer CM-12.6)
Bird Management Plan for Wandoo offshore facilities [VOG-1100-YH-0013] implemented.	Devices implemented in the Bird Management Plan reduce the risk to birds from helicopter strike. There are costs associated with procedure implementation, maintenance and management of devices and related reporting. The benefits of reducing bird strike and bird injury outweigh costs. Reducing bird presence on the Facility also reduces health and safety risks to personnel from hazardous helicopter landings, exposure to guano from direct contact or inhalation, or guano loading causing slips, trips and falls or deterioration of infrastructure.	Adopted (refer CM-12.7)
Marine fauna collisions reported to National Ship Strike Database.	Supports continuous improvement in marine fauna protection by contributing to national datasets used to identify collision trends, high-risk species, and operational factors associated with vessel strikes. Reporting also demonstrates alignment with best-practice marine stewardship and regulatory expectations for adaptive management.	Adopted (refer CM-12.8)

INITIAL RISK WITH EXISTING CONTROLS		
RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Incidental (1)	Possible (C)	Low Risk

5.18.2 Description of Hazard

Disturbance to marine fauna and seabirds may occur as a result of activities associated with facility operations. Vessel movement and helicopter operations have the potential to cause interference or collision with marine fauna.

The presence of open top storage skips on the unstaffed WNA also has the potential to entrap birds.

5.18.2.1 Vessel Collision

A collision between a vessel or tanker (hull and propellers) and marine fauna may result in injury or mortality.

Factors that contribute to the frequency and severity of impacts from vessel interaction with marine fauna vary and depend on the vessel type, operation (e.g. specific activity and speed), physical environment (e.g. water depth), the type of animal potentially present and their behaviours.

The anticipated number of vessel movements is one per week. Tanker movements occur approximately 6-10 times per year, and offtake typically takes <572 hours. If an accommodation vessel or MODU is required during a project, it may be onsite for up to 7 weeks.

During some project activities (e.g. infrastructure replacement) the volume of vessels will increase to up to 4 vessels per day for up to 7 weeks. The maximum number of vessels that will be in the Operational Area concurrently is 4, potentially consisting of 2 tow tugs, a crew transfer vessel and a diving support vessel.

Vessels in the Operational Area either stationary or moving at slow speeds (i.e. maximum of 3 knots). Therefore, the presence of 4 vessels has been used for the purpose of assessing the risk of vessel collision with marine fauna. Vessels within the Operational Area adhere to a 3 knot speed limit.

5.18.2.2 Bird Strike/Entrapment

Transient seabirds and migratory shorebirds may opportunistically rest on the WNA or WNB as they pass through the Operational Area during project activities, increasing the risk of bird strike with helicopters.

The potential for interaction is greatest as helicopters approach the facilities causing birds to take flight. This can lead to pilot distraction and introduces the potential for bird strike. Factors that contribute to the frequency and severity of impacts from bird interactions vary and depend on bird species seasonal conditions, and weather events (e.g., winter storms). The approach speed of the helicopter, landing sequence and the level of bird activity on the facilities also influence risk.

Five-year data for helicopter movements to and from the Wandoo Facility shows an average of 7 flights per week.

The presence of open top storage skips on the unstaffed WNA has the potential to entrap birds.

5.18.3 Impact and Risk Evaluation

Potential risks caused by the physical presence of vessels and helicopters include:

- Injury/mortality to marine fauna.

The following receptors within the Operational Area may be impacted by the physical presence of vessels and helicopters:

- Fish, sharks and rays
- Marine reptiles
- Marine mammals
- Seabirds and shorebirds.

5.18.3.1 Risk Assessment

Slow-moving marine fauna present in surface waters, such as marine turtles, whale sharks, dugongs, and cetaceans, are most at risk to vessel strike due to their proximity to the vessel (hull, propeller or equipment) and their limited ability to avoid vessels (i.e. diving). Vessel collision can cause serious injury and/or mortality to individuals.

The National Strategy for Reducing Vessel Strike of Marine Megafauna identifies cetaceans and marine turtles to be the most vulnerable to vessel strikes (CoA, 2017a). Other marine fauna species, including seabirds, marine mammals (dolphins and seals) and fish species (including sharks and rays), are likely to avoid any moving vessels and are considered at low risk of potential vessel strike.

Birds roosting on the Wandoo Facility are most at risk of interaction with helicopter operations due to their proximity to landing areas and potential to take flight during approach. The risk of bird collision during helicopter operations is an ongoing concern for the safety of flights to and from the Wandoo Facility.

Fish, Sharks and Rays

Large, slow moving fish species that are known to spend time close to the surface (i.e. Whale Sharks) have been identified to be more vulnerable to vessel strike or collision. Smaller fish may also be at risk of injury or mortality from vessels if they are caught in vessel thrusters during station keeping operations (i.e. DP). However, this is unlikely given the large distribution and low density of small fish species, combined with the avoidance behaviour that is commonly displayed by pelagic fish from noise emitted during station keeping operations (Section 5.12.4).

Vessel strike is recognised as a key threat to recovery by the Approved Conservation Advice for Whale Sharks (TSSC, 2015b). A foraging BIA (northward from Ningaloo along the 200 m isobath) for whale sharks overlaps the Operational Area (Figure 3-16). Therefore, whale sharks will likely be present within the Operational Area as they are known to aggregate around Ningaloo between March and July each year to feed (TSSC, 2015b). Whale sharks reportedly spend 40% of their time in the upper 15 m of the water column and approximately 25% of their time within 2 m of the sea surface increasing their vulnerability to vessel strike (Wilson et al. 2006, Gleiss et al. 2013). Collision has been identified to be plausible with both smaller vessels as well as larger commercial vessels that have drafts greater than 20 m below the surface.

Vessels contracted by VOGA for the project activities will be required to maintain safe distances from any whale sharks sighted while in the Operational Area, as defined by the Biodiversity Conservation Regulations 2018 (WA) to minimise exposure (Table 5-93). Given vessel activity is limited to within the Operational Area and vessels will be operating at slow speeds, collisions with individual whale sharks is considered highly unlikely.

Marine Mammals

Cetaceans are naturally inquisitive and are often attracted to transiting vessels, with dolphins commonly known to 'bow ride' with vessels. The reaction of whales to an approaching vessel varies, with behaviours of Humpback Whales and other cetaceans observed to include longer dive times and movements away from the vessels path with increased speed (Baker and Herman, 1989; Meike et al., 2004). Data compiled from the International Whaling Commission (IWC) global database for vessel strike incidents in Australian waters between 1997 and 2015 indicate that marine mammals, particularly humpback whales, account for the highest frequency of recorded collisions (Peel et al., 2016).

Cetaceans typically spend more time at the surface when resting, foraging, nursing or mating (CoA, 2017a). Individuals engaged in these biologically important activities are often distracted, making them less likely to detect an approaching vessel and therefore more susceptible to collisions (Laist et al., 2001). When vessels are stationary or moving slowly, the risk of collision with cetaceans is minimal. According to Laist et al. (2001), larger vessels travelling at speeds greater than 10 knots can inflict severe or fatal injuries on cetaceans, with the most serious injuries occurring at speeds exceeding 14 knots.

Whilst several species of marine mammals may transit through the Operational Area during project activities, there are no known key aggregation areas for resting, breeding or foraging that intersect with the Operational Area. However, a migration BIA for the humpback whale overlaps with the Operational Area with key migration seasons identified along the WA coast between May and late November (Section 3.4.3.5). The Listing Advice for the Humpback Whale (TSSC, 2022) details that the species is no longer listed as vulnerable and identifies vessel strike as a current risk that does not threaten or prevent population growth. Activities associated with facility operations may occur during the humpback whale migration, however the potential for interaction is considered unlikely with the Operational Area representing 0.002% of the BIA and the slow speeds of the vessels within the Operational Area.

Marine Reptiles

Marine turtles transiting through the Operational Area are at risk from vessel strike during the time when they periodically return to the surface to breath and rest. Marine turtles spend as little as 3 – 6% of their time at the surface with routine dive times lasting anywhere from 15 minutes to an hour depending on environmental conditions (NOAA, 2021). The Recovery Plan for Marine Turtles in Australia (CoA, 2017) identifies vessel strike as a threat to marine turtles, particularly in shallow coastal foraging habitats and internesting areas, with a high concentration of recreational and commercial vessels.

Several marine turtle species have been identified to be present within the Operational Area, only one species has an identified BIA (Table 3-7). An internesting buffer BIA for the flatback turtle overlaps with the Operational Area and is defined by a 60 km buffer established seawards from known nesting sites such as those in the Dampier Archipelago (~39 km from the Operational Area)

(Figure 3-22). This buffer is identified as internesting habitat and is critical to the species during nesting activities which occur between October and March each year (CoA, 2017).

A modelling study of internesting flatback turtles in the NWS was undertaken to identify suitable habitat within the region. The study found that turtles preferred water depths of 0–16 m within 5–10 km of the coastline, with all 47 tracked female turtles remaining in depths <44 m, with an average depth of <10 m (Whittock et al., 2016). The study further concluded that waters >25 m deep and >27 km from the coast were unsuitable (Whittock et al., 2016). The Operational Area is ~39 km from the nearest shoreline with water depths of ~55 m. Therefore, it is expected that any presence of marine turtles would be limited to transient individuals and that responses to vessel presence would result in avoidance behaviour.

Seabirds and Shorebirds

The Wildlife Conservation Plan for Seabirds recognises that seabirds are known to aggregate around oil and gas platforms in above average numbers due to night lighting, flaring, food concentrations and other visual cues (Wiese et al. 2001). As a result, there is potential for helicopter blades to strike seabirds, particularly during take-off and landing when the helicopters are in close proximity to vessels/platform where birds may be present. Birds may also become entrapped in open top storage skips, particularly on WNA as it is not normally staffed.

There are 17 EPBC-listed bird species that may occur within the Operational Area, of which only one has a breeding BIA overlapping the Operational Area: Wedge-tailed Shearwater (Table 3-7; Figure 3-14). The probability of a strike is related to the abundances of different bird species on or near the infrastructure. Wandoo B generally experiences minimal bird roosting due to continuous manning, whereas occasional bird activity has been observed on the WNA.

The Operational Area does not overlap with any foraging BIAs for bird species or contain roosting or nesting habitat, which reduces the likelihood of large numbers of birds or individuals at vulnerable life stages being present. This significantly lowers the potential for bird strike or entrapment events. Any birds occurring within the Operational Area are expected to be foraging opportunistically, rafting, or transiting through the area.

While helicopter movements present a potential risk for bird strike, the Wildlife Conservation Plan for Seabirds and the Wildlife Conservation Plan for Migratory Shorebirds does not identify aircraft collisions as a specific threat to any species (CoA, 2020; DoE, 2015b). Routine helicopter operations will occur during daylight hours and outside major roosting and foraging areas, minimising potential for interaction. To ensure safe helicopter operations for personnel and further reduce the likelihood of bird injury, VOGA developed a Bird Management Plan (VOG-1100-YH-0013). Bird deterrent devices are used to encourage birds to leave the platform before helicopter arrivals and departures. The BMP identifies current and proposed deterrents that will be utilised in different periods to prevent habituation.

The presence of open-top skips on the Wandoo Facility introduces a risk of bird entrapment. However, with the implementation of controls, this risk is considered low.

5.18.4 Risk Ranking

Vessel movements and helicopter operations will occur within the Operational Area, creating a potential risk of interaction with marine fauna resulting in injury or mortality. However, the

number of receptors present in the Operational Area is expected to be limited to a small number of transient individuals.

BIAs for the whale shark (foraging) and humpback whale (migration) were identified within the Operational Area; however, the Operational Area overlaps a small portion of the BIAs for these species. Vessels will transit very slowly (up to 3 knots) within the Operational Area, posing a low risk of collision with marine fauna. Therefore:

- The consequence ranking of '1' (Incidental) was assigned to marine fauna and seabirds, with a likelihood of 'C' (Possible), resulting in a risk ranking of 'Low' (RRIV).

5.18.5 ALARP Demonstration

Table 5-93 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with disturbance to marine fauna and seabirds.

Three additional controls were identified and adopted that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with disturbance to marine fauna and seabirds are assessed as low as reasonably practicable.

5.18.6 Acceptability Demonstration

Table 5-94: Acceptability demonstration – Disturbance to marine fauna and seabirds

ACCEPTABLE LEVEL OF IMPACT/RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant Principles of ESD not compromised given proposed controls (Table 5-93).
External context – objections or claims considered	N/A – No external objections or claims received.
Internal context – VOGA HSE policy/procedure met	Yes – Risk managed in accordance with VOGA HSE policy.
Other requirements met	Yes – including: • Compliance with Part 8 of the EPBC Regulation 2000. • Compliance with separation distances defined for whale sharks within the Biodiversity Conservation Regulations 2018 (WA). It is considered that the petroleum activity is consistent with the objectives and actions of the following EPBC management plans that identify vessel strike as a threat (Table 1-3): • Approved Conservation Advice for Rhincodon typus (whale shark) (TSSC, 2015b) • Conservation Advice *Phaethon lepturus fulvus* white-tailed tropicbird (Christmas Island) (DoE, 2014). • Approved Conservation Advice for *Balaenoptera borealis* (Sei Whale) (TSSC, 2015c)

	• Approved Conservation Advice for *Balaenoptera physalus* (Fin Whale) (TSSC, 2015d) • Conservation Management Plan for the Blue Whale, 2015-2025 (DoE, 2015a) • Conservation Advice for *Orcaella heinsohni* (Australian snubfin dolphin) (DCCEEW, 2025d) • Conservation Advice for *Sousa sahulensis* (Australian humpback dolphin) (DCCEEW, 2025e) • Approved Conservation Advice for *Megaptera novaeangliae* (Humpback Whale) (TSSC, 2015e) • National Recovery Plan for the Southern Right Whale (DCCEEW, 2024l) • Recovery Plan for Marine Turtles in Australia, 2017-2027 (CoA, 2017) • Approved Conservation Advice for *Dermochelys coriacea* (Leatherback Turtle) (DEWHA, 2008a) • Wildlife Conservation Plan for Migratory Shorebirds – 2015 (DoE, 2015b) • Wildlife Conservation Plan for Seabirds (CoA, 2020).
RR < High (RRII)	Yes – Low (RRIV)
EPO(s) manage impacts to acceptable levels	Yes – the following relevant EPOs will be maintained: • EPO-OP-12 See Section 7 for further details.
Acceptability summary: The potential risks of the disturbance of marine fauna and seabirds have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-93), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.7).	

5.19 Ancillary Hydrocarbon or Chemical Spills

5.19.1 Hazard Report

Table 5-95: Hazard report – Ancillary hydrocarbon or chemical spills

HAZARD	Ancillary hydrocarbon or chemical spills
EP risk no.	EP-OP-R18
Activity cause	Damage during handling or storage of chemicals and hydrocarbons. Deck spills from mechanical failure or inboard leaks. Bulk storage transfer failure.
Potential impacts	Hydrocarbon or chemical loss up to 6 m^3 to sea: • A change in water quality • Injury/mortality to marine fauna.
Extent and duration	Water-quality impacts are confined to the immediate near-field around the release point due to rapid dilution, degradation and dispersion. Impacts are temporary, non-persistent and recover within a short timeframe.

PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Hydrocarbon (including diesel and lube oil) or chemical spill due to materials handling and storage.	Intermediate Bulk Containers (IBCs) are transferred to/from vessels using a chemical cradle or are containerised.	Engineering	Prevention	EPO-OP-01 No unplanned discharge of hydrocarbons or chemicals to the marine environment.	IBCs shall be transferred to/from vessels using a lifting cradle or will be containerised.	VOGA inspection or audit confirms compliance with contractor Lifting Procedure.
	Cranes and lifting equipment are certified.	Engineering	Prevention		Cranes and lifting equipment shall be certified.	IBCs, cranes and lifting equipment certification records.
	All bulk chemicals are stored in bunded areas.	Engineering	Prevention		Bunds show no visible sign of damage or deterioration that would impair their ability to contain spills.	Visual inspection during operator walk-around.
	The operation and decanting of Intermediate Bulk Containers (IBCs) conducted in accordance with WNB-025-001 *Operation of Intermediate Bulk Containers (IBCs)*.				The operation and decanting of Intermediate Bulk Containers (IBCs) must be conducted in a manner that prevents chemical spills, uncontrolled releases, or exposure to the environment.	IBCs inspected for damage prior to use, and any defective units taken out of service. All chemical transfer operations attended at all times, with day-tank levels confirmed before decanting to prevent overfill. Spills during IBC operation or decanting immediately contained, isolated from drains, and cleaned using appropriate absorbent materials, with all spills reported to the control room. Cam-lock connections properly secured and discharge valves confirmed closed before hose removal or connection.

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Vessels will implement a SOPEP/SMPEP (equivalent to class) in the event of a spill.	Administrative	Mitigation	EPO-OP-01 No unplanned discharge of hydrocarbons or chemicals to the marine environment. EPO-OP-02 In the event of loss of hydrocarbons, implement NOPSEMA-accepted spill response documents.	SOPEP/SMPEP (equivalent to class) procedures shall be available during activities.	VOGA inspection or audit confirms SOPEP/SMPEP (equivalent to class) procedures are available on the vessels during activities.
The NOPSEMA-accepted Wandoo Field OSCP [WAN-2000-RD-0001] will be implemented.	Administrative	Mitigation	EPO-OP-02 In the event of loss of hydrocarbons, implement NOPSEMA-accepted spill response documents.	Oil spill response strategies shall be implemented in accordance with the Wandoo Field OSCP [WAN-2000-RD-0001].	IAP records.
Hydrocarbon and chemical spill containment and clean-up material.	Administrative	Mitigation	EPO-OP-01 No unplanned discharge of hydrocarbons or chemicals to the marine environment.	Spill kit contents are inspected and restocked after use. Spill kits located near high risk areas for prompt spill response. Chemical and hydrocarbon spills will be immediately cleaned up.	Visual inspection during operator walk-around. Incident reports indicate spills are cleaned up immediately.

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Incidental (1)	Possible (C)	Low risk
ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
A low risk is defined as acceptable and typically do not require special attention outside of normal activities under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		
Additional management controls	**Assessment of option**	**Adopted/Not adopted**
Increased bunding and drainage on WNA.	Not feasible due to the requirement for rainwater drainage; and the fact that chemicals need to be portable, therefore higher bund walls prevent connection and access to chemical outlets and manifold.	Not adopted
Vessel firefighting system (portable or in built), to be consistent with IMO SOLAS Chapter 11-2, Part C, Regulation 10 amendments related to the use and storage of firefighting foams containing perfluoroctane sulfonic acid (PFOS), as outlined in MSC.532(107), including: • For vessels constructed on or after 1 January 2026, no use or storage of extinguishing media containing PFOS. • For vessels constructed before 1 January 2026, no use or storage of extinguishing media containing PFOS, beyond the date of first survey on or after 1 January 2026.	Consistency with IMO SOLAS Chapter 11-2, Part C, Regulation 10 amendments, as outlined in MSC.532(107) may reduce the presence of PFOS-containing firefighting foams on vessels and the MODU. While not yet incorporated into ratified in relevant Australian domestic Legislation (Marine Order 15), implementing contemporary IMO requirements for the use and storage of fire extinguishing media is consistent with international best practice. Benefit outweighs cost/sacrifice.	Adopted

INITIAL RISK WITH EXISTING CONTROLS		
RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Incidental (1)	Possible (C)	Low risk

5.19.2 Description of Hazard

VOGA has assessed that the accidental release of ancillary hydrocarbons and chemicals could occur as a result of the following scenarios:

- Damage during handling or storage of chemicals and hydrocarbons
- Decks spills from mechanical failure or inboard leaks
- Bulk storage transfer failure.

The Wandoo Facilities, MODU and vessels will carry various fluids, such as maintenance chemicals and lubricating oils, which are stored in purpose-designed containers. Materials handling and storage damage to containers could result in a spill to the marine environment. Any spills are likely to be small in nature with the largest credible event being 1,450 L chemical and 205 L diesel, which are the entire volume of the largest storage drum for each product.

Minor spills may also occur from onboard leaks which could be generated from any of the wide range of equipment on the Wandoo Facilities, MODU and vessels. The leaks may come from a failure of a mechanical component, fitting or hose. Waste lube oil from mud pumps, compressors, equipment crankcases and drip pans drain into the dirty-oil holding tank. Leaks from inboard fittings and connections would be contained within bunded areas, which drain to a sump through the closed drain system. Any spill to deck will be cleaned up using absorbents. Therefore, spills into the marine environment are considered highly unlikely.

Bulk chemicals products will be transferred to/from the Wandoo Facilities, MODU and vessels via cranes, lifting cradles or dedicated containers. A lifting equipment incident or loss of station by a vessel may result in a release of bulk chemical products. Bulk products are transferred using double containerised packaging and stored in bunded areas. A lifting equipment incident is highly unlikely due to crane and lifting equipment certification and maintenance requirements and lifting procedures. The largest credible spill event that could occur during bulk transfer is up to 6 m^3, which is the entire volume of an IBC.

5.19.3 Impact and Risk Evaluation

The accidental release of an accidental spill of ancillary hydrocarbons or chemicals may result in:

- A change in water quality.

The potential risks from a change in water quality caused by an accidental release of ancillary hydrocarbons or chemicals include:

- Injury/mortality to marine fauna.

The following receptors within the Operational Area may be impacted by an accidental spill of ancillary hydrocarbons or chemicals:

- Water quality
- Marine fauna.

5.19.3.1 Risk Assessment

Water Quality

Change in Water Quality

The accidental release of ancillary hydrocarbons or chemicals and hydrocarbons into the marine environment has the potential to cause a localised reduction of the water quality in the receiving marine environment. A visible oil sheen on the water surface may also occur in the event of minor hydrocarbon spills. However, the hydrocarbons that have the potential to release, such as hydraulic fluids, are medium oils of light to moderate viscosity that spread rapidly on the water surface. Therefore, hydraulic fluid would be expected to evaporate rapidly after being released due to natural weathering processes, with minimal residual components remaining given the volatile nature of the fluids. The chemical products would be subjected to rapid dispersion and dilution by the open ocean conditions. Any change in the water quality following a minor spill is anticipated to be highly localised, within the immediate vicinity of the release and result in short-term impacts which rapidly recovers.

All chemicals will be selected in accordance with VOGA's Chemical Assessment and Selection Process, as described in Section 8.11.

See Section 5.5 for the impact assessment of a worst-case loss of containment of MDO.

Marine Fauna

Injury/Mortality to Marine Fauna

As a result of a change in water quality from an unplanned spill of ancillary hydrocarbons or chemicals, further impacts to receptors may occur, which include potential injury or mortality from toxicity exposure to sensitive marine fauna, such as surfacing plankton. Given that surface discharges are rapidly dispersed, and any subsea discharges (i.e., from ROVs) would be of small volumes, potential impacts would be highly localised and temporary. Therefore, the potential for toxicity to marine fauna will be rare as the temporary exposure will preclude toxic effects.

See Section 5.5 for the impact assessment of a worst-case loss of containment of MDO.

5.19.4 Risk Ranking

A minor spill of ancillary hydrocarbons or chemicals is expected to result in highly localised and temporary change to water quality within the immediate vicinity of the release. Due to the offshore oceanographic nature of the environment, the minimal volume, and low toxicity of the spill, impacts to water quality and to marine fauna are expected to be localised and short-term. Therefore,

- The consequence ranking of '1' (Incidental) was assigned to water quality, and a likelihood of 'C' (Possible) was considered appropriate, resulting in a risk ranking of 'Low' (RRIV).
- The consequence ranking of '1' (Incidental) was assigned to marine fauna and a likelihood of 'B' (Unlikely) was considered appropriate, resulting in a risk ranking of 'Low' (RRIV).

5.19.5 ALARP Demonstration

Table 5-95 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with ancillary hydrocarbon or chemical spills.

One additional control was identified and adopted that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with ancillary hydrocarbon or chemical spills are assessed as low as reasonably practicable.

5.19.6 Acceptability Demonstration

Table 5-96: Acceptability demonstration – Ancillary hydrocarbon and chemical spills

ACCEPTABLE LEVEL OF IMPACT/RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant principles of ESD not compromised given proposed controls.
External context – objections or claims considered	N/A – no external objections or claims received.
Internal context – VOGA HSE policy/procedure met	Yes – Risk managed in accordance with VOGA HSE policy. Potential spills to be managed in accordance with the Wandoo Field Oil Spill Contingency Plan (OSCP) [WAN-2000-RD-0001].
Other requirements met	Yes – Notice to Mariners issued via AMSA in a timely manner. • Potential spills to be managed in accordance with SOPEP/SMPEP (equivalent to class) It is considered that the petroleum activity is consistent with the objectives and actions of the following EPBC management plans that identify marine pollution as a threat (Table 1-3): • National recovery plan for the red goshawk *Erythrotriorchis radiatus* (DCCEEW, 2012) • National Recovery Plan for the Australian Fairy Tern (*Sternula nereis nereis*) (DAWE, 2020a) • Approved Conservation Advice for *Sternula nereis nereis* (Fairy Tern) (TSSC, 2011) • Approved Conservation Advice for *Calidris canutus* (Red Knot) (DCCEEW, 2024k) • Approved Conservation Advice for *Calidris frruginea* (Curlew sandpiper) (DCCEEW, 2023a) • Approved Conservation Advice for *Papasula abbotti* (Abbott's booby) (TSSC, 2020a) • Conservation Advice for *Calidris acuminata* (sharp-tailed sandpiper) (DCCEEW, 2024o) • Conservation Advice for *Charadrius leschenaultii* (greater sand plover) (DCCEEW, 2023e)

ACCEPTABLE LEVEL OF IMPACT/RISK DEMONSTRATED	
	• Conservation Advice for *Limnodromus semipalmatus* (Asian dowitcher) (DCCEEW, 2024m) • Conservation Advice for *Numenius madagascariensis* (far eastern curlew) (DCCEEW, 2023g) • Conservation Advice *Phaethon lepturus fulvus* white-tailed tropicbird (Christmas Island) (DoE, 2014) • Conservation Advice for *Tringa nebularia* (common greenshank) (DCCEEW, 2024p) • Wildlife Conservation Plan for Migratory Shorebirds – 2015 (DoE, 2015b) • Approved Conservation Advice for *Pristis zijsron* (green sawfish) (DEWHA, 2008b) • Approved Conservation Advice for *Pristis clavata* (dwarf sawfish) (DEWHA, 2009) • Sawfish and River Sharks Multispecies Recovery Plan: (*Pristis pristis, Pristis zijsron, Pristis clavata, Glyphis glyphis* and *Glyphis garricki*) (DoE, 2015c).
RR < High (RRII)	Yes – Low (RRIV).
EPO(s) manage impacts to acceptable levels	Yes – The following relevant EPOs will be maintained: • EPO-OP-01 • EPO-OP-02 See Section 7 for further details.
Acceptability summary: The impacts and potential risks of an accidental release of ancillary hydrocarbons or chemicals have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-95), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.7).	

5.20 Physical Presence - Interaction with Other Marine Users

5.20.1 Hazard Report

Table 5-97: Hazard report – Physical presence – Interaction with other marine users

HAZARD	Physical presence - Interaction with other marine users
EP risk no.	EP-OP-R19
Activity cause	Physical presence of infrastructure and marine operations.
Potential impacts	Interaction with commercial and recreational fishing and shipping.
Extent and duration	Within the Operational Area.

PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Presence of hydrocarbon production subsea and surface infrastructure consisting of subsea flowlines/ risers/conductors, CGS and export system including CALM Buoy, mooring system, floating hose and unutilised subsea asset (Wandoo-1). Presence of support vessels.	Functional communication equipment on board vessels and facilities to communicate with commercial and recreational shipping vessels in the vicinity of the activities.	Engineering	Reduction	EPO-OP-13 No interference with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted.	Communication equipment on board vessels, shall be functional and maintained in accordance with the contractor's Preventative Maintenance System (PMS).	VOGA inspection or audit confirms application of contractor's PMS. Communication equipment on board vessels are included in the contractor's PMS.
	Consultation/notification with relevant stakeholders including AusCoast/AMSA notification as required.	Administrative	Reduction		Records of communication with stakeholders will be stored.	Records of communication with stakeholders.
					Facility to be operated in strict adherence with any agreements with stakeholders.	Register of stakeholder assessment.
	Vessels to adhere to the navigation safety requirements including the *Navigation Act 2012* and any subsequent Marine Orders.	Administrative	Reduction		Vessels compliant with *Navigation Act 2012* and Marine Order 21 (Safety of navigation and emergency procedures) and Marine Order 30 (Prevention of collisions).	Marine assurance inspection records demonstrate compliance with standard maritime safety procedures.
Presence of topside hydrocarbon production facilities.	500 m PSZ surrounding the facility.	Administrative	Reduction		500 m PSZ surrounding the facility, as per the Wandoo Marine Operations Manual [WNB-1000-YV-0001].	Wandoo Marine Operations Checklist [WNB-1000-NV-0001]. Notice to Mariners placed with AHO outlining PSZ and time frames of the major projects.
Temporary presence of subsea equipment associated with project, campaigns, surveys, etc.	Functional communication equipment on board vessels and facilities to communicate with commercial and recreational shipping vessels in the vicinity of the activities.	Engineering	Reduction		Communication equipment on board vessels, shall be functional and maintained in accordance with the contractor's Preventative Maintenance System (PMS).	VOGA inspection or audit confirms application of contractor's PMS. Communication equipment on board vessels are included in the contractor's PMS.
	Consultation/notification with relevant stakeholders including AusCoast/AMSA notification as required.	Administrative	Reduction		Relevant stakeholders to be identified and notified as appropriate prior to performing temporary subsea storage.	Register of stakeholder assessment.

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
None identified.	N/A	N/A	N/A	N/A	N/A

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Incidental (1)	Unlikely (B)	Low risk

ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
A low risk is defined as acceptable and typically do not require special attention outside of normal activities under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		
Additional management controls	**Assessment of option**	**Adopted/not adopted**
Permanently abandon un-used Wandoo-1 and retrieve wellhead within validity of this EP.	VOGA intend to permanently abandon Wandoo-1 and retrieve the wellhead at or below the mudline; however instead of doing this in an individual campaign, VOGA propose to conduct within the same decommissioning campaign for the rest of the Wandoo facilities following CoP from the Wandoo Field. There are operational challenges and risks associated with conducting abandonment prior to end of field life of WNA and WNA-WNB flowlines. VOGA is of the position that it is a lower risk to abandon Wandoo-1 at the same time as WNA and flowlines due to: • SIMOPS - positioning the MODU at Wandoo-1 would be challenging due to the proximity of infrastructure in place and field congestion limiting rig and associated vessel manoeuvrability. • Close proximity of jack-up MODU, support vessels and the WNA monopod • Lifts over intrafield production flowlines. The cost and timing associated with an abandonment make the investment required to remove the well earlier disproportional to the impact reduction. The budgetary estimate to P&A Wandoo-1 is 14.1 days, assuming a spread rate of approximately $750 k/day equating to a total budget of $10.6 million (excluding rig move costs, production downtime and project cost contingencies). Due to the multiple well barriers in place and the sub-hydrostatic pressure within the Wandoo reservoir, the inherent hydrostatic of the sea water column and column of fluids within the well ensure that a permanent overbalance is in place at reservoir level at all times. i.e. there is no credible risk of LOWC. The wellhead protrudes approximately 3 m above the seabed, and given its location inside the long-term PSZ, will not have any additional impact to other marine users. Over the 5-year period of this EP, the steel wellhead would degrade a negligible amount, and is not expected to have any impact on water or sediment quality due to the short timeframe. Given the well status, low impact to environment and operational risks, the cost and risks associated is disproportional to the benefit of removing the well earlier than it would be removed at EOFL. Based on this conclusion, the risk from physical presence and leaving well in place until end of field life is considered acceptable and ALARP.	Not adopted.

RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Incidental (1)	Unlikely (B)	Low risk

5.20.2 Description of Hazard

All aspects of the Wandoo facilities including subsea and surface facilities at WNA, WNB, Wandoo-1 well and the CALM Buoy and offloading system, are present throughout operations. The Wandoo B platform and CGS have been in place since 1997. The CALM Buoy infrastructure will be replaced as part of a maintenance project during the validity period of this EP, however the dimensions of the new infrastructure are the same as the current (described in Section 2.4).

This hazard also includes the physical presence of vessels, tankers, ROVs and divers associated with Wandoo operations when inside the Operational Area.

Infield vessel movements are estimated to be one per week. Tanker movements occur approximately 6-10 times per year, and offtake typically takes <48 hours. If an accommodation vessel or MODU is required during a project, it may be onsite for up to 7 weeks.

During some project activities (e.g. infrastructure replacement) the number of support vessels will increase to up to 4 vessels per day for up to 7 weeks. The maximum number of vessels that will be in the Operational Area concurrently is 4, potentially consisting of 2 tow tugs, a crew transfer vessel and a diving support vessel (Section 2.6.2).

All activities will occur within the PSZ which is a 500 m radius around the existing infrastructure. The PSZ will be in place for the in-force period of the EP and excludes unauthorised vessels.

The unutilised asset Wandoo-1 wellhead is not proposed to be permanently decommissioned within the validity period of this EP, and will be decommissioned at the end of project life, with the rest of the Wandoo subsea and topsides equipment.

5.20.3 Impact and Risk Evaluation

Potential impacts to other marine users and associated values from Wandoo Facility activities include:

- Potential changes to their functions, interests and activities.

The following receptors within the Operational Area may be impacted by the physical presence of infrastructure and vessels:

- Commercial fisheries and recreational fishing
- Shipping.

5.20.3.1 Impact Assessment

Commercial Fishing and Recreational Fishing

Changes to the Functions, Interests and Activities

The presence of the Wandoo subsea and topsides facilities and associated PSZ prevent commercial and recreational fishers from accessing the immediate area. No fishing is permitted in the PSZ/restricted zone. Operations at Wandoo have been ongoing since the 1990s, therefore no commercial fishers will have operated in that location since that time.

Vessel contractors will issue a Notice to Mariners to AMSA prior to moving into the Operational Area. Access to AMSA's website and their Maritime Safety Information updates allows members of the Western Australian Fishing Industry Council (WAFIC) and other commercial vessels to be made aware of the presence of vessels within the Operational Area. Consultation has been conducted with WAFIC through the years of operation at Wandoo and will be ongoing for future campaigns (Section 9).

As described in Section 3.5.1, two WA-managed fisheries with catch-effort were recorded within 10 nm reporting CAES blocks that overlap the Operational Area, the Pilbara Fish Trawl and WA Tour Operator (Figure 3-38 and Figure 3-45). The Operational Area intersects the Pilbara Fish Trawl fishery, which is managed through designated areas (or zones) restricting the catch method allowed within that area. The Operational Area overlaps the Trap Fishing only area, and Area 1 (trawl and trap fishing allowed). The assessment of 10-year fishing effort indicated a maximum number of four vessels were active within the entire fishery. If trawl vessels encounter activity vessels, they may be required to deviate slightly from trawl lines. The likelihood of this would be reduced through on-water communications and consultation, and limited to only the small portion of the fishery management area that overlaps the Operational Area, which is located within the PSZ.

Less than three fishing tour operator licence holders recorded effort in the 10 nm CAES blocks overlapping the Operational Area. The Dampier Archipelago (approximately 45 km southeast of the Operational Area) and the Glomar Shoals (approximately 44 km northeast of the Operational Area) are the closest features where many tour-operators are most likely to access. As noted in Section 3.5.1, DPIRD's FishCube fishing effort data between 2018–2023 notes that there were active fishing Tour Operators in the block intersecting the Operational Area, which correlates with the Wandoo platform being listed as a recreational fishing site by DPIRD (2023b) (Section 3.5.4.1) and correspondence from RecfishWest (Sensitive Information Report). The area is used for deepwater fishing by fishing charters and large private fishing boats. However, no unauthorised vessels are permitted within the 500 m PSZ, therefore no displacement from fishing areas is expected. Short-term and temporary impacts may be expected to recreational fishing during projects where there is an increase in the volume of vessels or the MODU is present.

Fisheries with recorded catch within the Operational Area at the 60 nm reporting blocks include the:

- Mackerel Managed Fishery
- Marine Aquarium Managed Fishery
- Nickol Bay Prawn Managed Fishery
- Onslow Prawn Managed Fishery
- Pilbara Crab Managed Fishery
- Pilbara Fish Trawl Interim Managed Fishery
- Pilbara Line Fishery
- Pilbara Trap Managed Fishery
- Specimen Shell Managed Fishery.

The Pilbara Trap and Mackerel managed fisheries may be present in the Operational Area. The Pilbara Line and Mackerel managed fisheries operate via line-surface trolling for pelagic species. The Pilbara crab managed fishery operates using hourglass traps, primarily within inshore waters around Nickol Bay (Newman et al., 2023a). The Pilbara Trap Managed Fishery uses baited trap gears in depths of ~30–200 m (DCCEEW, 2023c). Interactions with these fisheries from vessel operations are likely to be limited to very-short term impacts to a minor portion of any fishery management area.

The Nickol Bay and Onslow Prawn managed fisheries are managed through spatial closures (designated fishing areas). The Nickol Bay management area does not overlap the Operational Area, therefore planned activities are not likely to interact with the fishery. The Onslow Prawn Managed Fishery is limited to Area 3, which overlaps the Operational Area. Fishing effort is typically targeted in the nearshore and coastal waters, west of the Dampier archipelago (Newman et al., 2023a). Given the distance from suitable and previously targeted areas, it is not considered likely the physical presence of activity vessels could have any interactions with the Onslow Prawn Managed Fishery.

The Marine Aquarium Fish, and Specimen Shell fisheries operate in coastal, nearshore waters via hand-catch or dive methods. Given the distance from shorelines and water depths in the Operational Area, impacts from physical presence of facilities and vessels are not considered likely.

No Commonwealth managed fisheries were recorded to have previous catch effort in the Operational Area, therefore are unlikely to have any interaction with planned activities. The PSZ is a relatively small radius (500 m) around existing infrastructure, and has been in place since the commencement of operations at the Wandoo Facilities in the 1990s.

There have been no complaints or concerns from any other marine user (based on records since 2006).

Shipping

Changes to the Functions, Interests and Activities

Commercial shipping vessels move through the offshore waters on route to or from the marine terminals at Barrow and Varanus Islands. Ships using NWS waters include iron ore carriers, oil tankers and other vessels proceeding to or from the ports of Dampier, Port Walcott and Port Hedland. However, these are predominantly heading north from these ports. Large cargo vessels carrying freight bound or departing from Fremantle transit along the WA coastline heading north and south in deeper waters. The Operational Area is approximately 35 km from the northbound shipping fairway from Dampier. As detailed in Section 3.5.2, established shipping fairways are approximately 9 km south of the Operational Area. As a 500 m restricted zone exists around the facility where shipping traffic is not permitted, as well as a cautionary zone (2.5 km around the Wandoo facilities), the support vessels within the Operational Area are unlikely to interact with shipping traffic. Given the activities will be occurring within the PSZ and cautionary zone, impacts to commercial shipping activities are considered to be low.

5.20.4 Risk Ranking

The Operational Area is located within the PSZ, prohibiting unauthorised vessels from entering. Previous fishing effort has remained relatively low (<5 active vessels per year), for fisheries with the potential to interact with operational activities. Impacts to commercial fisheries and shipping from the physical presence of operational and project vessels will be unlikely. Therefore:

- The consequence ranking of '1' (Incidental) was assigned to potential interactions with other marine users, and likelihood of 'B' (Unlikely) was considered appropriate, resulting in a risk ranking of 'Low' (RRIV).

5.20.5 ALARP Demonstration

Table 5-97 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with interactions with other marine users. No additional controls were identified that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with interaction with other marine users are assessed as low as reasonably practicable.

5.20.6 Acceptability Demonstration

Table 5-98: Acceptability demonstration – Physical presence – Interaction with other marine users

ACCEPTABLE LEVEL OF RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant Principles of ESD not compromised given proposed controls (Table 5-97).
External context – objections or claims considered	N/A – No external objections or claims received.
Internal context – VOGA HSE policy/procedure met	Yes – Risk managed in accordance with VOGA HSE policy.
Other requirements met	Yes – Notice to Mariners issued via AMSA in a timely manner. Yes – • *Navigation Act 2012* • International Convention for the Safety of Life at Sea 1974 • International Regulations for Preventing Collisions at Sea 1972. VOGA will not interfere with the rights of other marine users to a greater extent than is necessary for the reasonable exercise of right conferred by the titles granted, as per Section 280 of the OPGGS Act.
RR < High (RRII)	Yes – Low (RRIV).
EPO(s) manage impacts to acceptable levels	Yes – The following relevant EPOs will be maintained: • EPO-OP-13 See Section 7 for further details.

Acceptability summary:

The impacts and potential risks of physical presence – interaction with other marine users have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-97), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.7).

5.21 Seabed Disturbance

5.21.1 Hazard Report

Table 5-99: Hazard report – Seabed disturbance

HAZARD	Seabed disturbance
EP risk no.	EP-OP-R20
Activity cause	Marine operations.
Potential impacts	Change to benthic habitat and assemblages. Change to water quality. Change to submerged cultural heritage.
Extent and duration	Localised, short term.

PREVENTION						
Activity/cause	**Existing management controls**	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
Cleaning and marine growth removal. ROV and diving. Metocean monitoring. Installation of flowline stabilisation and freespan supports. Anchoring and mooring. Removal and replacement of subsea assets; wet storing.	There are no controls identified for these causes as there are no significant benthic habitats in the Permit Area, and impacts are local to the Facility.	N/A	N/A	EPO-OP-14 No serious or irreversible changes to the seabed which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	N/A	N/A
Installation of scour protection.	Grout selection process will include lowest toxicity	Engineering	Reduction		Grout selection and approval process is documented.	Records of selection and approval.

MITIGATION					
Existing management controls	**Control type**	**Control hierarchy**	**Performance outcome**	**Environmental performance standard**	**Measurement criteria**
None identified.	N/A	N/A	N/A	N/A	N/A

INITIAL RISK WITH EXISTING CONTROLS		
Consequence	**Likelihood (of consequence)**	**Initial risk**
Incidental (1)	Possible (C)	Low risk

INITIAL RISK WITH EXISTING CONTROLS		
ADDITIONAL CONTROLS/DEMONSTRATION OF ALARP - VOGA WORKSHOP		
A low risk is defined as acceptable and typically do not require special attention outside of normal activities under the VOGA risk level action criteria. The following ALARP analysis provides assurance that all risk treatment options have been considered.		
Additional management controls	**Assessment of option**	**Adopted/Not adopted**
Eliminate subsea inspection and maintenance activities.	The subsea activities that result in potential seabed disturbance are essential for maintaining the integrity of the subsea hydrocarbon system and cannot be avoided. The alternative of doing nothing would potentially compromise the integrity of the system, with increased technical risks and production failures, resulting in significant financial costs and potentially leading to increased risks of loss of containment, resulting in environmental impacts.	Not adopted
No anchoring of support vessels.	Reduces the area of seabed disturbance. Cost of additional fuel will be substantial (tens of thousands of dollars). The featureless seabed of the activity area means there is no environmental benefit in preventing vessels from anchoring if they need to. Anchoring, if required, will save the volume of fuel consumed and reduce associated atmospheric emissions.	Not adopted
RESIDUAL RISK AFTER ADDITIONAL CONTROLS		
Consequence	**Likelihood (of consequence)**	**Residual risk**
Incidental (1)	Possible (C)	Low risk

5.21.2 Description of Hazard

The physical presence of the Wandoo Facility subsea infrastructure may alter the seabed due to the creation of benthic habitats and sea floor scour along the seabed.

The following infrequent activities may cause seabed disturbance:

- MODU Operations (Section 2.8.8) – the MODU may be used for accommodation (though drilling is out of scope of this EP). The seabed disturbance caused by the MODU legs may be up to 435 m^2 per location. The MODU legs will be placed within a few metres of the positions occupied in previous campaigns (e.g. Wandoo well construction campaigns).
- Cleaning and marine growth removal (Section 2.8.8) – Cleaning and marine growth removal employs diver-operated tools, abrasive blasting or water blasting, and occurs approximately once every 5 years. The high-pressure water jetting may disrupt the sediment around the subsea infrastructure. The organic matter dislodged during cleaning will fall to the seabed.
- Diving and ROV (Section 2.8.7) – ROVs are used for annual inspections and for survey activities which can range from one to several days at a particular location. ROVs may be wet-parked on the seabed. The footprint of a typical ROV is 1.7m^2.
- Metocean monitoring (Section 2.8.6) – Anchors/clump weights may be left on the seabed. The footprint of an anchor/clump weight is less than 4 m^2.
- Installation of flowline stabilisation and supports (Section 2.8.11) – grout bags, form work and structural steel may be used for flowline stabilisation and freespan support. Stabilisation will be installed at or adjacent to existing infrastructure. Excess grout may be released to the seabed.
- Installation of scour protection (Section 2.8.12) – Scour protection may be grout bags, formwork fabric frond matting and crushed rock or iron ore. Scour protection will be installed at or adjacent to existing infrastructure. Grout may be released to the seabed if grout bags are used. If rock dumping is used, rock will be installed within 20 m of existing infrastructure using a fall pipe.
- Anchoring and mooring (Section 2.8.16) – vessels supporting maintenance activities may be required to anchor within the PSZ/Operational Area using up to 3 anchors. Clump weights may be used. The footprint of a typical anchor arrangement is below 10 m^2 total.
- Removal and replacement of subsea assets (Section 2.8.13) – sections of subsea flowlines, floating hose, marine hose or mooring lines may require replacement and equipment may be stored on the seabed on a temporary or long-term basis. The maximum footprint for wet parking of any equipment would be less than 20 m^2.
- Maintenance activities generating solid release to the seabed (2.8.10) – metal filings (known as swarf) may be generated during cutting activities, which would settle on the seabed within close proximity of the cut site.

5.21.3 Impact and Risk Evaluation

Potential impacts caused by seabed disturbance include:

- Change to benthic habitat and assemblages

- Change to water quality
- Change to submerged cultural heritage.

The following receptors within the Operational Area may be impacted by seabed disturbance:

- Benthic habitats
- Benthic invertebrates
- Water quality
- Submerged cultural heritage.

Given that there are no discernible impacts on commercially important demersal species at either an individual or population level due to the nature and scale of the potential seabed disturbance, social and economic impacts on commercial fisheries have not been evaluated.

5.21.3.1 Impact Assessment

Water Quality

Change to Water Quality

Seabed disturbance from Wandoo Facility activities may generate localised and temporary increases in suspended sediments, turbidity and sediment deposition. Suspended sediments are expected to settle rapidly, with water quality returning to pre-disturbance conditions shortly after each activity.

Sediment loads are not expected to be significant due to the small disturbance footprint of each activity (e.g., vessel anchoring, stabilisation and scour protection), all of which occur at or adjacent to existing infrastructure. If rock dumping is required, installation will occur within a limited area using a fall-pipe system, generating only short-term turbidity. No excavation, mass-flow excavation, high-pressure jetting or other intrusive seabed intervention is proposed.

Each seabed-proximal activity is expected to produce a single, brief turbidity plume within an area of predominantly soft-sand habitat. Given the hydrodynamic conditions of the open NWS environment, any reduction in water quality will be highly localised, temporary and short-lived, with sediments settling quickly (NERA, 2018).

Benthic Habitats and Assemblages

Change to Benthic Habitat and Assemblages

Benthic habitat within the Operational Area consists of soft, sandy, unconsolidated sediments typical of the North West Shelf, with no coral, seagrass, macroalgae or other significant benthic features recorded. Monitoring indicates benthic infauna richness and abundance vary with sediment composition but remain consistent with regional patterns.

Placement of infrastructure (e.g., scour protection, flowline supports, anchors) may cause localised and temporary disturbance through sediment deposition, smothering of sessile epifauna or infauna, and short-term turbidity. Disturbance footprints are expected to be limited to tens of

metres and occur in areas already subject to previous seabed modification. No excavation, jetting or large-scale seabed intervention is proposed.

No EPBC-listed benthic species, communities or sensitive habitats occur in the Operational Area. Given the highly localised, short-term nature of disturbance and the absence of significant benthic habitat, impacts to benthic habitat and assemblages are not expected to affect broader marine ecosystem functioning.

Submerged Cultural Heritage

Change to Submerged Cultural Heritage

Seabed disturbance from Wandoo Facility activities has very low potential to cause a change to submerged cultural heritage sites, given the small areas of seabed disturbance involved. As described in Section 3.6.4, Australia's underwater cultural heritage, such as shipwrecks, sunken aircrafts, First Nations underwater cultural heritage, and other underwater heritage sites are protected under the UCH Act. No cultural heritage artefacts, such as shipwrecks or registered Aboriginal Cultural Heritage sites, have been identified within the Operational Area (Section 3.6.4 and 3.7.5). Any impact to submerged cultural heritage is expected to be incidental.

5.21.4 Risk Ranking

The seabed of the Operational Area is characterised by soft, unconsolidated sediments with limited sensitive features, benthic assemblages, and no known underwater cultural heritage sites. Impacts to these receptors from seabed disturbance will be temporary and considered to be localised and minimal. Therefore:

- The consequence ranking of '1' (Incidental) was assigned to benthic habitats and assemblages, and a likelihood of 'C' (Possible) was considered appropriate, resulting in a risk ranking of 'Low' (RRII).
- The consequence ranking of '1' (Incidental) was assigned to water quality and a likelihood of 'C' (Possible) was considered appropriate, resulting in a risk ranking of 'Low' (RRII).
- The consequence ranking of '1' (Incidental) was assigned to submerged cultural heritage, and a likelihood of 'A' (Rare) was considered appropriate, resulting in a risk ranking of 'Low' (RRIV).

5.21.5 ALARP Demonstration

Table 5-99 presents the results from ALARP assessment, demonstrating that all reasonably practicable controls have been adopted to reduce impacts and risk to ALARP levels. The assessment applied the VOGA Risk Matrix (Table 4-1) to determine the inherent and residual impact levels, followed by application of the ALARP decision-context methodology (Table 4-4) and the criteria for demonstrating ALARP outlined in Section 4.8. This structured evaluation confirmed that the suite of existing controls represents all reasonably practicable measures for managing the impacts associated with seabed disturbance. No additional controls were identified that would further reduce environmental impacts without imposing disproportionate sacrifice in terms of operational feasibility, cost, or complexity. On this basis, the residual environmental impacts associated with seabed disturbance are assessed as low as reasonably practicable.

5.21.6 Acceptability Demonstration

Table 5-100: Acceptability demonstration – Seabed disturbance

ACCEPTABLE LEVEL OF RISK DEMONSTRATED	
Principles of ESD not compromised	Relevant Principles of ESD not compromised given proposed controls (Table 5-99).
External context – objections or claims considered	N/A – no external objections or claims received.
Internal context – VOGA HSE policy/procedure met	Yes – Risk managed in accordance with VOGA HSE policy.
Other requirements met	Yes – Risk to underwater cultural heritage managed in accordance with the UCH Guidelines and *Underwater Cultural Heritage Act 2018*. The evaluation of impacts and risks indicates significant impacts to MNES will not result from seabed disturbance. Seabed disturbance has not been identified as a threat in any recovery plans or conservation advice for threatened and migratory species.
RR < High (RRII)	Yes – Low (RRIV).
EPO(s) manage impacts to acceptable levels	Yes – The following relevant EPOs will be maintained: • EPO-OP-14 See Section 7 for further details.
Acceptability summary: The impacts and potential risks of seabed disturbance have been managed to a level that is broadly acceptable based on the demonstration of ALARP (Table 5-99), alignment with industry best practice, and VOGA's process for evaluating acceptability (Section 4.7).	

Section 6 Cumulative Impact Assessment

In alignment with NOPSEMA's Environment Plan Decision Making Guideline criterion 10A(d) (NOPSEMA, 2024a), VOGA has assessed the cumulative impacts associated with the Wandoo Facility activities. In the context of offshore petroleum activities, cumulative environmental impacts are defined by NOPSEMA as successive, additive, or synergistic impacts of collectively significant activities or projects with material impacts on the environment that have the potential to accumulate over temporal and spatial scales (NOPSEMA, 2024a).

The effects of past projects and activities, and currently operating activities, are captured when describing the existing condition of and any pressure or threats affecting the environment (see (Section 3). This baseline condition and understanding of the capacity of the receiving environment and receptors to accommodate changes, considering existing pressures and threats, informs the environmental hazard assessment conducted in Section 5 of this EP.

The focus of this Cumulative Impact Assessment (CIA) is to build on these assessments by considering the potential impacts from the planned components of the proposed activity on key matters in conjunction with the potential impacts from other reasonably foreseeable future projects and activities. Given that unplanned events are not intended to occur as a result of the Wandoo Facility activities, risks from unplanned aspects have not been considered in the CIA.

6.1 Methodology

There is no specific guidance on CIA provided by NOPSEMA or the Australian Government for the OPGGSA or EPBC Act assessment regimes. Therefore, other relevant guidance has been used to inform the CIA methodology for this EP, including:

- UK Nationally Significant Infrastructure Projects Advice Note Seventeen: Cumulative effect assessment relevant to nationally significant infrastructure projects (Planning Inspectorate, 2019).
- NSW Department of Planning and Environment Cumulative Impact Assessment Guidelines for State Significant Projects (DPIE, 2022).

Both the UK and DPIE guidelines are intended to apply to large-scale national and state significant projects, respectively, with greater potential for cumulative impacts into the long-term. Consequently, the assessment approach applied here has been adapted to the nature and scale of the activities covered in this EP.

6.2 Scoping the Cumulative Impact Assessment

A scoping assessment was undertaken to determine if impacts from Wandoo Facility activities could result in cumulative impacts to receptors.

The scoping process considered the following factors:

- **Other reasonably foreseeable future projects** to be considered in the CIA based on currently operating projects, approved projects, and projects under assessment (including those under public comment); and if these projects and their associated activities are reasonably foreseeable within the spatial and temporal extent of the assessment.

This defines the boundaries of the assessment by including projects and activities that have a realistic likelihood of occurring and potential contribution to cumulative impacts.

- **Key environmental matters** are features of the environment (ecological, socio-economic, and cultural values and sensitivities) that are valued because of their rarity or importance, including the critical role they play in supporting systems which are essential for the environment, people and/or the economy (DPIE, 2022). For example, commercial fisheries and threatened species undertaking biologically important behaviours.
- **Spatial extent** is the study area for the CIA, depending on the key environmental matters' range and distribution within the bioregion; and environment that may be affected by the planned activities. DPIE (2022) recommends that while the area chosen for each key matter must be broad enough to capture all relevant cumulative impacts, it should not be unnecessarily large or include areas where the cumulative impacts are likely to be negligible relative to the baseline condition of the relevant matter.
- **Temporal extent** is the period of the CIA, depending on the duration of the planned activities or characteristics of the key environmental matters.
- **Material cumulative impacts** resulting from the and other relevant future projects that have the potential to be above the defined acceptable levels. For example, threats of wide-scale, serious or irreversible damage due to cumulative impacts.
- **Cumulative impact assessment approach** based on standard assessment of material cumulative impacts, identify which cumulative impacts require further comprehensive assessment through either issue-specific CIA or combined CIA.

To identify the above factors, the scoping assessment was undertaken in two parts.

- **Part 1**: Identify reasonably foreseeable future projects and activities (Section 6.2.1).
- **Part 2**: Identify relevant key environmental matters (Section 6.2.2).

The DPIE Guidelines (2022) state that the CIA is to focus on the key matters that could be materially affected by the cumulative impacts of the project and other relevant future projects—not on every conceivable cumulative impact on every matter.

The scoping assessment identifies potential cause-effect pathways which could result in material cumulative impacts.

6.2.1 Part 1: Identify Reasonably Foreseeable Future Projects and Activities

To identify reasonably foreseeable future projects and activities, spatial and temporal extents for cumulative impacts have been based on the maximum spatial and temporal influence of the Wandoo Facility activities.

The spatial extent of impacts from the Wandoo Facility varies depending on the source of aspect. The largest potential impact area for any planned aspect from the Wandoo Facility activities are a disruption in fauna behaviour caused by light emissions from non-routine flaring activities, for which a conservative spatial extent of 57 km from the Operational Area was adopted (Section 5.14). The next largest potential impact area is associated with a change in fauna behaviour caused by continuous underwater noise from support vessel operations, for which a conservative spatial extent of 17.3 km from the Operational Area was adopted (0).

Therefore, as a conservative approach, a spatial extent of 60 km has been used for the purposes of identifying existing and future projects and activities which may have effects that overlap with those the project, resulting in potential cumulative impacts.

The temporal end date selected for the CIA has been conservatively set as 2038, which allows for the planned end of field life.

The scoping steps of Part 1 are:

- Review NOPSEMA Environment Plan and DMPE GeoVIEW websites to identify projects and activities that overlap the spatial (60 km from the Operational Area) and temporal (2026-2031) extents.
- Confirm potential overlap with other NWS petroleum titleholders.

Relevant future projects and activities identified to date, within the lifetime of the project (2038) and located 60 km from the Operational Area, are detailed in Table 6-1. Projects and activities that are not relevant have been excluded from the assessment scope to maintain practicality and relevance in decision-making processes.

There are several petroleum pipelines within 60 km of the Operational Area. These are detailed in Table 6-1.

There are no subsea cables which overlap with the Operational Area or the 60 km spatial extent, therefore they have not been considered further.

Existing activities and relevant future activities that are included within the scope of the following CIA are those that can be publicly identified at the time of preparing and submitting this EP. Assumptions around specific timings for projects or activities have been made as there is some level of uncertainty in schedule and timing of approvals to support activities. Consequently, a conservative approach has been adopted whereby credible worst-case scenarios (e.g. concurrent activities with overlapping predicted impacts) are assessed.

Table 6-1: Reasonably foreseeable future projects or activities within the spatial boundary of the CIA

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap	Project Relevant
Petroleum Activities						
VOGA	Geotechnical and geophysical survey	Accepted	Expected 2026	**Yes** ~105 days	**Yes** Potential spatial overlap of survey light emissions and noise emissions with Wandoo Facility activities.	**Yes** Potential temporal and spatial overlaps identified.
VOGA	Multi-well exploration drilling	Under Assessment	Est. 2026-2027	**Yes** ~140 days over 5 years	**Yes** Potential spatial overlap of exploration drilling light emissions and noise emissions with Wandoo Facility activities.	**Yes** Potential temporal and spatial overlaps identified.
VOGA	Well construction drilling	Under Assessment	Est. 2027	**Yes** ~150 days over 5 years	**Yes** Potential spatial overlap of well construction light emissions and noise emissions with Wandoo Facility activities.	**Yes** Potential temporal and spatial overlaps identified.
Jadestone Energy	Production and export facility operations (Stag)	Accepted	Expected 2026	**Yes** Potential temporal overlap with Wandoo Facility activities.	**Yes** Potential spatial overlap of Stag field operations light emissions and noise emissions with Wandoo Facility activities.	**Yes** Potential temporal and spatial overlaps identified.
Santos	Operation of a facility/petroleum pipeline	Accepted	2020-2025	**No** NOPSEMA was notified of stop date	**Yes** Potential spatial overlap of Reindeer field light emissions	**No** No potential temporal overlap identified.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap	Project Relevant
	(Reindeer wellhead platform, Devil Creek gas supply pipeline)			19 June 2025 (See below CoP EP).	extent with Wandoo Facility activities underwater noise and light emissions extent.	
Santos	Operation of a facility/petroleum pipeline (Reindeer wellhead platform, Devil Creek gas supply pipeline (Cessation of Production))	Accepted	Expected 2025	**Yes** Potential temporal overlap of Reindeer CoP activities with Wandoo Facility activities.	**Yes** Potential spatial overlap of Reindeer field light emissions and noise emissions extents with Wandoo Facility light and noise emissions.	**Yes** Potential temporal and spatial overlaps identified.
Santos	Exploration vessel based survey	Accepted	October 2021	**No** NOPSEMA was notified of stop date 17 October 2021.	**Yes** Potential spatial overlap with Operational Area (B) with Wandoo Facility activities.	**No** No potential temporal overlap identified.
Woodside	Facility operations and development of Xena reservoir (Pluto)	Accepted	2025	**No** NOPSEMA was notified of stop date 7 March 2026.	**Yes** Potential spatial overlap as Pluto LNG pipeline is located within 60 km of the Wandoo Facility Operational Area.	**No** No potential temporal overlap identified.
Woodside	Operation of a facility/petroleum pipeline (Scarborough Floating Production Unit)	Accepted	2026-2031	**Yes** Potential temporal overlap of Scarborough operations and construction activities	**Yes** Potential spatial overlap as Scarborough trunkline Operational Area is located within 60 km of the Wandoo Facility Operational Area.	**Yes** Potential temporal and spatial overlaps identified.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap	Project Relevant
				with Wandoo Facility activities.		
Woodside	Facility operations and production of dry gas and condensate (North Rankin)	Accepted	2026-2031	**Yes** North Rankin facility will operate 24 hours a day for 5-year duration of the EP, overlapping with Wandoo Facility activities.	**Yes** Potential spatial overlap as North Rankin pipelines Operational Area is located within 60 km of the Wandoo Facility Operational Area.	**Yes** Potential temporal and spatial overlaps identified.
Woodside	Geophysical and geotechnical surveys (Angel)	Under Assessment	Expected 2026	**Yes** Potential temporal overlap of Angel survey activities with Wandoo Facility activities.	**Yes** Potential spatial overlap of Angel survey light and noise emission extents with Wandoo Facility light and noise emissions.	**Yes** Potential temporal and spatial overlaps identified.
Commercial Fisheries						
Western Tuna and Billfish Fishery	Pelagic longline and low levels of minor-line fishing are used in this fishery.	Active	12 month fishing season, commencing 1st February each year.	**Yes** Potential temporal overlap of fishing vessel activities with timings of the project activities. (Butler et al., 2024)	**Yes** The fishery management area overlaps the Project Operational Area. Refer to Table 3-8 for further information on commercial fisheries in Commonwealth waters.	**Yes** Potential temporal and spatial overlaps identified.
Western Skipjack Tuna Fishery	Purse seine and pole & line are used in this fishery.	Not active	Not active since 2009.	**No** The fishery is not currently active, and	**Yes** The fishery management area overlaps the Project Operational Area. Refer to	**No** Spatial overlap but no temporal overlap identified.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap	Project Relevant
				no fishing has occurred since 2009.	Table 3-8 for further information on commercial fisheries in Commonwealth waters.	
Southern Bluefin Tuna Fishery	Pelagic longline and purse seine fishing gear are used in this fishery.	Active	12 month fishing season, commencing 1st December each year.	**Yes** Potential temporal overlap of fishing vessel activities with timings of the Project activities.	**Yes** The fishery management area overlaps the Project Operational Area. Refer to Table 3-8 for further information on commercial fisheries in Commonwealth waters.	**Yes** Potential temporal and spatial overlaps identified.
Abalone Managed Fishery	Hand collection method is used in this fishery.	Not active	12 month fishing season, from February – January.	**No** The fishery is not currently active.	**Yes** The fishery management area overlaps the Project Operational Area. Refer to Table 3-8 for further information on commercial fisheries in WA state waters.	**No** Spatial overlap but no temporal overlap identified.
Hermit Crab Fishery	Hand collection method is used in this fishery.	Active	12 month fishing season.	**Yes** Potential temporal overlap of fishing vessel activities with timings of the Project activities.	**Yes** The fishery management area overlaps the Project Operational Area. Refer to Table 3-8 for further information on commercial fisheries in WA state waters.	**Yes** Potential temporal and spatial overlaps identified.
Mackerel Managed Fishery	Surface and midwater troll fishing are used in this fishery.	Active	12 month fishing season.	**Yes** Potential temporal overlap of fishing vessel activities with	**Yes** The fishery management area overlaps the Project Operational Area.	**Yes** Potential temporal and spatial overlaps identified.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap	Project Relevant
				timings of the Project activities.	Refer to Table 3-8 for further information on commercial fisheries in WA state waters.	
Marine Aquarium Fish Managed Fishery	Hand collection and fishing line methods are used in this fishery.	Active	12 month fishing season.	**Yes** Potential temporal overlap of fishing vessel activities with timings of the Project activities.	**Yes** The fishery management area overlaps the Project Operational Area. Refer to Table 3-8 for further information on commercial fisheries in WA state waters.	**Yes** Potential temporal and spatial overlaps identified.
Nickol Bay Prawn Fishery	Low opening, otter prawn trawl systems are used in this fishery.	Active	12 month fishing season.	**Yes** Potential temporal overlap of fishing vessel activities with timings of the Project activities.	**Yes** The fishery management area overlaps the Project Operational Area. Refer to Table 3-8 for further information on commercial fisheries in WA state waters.	**Yes** Potential temporal and spatial overlaps identified.
Onslow Prawn Limited Entry Fishery	Low opening, otter prawn trawl systems are used in this fishery.	Active	12 month fishing season.	**Yes** Potential temporal overlap of fishing vessel activities with timings of the Project activities.	**Yes** The fishery management area overlaps the Project Operational Area. Refer to Table 3-8 for further information on commercial fisheries in WA state waters.	**Yes** Potential temporal and spatial overlaps identified.
Pilbara Crab Managed Fishery	Hourglass traps are used in this fishery.	Active	12 month fishing season.	**Yes** Potential temporal overlap of fishing vessel activities with timings of the Project activities.	**Yes** The fishery management area overlaps the Project Operational Area.	**Yes** Potential temporal and spatial overlaps identified.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap	Project Relevant
					Refer to Table 3-8 for further information on commercial fisheries in WA state waters.	
Pilbara Fish Trawl Interim Managed Fishery	Trawl, trap and line methods are used in this fishery.	Active	12 month fishing season.	**Yes** Potential temporal overlap of fishing vessel activities with timings of the Project activities.	**Yes** The fishery management area overlaps the Project Operational Area. Refer to Table 3-8 for further information on commercial fisheries in Commonwealth waters.	**Yes** Potential temporal and spatial overlaps identified.
Pilbara Line Fishery (Condition)	Trawl, trap and line methods are used in this fishery.	Active	12 month fishing season.	**Yes** Potential temporal overlap of fishing vessel activities with timings of the Project activities.	**Yes** The fishery management area overlaps the Project Operational Area. Refer to Table 3-8 for further information on commercial fisheries in WA state waters.	**Yes** Potential temporal and spatial overlaps identified.
Pilbara Trap Managed Fishery	Trawl, trap and line methods are used in this fishery.	Active	12 month fishing season.	**Yes** Potential temporal overlap of fishing vessel activities with timings of the Project activities.	**Yes** The fishery management area overlaps the Project Operational Area. Refer to Table 3-8 for further information on commercial fisheries in WA state waters.	**Yes** Potential temporal and spatial overlaps identified.
South-west Coast Salmon Fishery	Seine nets are used in this fishery.	Not active	3-month fishing season, February – April.	**No** The fishery is not currently active.	**Yes** The fishery management area overlaps the Project Operational Area.	**No** Spatial overlap but no temporal overlap identified.

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap	Project Relevant
			(DCCEEW, 2024q)		Refer to Table 3-8 for further information on commercial fisheries in WA state waters.	
Specimen Shell Managed Fishery	Hand collection is the main method used in this fishery. In some instances, remotely operated underwater vehicles are used (Newman et al., 2023a).	Active	12 month fishing season.	**Yes** Potential temporal overlap of fishing vessel activities with timings of the Project activities.	**Yes** The fishery management area overlaps the Project Operational Area. Refer to Table 3-8 for further information on commercial fisheries in WA state waters.	**Yes** Potential temporal and spatial overlaps identified.
Tour Operator	Range of methods including hook and line, surface and midwater troll methods.	Active	12 month fishing season.	**Yes** Potential temporal overlap of fishing vessel activities with timings of the Project activities.	**Yes** No defined management area. However, the fishery is permitted to fish anywhere in WA state waters.	**Yes** Potential temporal and spatial overlaps identified.
West Coast Deep Sea Crustacean Managed Fishery	Baited pots operated in a long-line formation are used in this fishery.	Active	12 month fishing season.	**Yes** Potential temporal overlap of fishing vessel activities with timings of the Project activities.	**Yes** The fishery management area overlaps the Project Operational Area. Refer to Table 3-8 for further information on commercial fisheries in WA state waters.	**Yes** Potential temporal and spatial overlaps identified.
Western Australian Sea	Hand collection is the main method	Active	12 month fishing season.	**Yes** Potential temporal overlap of fishing	**Yes**	**Yes**

Titleholder / Operator / Proponent	Activity Type	Status	Timing	Potential for Temporal Overlap	Potential for Spatial Overlap	Project Relevant
Cucumber Fishery	used in this fishery.			vessel activities with timings of the Project activities.	The fishery management area overlaps the Project Operational Area. Refer to Table 3-8 for further information on commercial fisheries in WA state waters.	Potential temporal and spatial overlaps identified.
Commercial Shipping						
Commercial shipping	Coastal shipping traffic is common to offshore areas; the largest port in coastal waters adjacent to the activity location is the Port of Dampier. AMSA shows the closest shipping fairway is ~9 km south of the Operational Area (Section 3.5.2).	Active	Ongoing	**Yes** Potential temporal overlap of commercial shipping activities with Wandoo Facility activities.	**Yes** Potential temporal overlap of commercial shipping activities with underwater sound and artificial emissions from Wandoo Facility activities.	**Yes** Potential temporal and spatial overlaps identified.

6.2.2 Part 2: Scoping Assessment to Identify Relevant Key Environmental Matters

The scoping process begins with reviewing Section 4 to determine the planned aspects of the Wandoo Facility, the relevant key environmental matters, and the acceptable levels of impact for each. Using this understanding, the assessment considers the spatial extent of activities to identify potential cumulative impact pathways arising from overlap between the Wandoo Facility and other reasonably foreseeable projects or activities, particularly where these intersect with areas of significance such as BIAs, critical habitat, active fishing cells, or petroleum titles.

The indicative project life (to approximately 2038) is then used to examine temporal overlap, identifying where multiple activities may coincide with the presence or seasonal patterns of key environmental receptors in the North West Shelf. From these spatial and temporal pathways, the assessment determines whether material cumulative cause-effect pathways are likely, with particular regard to receptors of high conservation value, areas of commercial or cultural importance, and biologically important areas where critical behaviours occur.

The certainty of the data informing this scoping assessment is evaluated to understand confidence levels in the identified pathways. Each key environmental matter is then reviewed to determine whether a material cumulative impact may occur and whether the available information is sufficiently robust:

- If there is potential for material cumulative impacts, the key environmental matter is required to have a detailed CIA (Section 6.3).
- If the certainty of the scoping assessment data does not meet the following points below, the key environmental matter is required to have a detailed CIA (Section 6.3):
    - Impacts are well understood
    - Impacts are relatively easy to predict using standard methods
    - Impacts are capable of being mitigated to comply with relevant standards and to meet the acceptable level.

If one of the points is not met, then there is a moderate level of certainty for the scoping assessment. To ensure thoroughness, a cautious approach is taken. Receptors with scoping assessments of moderate certainty proceed to detailed CIA. However, if a scoping assessment demonstrates a high level of certainty that there are no significant cumulative impact pathways, the receptor is not considered further for detailed CIA.

As described in Section 3.6, there is no overlap between the Operational Area and any protected and significant areas (world heritage properties, national heritage places, underwater cultural heritage, state marine protected areas, AMPs, wetlands of international importance, KEFs and TECs) in the NWS region.

Table 6-2 details the results of Part 2 scoping assessment.

Table 6-2: Identification of relevant key environmental matters and detailed CIA scoping

Environmental Component	Key Environmental Matter	Wandoo Facility Aspects										Relevant EPOs	Cumulative Impact Scoping: Based on Planned Aspects from the Wandoo Facility and Reasonably Foreseeable Future Projects				
		Interaction with Other Marine Users	Seabed Disturbance	Noise Emissions	Atmospheric and GHG Emissions	Light Emissions	Discharge of Cooling Water	Discharge of Deck Drainage, Bilge, Sewage, Greywater, Putrescible Waste	Discharge of PFW and Ballast Water	Discharge of Chemicals and Hydrocarbons	Discharge of Desalination		Potential for cumulative impact - Spatial	Potential for cumulative impact - Temporal	Material cumulative cause-effect pathway	Level of Certainty of Scoping Assessment	Does the material cumulative impact require detailed assessment?
Physical Environment	Climate				✓							EPO-OP-09: The Wandoo Facility will not interfere with Australia's GHG commitments to the Paris Agreement under the *Climate Change Act 2022*. EPO-OP-10: Product generated from the Wandoo Facility will only be sold to customers (first sale) from countries that are signatories to the Paris Agreement or have a net zero commitment, as at the date of the relevant contract of sale	No - Low levels of contribution to Australian and global carbon budgets.	No (not outside the framework of the national emissions reduction targets)	The Wandoo Facility and other reasonably foreseeable projects and activities will contribute to GHG emissions being released into the atmosphere. A detailed impact assessment on GHG emissions by the Wandoo Facility have been assessed in Section 5.13 (Atmospheric and GHG emissions) with a residual impact rating of Low. The cumulative emissions are anticipated to be low levels in comparison to the Australian and global carbon budgets. Collectively direct and / or indirect low levels of GHG emissions from the Wandoo Facility and other reasonably foreseeable projects and activities will not result in material successive, additive or synergistic cumulative impacts to receptors.	High - Impacts are capable of being mitigated to comply with relevant standards and to meet the EPOs.	No - material cumulative impacts are not anticipated.
	Water Quality		✓				✓	✓	✓	✓	✓	EPO-OP-06: No serious or irreversible change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. EPO-OP-03: No impact to the environment outside the mixing zone from planned discharge	No – Spatial overlap will be negligible	No – Temporal overlap will be negligible	The Wandoo Facility and other reasonably foreseeable projects have the potential to cause a localised and temporary change to water quality. Changes to water quality are expected to be temporary and localised based upon the assessments in Section 5.21 (Seabed Disturbance); Section 5.15 (Discharge of Cooling Water); Section 5.16 (Discharge of Deck Drainage, Bilge Water, Sewage, Greywater, and Putrescible Waste); Section 5.8 (Discharge of PFW and Ballast Water);	High - assessment outcome and impacts are well understood.	No - material cumulative impacts are not anticipated.

Environmental Component	Key Environmental Matter	Wandoo Facility Aspects										Relevant EPOs	Cumulative Impact Scoping: Based on Planned Aspects from the Wandoo Facility and Reasonably Foreseeable Future Projects				
		Interaction with Other Marine Users	Seabed Disturbance	Noise Emissions	Atmospheric and GHG Emissions	Light Emissions	Discharge of Cooling Water	Discharge of Deck Drainage, Bilge, Sewage, Greywater, Putrescible Waste	Discharge of PFW and Ballast Water	Discharge of Chemicals and Hydrocarbons	Discharge of Desalination		Potential for cumulative impact - Spatial	Potential for cumulative impact - Temporal	Material cumulative cause-effect pathway	Level of Certainty of Scoping Assessment	Does the material cumulative impact require detailed assessment?
												of PFW and ballast water.			Section 5.11 (Planned Maintenance, Inspection and Repair Discharges); Section 5.17 (Discharge of Desalination Brine) with residual impact ratings of Low to Medium. Based on the spatial and temporal overlap of the Wandoo Facility with other reasonably foreseeable projects plus the localised scale of potential impacts, no material successive, additive or synergistic cumulative cause-effect pathways were identified.		
	Sediment Quality								✓	✓		EPO-OP-14: No serious or irreversible changes to the seabed which may adversely impact on biodiversity, ecological integrity, social amenity or human health.	No – Spatial overlap will be negligible	No – Temporal overlap will be negligible	The Wandoo Facility and other reasonably foreseeable projects and activities have the potential to cause a localised and temporary change to sediment quality. Changes to sediment quality are expected to be temporary and localised based upon the assessments in Section 5.8 (Discharge of PFW and Ballast Water); Section 5.11 (Planned Maintenance, Inspection and Repair Discharges) with a residual impact rating of Medium. Based on the spatial and temporal overlap of the Wandoo Facility with other reasonably foreseeable projects plus the localised scale of potential impacts, no material successive, additive or synergistic cumulative cause-effect pathways were identified.	High - assessment outcome and impacts are well understood.	No - material cumulative impacts are not anticipated.
	Air Quality				✓							EPO-OP-08: Air emissions requirements	No – Regional scale impacts	No – Temporal overlap will be negligible	The Wandoo Facility and other reasonably foreseeable projects have the potential to	High - assessment outcome and	No - material cumulative

Environmental Component	Key Environmental Matter	Wandoo Facility Aspects										Relevant EPOs	Cumulative Impact Scoping: Based on Planned Aspects from the Wandoo Facility and Reasonably Foreseeable Future Projects				
		Interaction with Other Marine Users	Seabed Disturbance	Noise Emissions	Atmospheric and GHG Emissions	Light Emissions	Discharge of Cooling Water	Discharge of Deck Drainage, Bilge, Sewage, Greywater, Putrescible Waste	Discharge of PFW and Ballast Water	Discharge of Chemicals and Hydrocarbons	Discharge of Desalination		Potential for cumulative impact - Spatial	Potential for cumulative impact - Temporal	Material cumulative cause-effect pathway	Level of Certainty of Scoping Assessment	Does the material cumulative impact require detailed assessment?
												from vessels within the Operational Area are consistent with Marine Order 97 requirements.	are not expected		cause a localised and temporary change to air quality. Changes to air quality from are expected to be temporary and localised based upon the assessments in Section 5.13 (Atmospheric and GHG emissions) with a residual impact rating of Low. Based on the spatial and temporal overlap of the Wandoo Facility with other reasonably foreseeable projects and activities and the localised scale of potential impacts, no material successive, additive or synergistic cumulative cause-effect pathways were identified.	impacts are well understood.	impacts are not anticipated.

Environmental Component	Key Environmental Matter	Wandoo Facility Aspects										Relevant EPOs	Cumulative Impact Scoping: Based on Planned Aspects from the Wandoo Facility and Reasonably Foreseeable Future Projects				
		Interaction with Other Marine Users	Seabed Disturbance	Noise Emissions	Atmospheric and GHG Emissions	Light Emissions	Discharge of Cooling Water	Discharge of Deck Drainage, Bilge, Sewage, Greywater, Putrescible Waste	Discharge of PFW and Ballast Water	Discharge of Chemicals and Hydrocarbons	Discharge of Desalination		Potential for cumulative impact - Spatial	Potential for cumulative impact - Temporal	Material cumulative cause-effect pathway	Level of Certainty of Scoping Assessment	Does the material cumulative impact require detailed assessment?
Key Benthic Habitats	Subtidal Soft Sediment and Benthic Fauna		✓						✓	✓		EPO-OP-14: No serious or irreversible changes to the seabed which may adversely impact on biodiversity, ecological integrity, social amenity or human health. EPO-OP-03: No impact to the environment outside the mixing zone from planned discharge of PFW and ballast water.	No – Spatial overlap will be negligible	No – Temporal overlap will be negligible	The Wandoo Facility and other reasonably foreseeable projects have the potential to cause a localised and temporary change to subtidal soft sediment and benthic fauna. Changes to habitat and injury/mortality to benthic fauna from Wandoo Facility activities are expected to be localised and either temporary or with rapid recovery expected following any disturbance based upon the assessments in Section 5.21 Seabed Disturbance); Section 5.8 (Discharge of PFW and Ballast Water); Section 5.11(Planned Maintenance, Inspection and Repair Discharges), with a residual impact rating of Low to Medium. Based on the spatial and temporal overlap of the Wandoo Facility with other reasonably foreseeable projects and activities and the localised scale of potential impacts, no material successive, additive or synergistic cumulative cause-effect pathways were identified.	High - assessment outcome and impacts are well understood.	No - material cumulative impacts are not anticipated.
Key Marine Fauna	Plankton			✓		✓	✓	✓	✓	✓	✓	EPO-OP-11: Impacts to marine fauna from light emissions will be limited to temporary behavioural change localised to the light source, with no species	No – No overlap with areas of high productivity, spawning grounds or upwelling.	No – No seasonal presence overlap.	The Wandoo Facility and other reasonably foreseeable project's activities have the potential to cause negligible impacts to plankton, including fish eggs and larvae; however, not affecting local ecosystem function. Impacts to plankton species from relevant Wandoo Facility aspects are expected to be temporary and localised	High - assessment outcome and impacts are well understood.	No - material cumulative impacts are not anticipated.

Environmental Component	Key Environmental Matter	Wandoo Facility Aspects										Relevant EPOs	Cumulative Impact Scoping: Based on Planned Aspects from the Wandoo Facility and Reasonably Foreseeable Future Projects				
		Interaction with Other Marine Users	Seabed Disturbance	Noise Emissions	Atmospheric and GHG Emissions	Light Emissions	Discharge of Cooling Water	Discharge of Deck Drainage, Bilge, Sewage, Greywater, Putrescible Waste	Discharge of PFW and Ballast Water	Discharge of Chemicals and Hydrocarbons	Discharge of Desalination		Potential for cumulative impact - Spatial	Potential for cumulative impact - Temporal	Material cumulative cause-effect pathway	Level of Certainty of Scoping Assessment	Does the material cumulative impact require detailed assessment?
												population-level impacts. EPO-OP-06: No serious or irreversible change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. EPO-OP-03: No impact to the environment outside the mixing zone from planned discharge of PFW and ballast water.			based upon the assessments in Section 5.12 (Noise Emission); Section 5.15 (Discharge of Cooling Water); Section 5.16 (Discharge of Deck Drainage, Bilge Water, Sewage, Greywater, and Putrescible Waste); Section 5.8 (Discharge of PFW and Ballast Water); Section 5.11 (Planned Maintenance, Inspection and Repair Discharges); Section 5.17 (Discharge of Desalination Brine), each with residual impact ratings of Low to Medium. Plankton are known to have naturally high mortality and rapid recovery rates. Changes to water quality or ambient noise from the Wandoo Facility activities are expected to result in only intermittent and brief disturbances to plankton. Based on the spatial and temporal overlap of the Wandoo Facility with other reasonably foreseeable project activities and the localised scale of potential impacts, no material successive, additive or synergistic cumulative cause-effect pathways were identified.		
	Inverte brates		✓	✓		✓						EPO-OP-14: No serious or irreversible changes to the seabed which may adversely impact on biodiversity, ecological integrity, social	No – No overlap with habitat critical to the survival of the species	No – No seasonal presence overlap.	The Wandoo Facility and other reasonably foreseeable projects have the potential to cause highly localised injury/potential mortality to marine invertebrates, however, they will not affect local ecosystem function or impacts at a population level.	High - assessment outcome and impacts are well understood.	No - material cumulative impacts are not anticipated.

Environmental Component	Key Environmental Matter	Wandoo Facility Aspects										Relevant EPOs	Cumulative Impact Scoping: Based on Planned Aspects from the Wandoo Facility and Reasonably Foreseeable Future Projects				
		Interaction with Other Marine Users	Seabed Disturbance	Noise Emissions	Atmospheric and GHG Emissions	Light Emissions	Discharge of Cooling Water	Discharge of Deck Drainage, Bilge, Sewage, Greywater, Putrescible Waste	Discharge of PFW and Ballast Water	Discharge of Chemicals and Hydrocarbons	Discharge of Desalination		Potential for cumulative impact - Spatial	Potential for cumulative impact - Temporal	Material cumulative cause-effect pathway	Level of Certainty of Scoping Assessment	Does the material cumulative impact require detailed assessment?
												amenity or human health. EPO-OP-11: Impacts to marine fauna from light emissions will be limited to temporary behavioural change localised to the light source, with no species population-level impacts. EPO-OP-06: No serious or irreversible change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. EPO-OP-03: No impact to the environment outside the mixing zone from planned discharge of PFW and ballast water.			Based on the spatial and temporal overlap of the Wandoo Facility with other reasonably foreseeable project activities and the localised scale of potential impacts, no material successive, additive or synergistic cumulative cause-effect pathways were identified.		
	Seabirds and Shorebirds					✓	✓	✓	✓	✓		EPO-OP-11: Impacts to marine fauna from light emissions will be limited to temporary behavioural change localised to the light source, with no species population-level impacts.	No – No overlap with BIAs, nesting sites or habitat critical to the survival of the species.	No – No seasonal presence overlap.	The Wandoo Facility and other reasonably foreseeable projects have the potential to cause minor behavioural impacts to seabirds and shorebirds, however, they will not affect local ecosystem function or impacts at a population level as assessed in Section 5.14 (Light Emissions); with a residual impact rating of Medium.	High - assessment outcome and impacts are well understood	No - material cumulative impacts are not anticipated.

Environmental Component	Key Environmental Matter	Wandoo Facility Aspects										Relevant EPOs	Cumulative Impact Scoping: Based on Planned Aspects from the Wandoo Facility and Reasonably Foreseeable Future Projects				
		Interaction with Other Marine Users	Seabed Disturbance	Noise Emissions	Atmospheric and GHG Emissions	Light Emissions	Discharge of Cooling Water	Discharge of Deck Drainage, Bilge, Sewage, Greywater, Putrescible Waste	Discharge of PFW and Ballast Water	Discharge of Chemicals and Hydrocarbons	Discharge of Desalination		Potential for cumulative impact - Spatial	Potential for cumulative impact - Temporal	Material cumulative cause-effect pathway	Level of Certainty of Scoping Assessment	Does the material cumulative impact require detailed assessment?
												EPO-OP-12: No serious or irreversible harm to a Threatened or Migratory listed species.			Based on the spatial and temporal overlap of the Wandoo Facility and other reasonably foreseeable project activities, any additional impacts to seabirds and shorebirds will not result in material successive, additive or synergistic cumulative impacts.		
	Fish and Sharks			✓		✓	✓	✓	✓	✓		EPO-OP-07: Impacts to marine fauna from noise emissions will be limited to temporary behavioural change localised to the noise source, with no species population-level impacts. EPO-OP-11: Impacts to marine fauna from light emissions will be limited to temporary behavioural change localised to the light source, with no species population-level impacts. EPO-OP-12: No serious or irreversible harm to a Threatened or Migratory listed species.	No – No overlap with BIAs, habitat critical to the survival of the species, migration pathways or spawning grounds.	No – No seasonal presence overlap.	The Wandoo Facility and other reasonably foreseeable project activities have the potential to cause minor behavioural impacts to fish and sharks; not affecting local ecosystem function or fish/shark populations based upon the assessments in Section 5.12 (Noise Emission); Section 5.14 (Light Emissions); Section 5.15 (Discharge of Cooling Water); Section 5.16 (Discharge of Deck Drainage, Bilge Water, Sewage, Greywater, and Putrescible Waste); Section 5.8 (Discharge of PFW and Ballast Water); Section 5.11 (Planned Maintenance, Inspection and Repair Discharges), each with residual impact ratings of Low to Medium. Based on the spatial and temporal overlap of the Wandoo Facility with other reasonably foreseeable project activities, no material successive, additive or synergistic cumulative cause-effect pathways were identified.	High - assessment outcome and impacts are well understood.	No - material cumulative impacts are not anticipated.
	Marine Mammals			✓			✓	✓	✓	✓		EPO-OP-07: Impacts to marine fauna from noise emissions will be limited to	Yes – BIA overlap.	Yes – Seasonal presence overlap.	The Operational Area overlaps with a Migration BIA for the humpback whale. The species migrates north through the EMBA from their Antarctic	High - assessment outcome and impacts are	No - material cumulative impacts are

Environmental Component	Key Environmental Matter	Wandoo Facility Aspects										Relevant EPOs	Cumulative Impact Scoping: Based on Planned Aspects from the Wandoo Facility and Reasonably Foreseeable Future Projects				
		Interaction with Other Marine Users	Seabed Disturbance	Noise Emissions	Atmospheric and GHG Emissions	Light Emissions	Discharge of Cooling Water	Discharge of Deck Drainage, Bilge, Sewage, Greywater, Putrescible Waste	Discharge of PFW and Ballast Water	Discharge of Chemicals and Hydrocarbons	Discharge of Desalination		Potential for cumulative impact - Spatial	Potential for cumulative impact - Temporal	Material cumulative cause-effect pathway	Level of Certainty of Scoping Assessment	Does the material cumulative impact require detailed assessment?
												temporary behavioural change localised to the noise source, with no species population-level impacts. EPO-OP-12: No serious or irreversible harm to a Threatened or Migratory listed species.			feeding grounds around May each year, reaching the waters of the NWMR in early-June (DoE, 2024b). However, the exact timing of the migration period can vary from year to year. Although, temporary and localised behavioural changes to whale sharks may occur within the Operational Area, these changes are not expected to result in ecologically significant impacts at a population level. The Wandoo Facility and other reasonably foreseeable projects have the potential to cause minor behavioural impacts and potential injury to individual transiting cetaceans, however they will not affect local ecosystem function or impacts at a population level as assessed in based upon the assessments in Section 5.12 (Noise Emission); Section 5.15 (Discharge of Cooling Water); Section 5.16 (Discharge of Deck Drainage, Bilge Water, Sewage, Greywater, and Putrescible Waste); Section 5.8 (Discharge of PFW and Ballast Water); Section 5.11 (Planned Maintenance, Inspection and Repair Discharges), each with residual impact ratings of Low to Medium. Based on the spatial and temporal overlap of the Wandoo Facility and other reasonably foreseeable projects and activities, any additional impacts to marine mammals will not result in	well understood	not anticipated.

Environmental Component	Key Environmental Matter	Wandoo Facility Aspects										Relevant EPOs	Cumulative Impact Scoping: Based on Planned Aspects from the Wandoo Facility and Reasonably Foreseeable Future Projects				
		Interaction with Other Marine Users	Seabed Disturbance	Noise Emissions	Atmospheric and GHG Emissions	Light Emissions	Discharge of Cooling Water	Discharge of Deck Drainage, Bilge, Sewage, Greywater, Putrescible Waste	Discharge of PFW and Ballast Water	Discharge of Chemicals and Hydrocarbons	Discharge of Desalination		Potential for cumulative impact - Spatial	Potential for cumulative impact - Temporal	Material cumulative cause-effect pathway	Level of Certainty of Scoping Assessment	Does the material cumulative impact require detailed assessment?
															material additive or synergistic cumulative impacts.		
	Marine Reptiles			✓		✓		✓	✓	✓		EPO-OP-07: Impacts to marine fauna from noise emissions will be limited to temporary behavioural change localised to the noise source, with no species population-level impacts. EPO-OP-11: Impacts to marine fauna from light emissions will be limited to temporary behavioural change localised to the light source, with no species population-level impacts. EPO-OP-12: No serious or irreversible harm to a Threatened or Migratory listed species.	Yes – Marine turtle BIAs and habitat critical to the survival of a species for are overlapped by the Operational Area, noise assessment area and worse-case flaring light assessment boundary.	Yes – Seasonal presence overlap.	The Wandoo Facility and other reasonably foreseeable projects have the potential to cause minor behavioural impacts to marine turtles undertaking biologically important behaviours. Impacts from underwater noise and light emissions will be temporary and recoverable as assessed in Section 5.12 (Noise Emissions); Section 5.14 (Light Emissions); Section 5.16 (Discharge of Deck Drainage, Bilge Water, Sewage, Greywater, and Putrescible Waste); Section 5.8 (Discharge of PFW and Ballast Water); Section 5.11 (Planned Maintenance, Inspection and Repair Discharges), each with residual impact ratings of Low to Medium. However, as the Operational Area, worst-case light and noise assessment areas from the Wandoo Facility and other reasonably foreseeable projects overlap foraging, internesting, nesting, mating and migrating corridor BIAs and habitat critical to the survival of the species, there is the potential of material successive, additive or synergistic material cumulative impacts to marine turtles. Species carried forward for detailed assessment are: • Flatback turtle (Listed as 'Vulnerable', marine and	High - assessment outcome and impacts are well understood.	Yes – further assessment is required to determine if cumulative impacts are acceptable as marine turtle BIAs and habitat critical may be overlapped by multiple offshore activities.

Environmental Component	Key Environmental Matter	Wandoo Facility Aspects										Relevant EPOs	Cumulative Impact Scoping: Based on Planned Aspects from the Wandoo Facility and Reasonably Foreseeable Future Projects				
		Interaction with Other Marine Users	Seabed Disturbance	Noise Emissions	Atmospheric and GHG Emissions	Light Emissions	Discharge of Cooling Water	Discharge of Deck Drainage, Bilge, Sewage, Greywater, Putrescible Waste	Discharge of PFW and Ballast Water	Discharge of Chemicals and Hydrocarbons	Discharge of Desalination		Potential for cumulative impact - Spatial	Potential for cumulative impact - Temporal	Material cumulative cause-effect pathway	Level of Certainty of Scoping Assessment	Does the material cumulative impact require detailed assessment?
															migratory under the EPBC Act); • Green turtle (Listed as 'Vulnerable', marine and migratory under the EPBC Act); • Loggerhead turtle (Listed as 'Endangered', marine and migratory under the EPBC Act); and • Hawksbill turtle (Listed as 'Vulnerable', marine and migratory under the EPBC Act).		
Protected and Significant Areas	AMPs					✓						EPO-OP-11: Impacts to marine fauna from light emissions will be limited to temporary behavioural change localised to the light source, with no species population-level impacts.	Yes – worse-case flaring light assessment boundary overlaps Dampier AMP and Montebello AMP.	Yes – Seasonal presence overlaps with AMP values.	The Dampier and Montebello AMPs represent important habitat for threatened marine turtles, such as flatback, hawksbill, and loggerhead turtles as conservation values of the AMPs. The AMPs also include a range of species, such as protected fish and seabird species, as well as species listed as threatened, migratory, marine or cetacean under the EPBC Act as values. The Wandoo Facility and other reasonably foreseeable project activities have the potential to cause minor behavioural impacts to migratory seabirds and fish, however no material successive, additive or synergistic cumulative impacts pathways have been identified for any such species. However, minor behavioural impacts to marine turtles undertaking biologically important behaviours may occur as assessed in Section 5.14 (Light Emissions) with a	High - assessment outcome and impacts are well understood	Yes – further assessment required for AMP's conservation value of marine turtles to determine if cumulative impacts are acceptable as marine turtle BIAs and habitat critical to the survival of a species may be overlapped by multiple offshore activities.

Environmental Component	Key Environmental Matter	Wandoo Facility Aspects										Relevant EPOs	Cumulative Impact Scoping: Based on Planned Aspects from the Wandoo Facility and Reasonably Foreseeable Future Projects				
		Interaction with Other Marine Users	Seabed Disturbance	Noise Emissions	Atmospheric and GHG Emissions	Light Emissions	Discharge of Cooling Water	Discharge of Deck Drainage, Bilge, Sewage, Greywater, Putrescible Waste	Discharge of PFW and Ballast Water	Discharge of Chemicals and Hydrocarbons	Discharge of Desalination		Potential for cumulative impact - Spatial	Potential for cumulative impact - Temporal	Material cumulative cause-effect pathway	Level of Certainty of Scoping Assessment	Does the material cumulative impact require detailed assessment?
															residual impact rating of Medium. However, as the worse-case flaring light assessment boundary from the Wandoo Facility and other reasonably foreseeable project activities overlap the AMPs, there is the potential of material successive, additive or synergistic cumulative impacts to marine turtles. Therefore, the following species are carried through for detailed assessment: • Flatback turtle (Listed as 'Vulnerable', marine and migratory under the EPBC Act); • Green turtle (Listed as 'Vulnerable', marine and migratory under the EPBC Act); • Loggerhead turtle (Listed as 'Endangered', marine and migratory under the EPBC Act); and • Hawksbill turtle (Listed as 'Vulnerable', marine and migratory under the EPBC Act).		
Social and Economic Environment	Commercial Fisheries	✓										EPO-OP-13: No interference with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted.	Yes – fishing management and license areas are overlapped.	Yes – activities will occur during fishing seasons.	The Wandoo Facility and other reasonably foreseeable projects have the potential to cause a localised and temporary change to the functions, interests, and activities of commercial fisheries as assessed in Section 5.20 (Interaction with Other Marine Users) but with a residual impact rating of Low. Temporary and localised changes in fishing activities to avoid the Wandoo Facility	High - assessment outcome and impacts are well understood	No - material cumulative impacts are not anticipated.

Environmental Component	Key Environmental Matter	Wandoo Facility Aspects										Relevant EPOs	Cumulative Impact Scoping: Based on Planned Aspects from the Wandoo Facility and Reasonably Foreseeable Future Projects				
		Interaction with Other Marine Users	Seabed Disturbance	Noise Emissions	Atmospheric and GHG Emissions	Light Emissions	Discharge of Cooling Water	Discharge of Deck Drainage, Bilge, Sewage, Greywater, Putrescible Waste	Discharge of PFW and Ballast Water	Discharge of Chemicals and Hydrocarbons	Discharge of Desalination		Potential for cumulative impact - Spatial	Potential for cumulative impact - Temporal	Material cumulative cause-effect pathway	Level of Certainty of Scoping Assessment	Does the material cumulative impact require detailed assessment?
															activities will not cause material change or result in material successive, additive or synergistic cumulative impacts to commercial fisheries The Wandoo Facility and other reasonably foreseeable projects have the potential to cause minor behavioural impacts to fish (as assessed in Section 5.12 (Noise Emissions), however, activities are not expected to affect the local ecosystem function or fish population. Therefore, indirect material successive, additive or synergistic cumulative impacts to commercial fisheries are not expected.		
	Commercial Shipping	✓										EPO-OP-13: No interference with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted.	Yes – No spatial overlap with commercial shipping routes but occasional traffic present.	Yes – Temporal overlap but results in no interference.	The Wandoo Facility and other reasonably foreseeable projects have the potential to cause temporary and localised changes in shipping movements as assessed in Section 5.20 (Interaction with Other Marine Users) with a residual impact rating of Low. Based on the spatial and temporal overlap of the Wandoo Facility with other reasonably foreseeable project activities and the localised scale of potential impacts, no material successive, additive or synergistic cumulative cause-effect pathways were identified.	High - assessment outcome and impacts are well understood	No - material cumulative impacts are not anticipated.
	Oil and Gas Industry		✓									EPO-OP-13: No interference with other marine users to a greater extent than is necessary for the	No – No direct spatial overlap with other operators' petroleum activities,	Yes – Potential for temporal overlap with other activities.	The Wandoo Facility and other reasonably foreseeable projects have the potential to overlap temporally but with no direct spatial overlap with offshore petroleum activities,	High - assessment outcome and impacts are well understood	No - material cumulative impacts are not anticipated.

Environmental Component	Key Environmental Matter	Wandoo Facility Aspects										Relevant EPOs	Cumulative Impact Scoping: Based on Planned Aspects from the Wandoo Facility and Reasonably Foreseeable Future Projects				
		Interaction with Other Marine Users	Seabed Disturbance	Noise Emissions	Atmospheric and GHG Emissions	Light Emissions	Discharge of Cooling Water	Discharge of Deck Drainage, Bilge, Sewage, Greywater, Putrescible Waste	Discharge of PFW and Ballast Water	Discharge of Chemicals and Hydrocarbons	Discharge of Desalination		Potential for cumulative impact - Spatial	Potential for cumulative impact - Temporal	Material cumulative cause-effect pathway	Level of Certainty of Scoping Assessment	Does the material cumulative impact require detailed assessment?
												exercise of right conferred by the titles granted.	titles or operational areas.		titles or Operational Areas, as assessed in Section 5.20 (Interaction with Other Marine Users) with a residual impact rating of Low. Operations and activities will be limited to within each operators title; therefore, the only overlap will be the activities' worst-case light and noise assessment areas which extend beyond the title areas. Impacts from light and noise from the Wandoo Facility on other offshore industry will be negligible and will not result in material cumulative impacts to the other offshore industry activities.		

Environmental Component	Key Environmental Matter	Wandoo Facility Aspects										Relevant EPOs	Cumulative Impact Scoping: Based on Planned Aspects from the Wandoo Facility and Reasonably Foreseeable Future Projects				
		Interaction with Other Marine Users	Seabed Disturbance	Noise Emissions	Atmospheric and GHG Emissions	Light Emissions	Discharge of Cooling Water	Discharge of Deck Drainage, Bilge, Sewage, Greywater, Putrescible Waste	Discharge of PFW and Ballast Water	Discharge of Chemicals and Hydrocarbons	Discharge of Desalination		Potential for cumulative impact - Spatial	Potential for cumulative impact - Temporal	Material cumulative cause-effect pathway	Level of Certainty of Scoping Assessment	Does the material cumulative impact require detailed assessment?
First Nations	Sea Country		✓										Yes – Overlap with First Nations values, such as Sea Country and marine turtle BIAs and habitat critical to the survival of a species.	Yes – Seasonal presence overlap with cultural values.	The Wandoo Facility and other reasonably foreseeable projects and activities have the potential to cause change in cultural heritage values. No planned impacts to submerged cultural heritage are predicted from Wandoo Facility as there are no known Traditional Owners artefacts or specific sites of cultural value associated with the seabed within the Operational Area. Furthermore, no claims or objections were made by Traditional Owner stakeholder groups regarding seabed disturbance within the Operational Area. Based on the activities of the Wandoo Facility impacts to cultural heritage is expected to be negligible and will not result in material cumulative impacts to cultural heritage values. As assessed above, marine turtles, have the potential to be impacted by cumulative impacts from the Wandoo Facility and other reasonably foreseeable projects. Marine turtles are identified as a First Nations cultural value (refer to Section 3.7.6). Therefore, the assessment undertaken in Section 6.3 will acknowledge the importance of marine turtles as both an ecological and cultural value.	Impacts are identified through stakeholder consultation.	No - material cumulative impacts are not anticipated.

6.3 Detailed Cumulative Impact Assessment

Marine turtles were identified by the process above to require a detailed cumulative impact assessment (Table 6-2).

The CIA for each aspect and environmental component involved identifying the receptor's conservation or other relevant values (e.g., EPBC Act–listed species, MNES, commercial or cultural significance), the applicable legislative or policy requirements, and the relevant spatial and temporal extents—including BIAs, periods of receptor presence, and any biologically important behaviours or life-cycle stages. Relevant actions or obligations arising from these requirements were also confirmed.

The assessment then defined the acceptable impact level, described the threatening processes associated with the aspect, characterised the existing environment, and outlined the spatial and temporal extent of project-related threats. Other reasonably foreseeable future projects with overlap in these extents were identified.

Potential cumulative impacts were assessed by describing the cumulative impact pathway, the level of certainty, existing and additional control measures, and the aspect-specific cumulative impact consequence level. Where relevant, a combined cumulative impact consequence level was also determined in accordance with the VOGA Environmental Risk Matrix (Table 4-1).

Table 6-3 provides a detailed CIA for marine turtle species identified in the scoping assessment.

Table 6-3: Detailed CIA – Marine turtles

Key Environmental Matter	Marine Reptiles – Marine Turtles
Conservation (or other) Value and Status	The Operational Area for the Wandoo Facility overlaps BIAs or habitat critical to the survival of the species for one species of marine turtle: • Flatback turtle (Listed as 'Vulnerable', marine and migratory under the EPBC Act) – internesting buffer, habitat critical The 57 km light emission buffer for the Wandoo Facility overlaps BIAs or habitat critical to the survival of the species for the following species of marine turtle: • Flatback turtle (Listed as 'Vulnerable', marine and migratory under the EPBC Act) ○ BIAs: aggregation, foraging, internesting, internesting buffer, mating, migration corridor, and nesting ○ Habitat critical to the survival of a species • Green turtle (Listed as 'Vulnerable', marine and migratory under the EPBC Act) ○ BIAs: aggregation, basking, foraging, internesting, internesting buffer, mating, migration corridor, nesting ○ Habitat critical to the survival of a species • Hawksbill turtle (Listed as 'Vulnerable', marine and migratory under the EPBC Act) ○ BIAs: foraging, internesting, internesting buffer, mating, migration corridor, and nesting ○ Habitat critical to the survival of a species • Loggerhead turtle (Listed as 'Endangered', marine and migratory under the EPBC Act) ○ BIAs: internesting buffer and nesting Marine turtles are identified as a First Nation cultural value within Section 3.7.6. Marine turtles are identified as a culturally important species with marine turtles and their eggs both identified as an important food sources for some First Nations groups.
Legislative or Other Requirements	Guidance on key terms within the Recovery Plan for Marine Turtles in Australia 2017-2027 (CoA, 2017), identified anthropogenic threats relevant to the Wandoo Facility: • Light pollution; • Habitat modification; and • Noise interference.
Relevant Wandoo Facility Spatial and Temporal Extent of Key Environmental Matter	**Flatback turtle** All recorded nesting beaches for flatback turtles are located in tropical to sub-tropical Australian waters, which is known to occur in summer months from October to March. On the NWS, significant rookeries occur on Barrow Island, Montebello Islands, Thevenard Island, Varanus Island, Lowendal Islands, King Sound, Dampier Archipelago and Delambre Island (Section 3.4.3.6; Figure 3-22). The worse-case flaring light assessment boundary (57 km) for the Wandoo Facility overlaps the following flatback turtle BIAs/habitat critical that are relevant to the sensitive life stages for artificial light: • Nesting BIA (0.7% overlap) • Internesting BIA (0.1% overlap) • Internesting buffer BIA (7.1% overlap). **Green turtle** Green turtles nest, forage and migrate across tropical northern Australia. Green turtles are common in the NWMR, with significant rookeries located on Barrow Island, Lacepede Islands, Montebello Islands, Dampier Archipelago, Browse Island and North-West Cape (Section 3.4.3.6, Figure 3-23). The worse-case flaring light assessment boundary (57 km) for the Wandoo Facility overlaps the following green turtle BIAs/habitat critical that are relevant to the sensitive life stages for artificial light:: • Nesting BIA (4.9% overlap) • Internesting BIA (0.4% overlap) • Internesting buffer BIA (8.9% overlap). **Hawksbill turtle** The largest known nesting area for the NWS population of hawksbill turtles is Rosemary Island and lower density nesting on Barrow Island, Airlie Island, Muiron Islands and North-west Cape, with peak breeding occurring between July and March (Section 3.4.3.6, Figure 3-24). The worse-case flaring light assessment boundary (57 km) for the Wandoo Facility overlaps the following hawksbill turtle BIAs/habitat critical that are relevant to the sensitive life stages for artificial light:

Key Environmental Matter	Marine Reptiles – Marine Turtles		
	• Nesting BIA (3.1% overlap) • Internesting BIA (0.6% overlap) • Internesting buffer BIA (11.1% overlap). **Loggerhead turtle** The loggerhead turtle has a global distribution throughout tropical, sub-tropical and temperate waters. Loggerhead turtles nest on the Muiron Islands, with nesting and breeding occurs from November to March (Section 3.4.3.6, Figure 3-25). The worse-case flaring light assessment boundary (57 km) for the Wandoo Facility overlaps the following loggerhead turtle BIAs that are relevant to the sensitive life stages for artificial light: • Nesting BIA (0.2% overlap) • Internesting buffer BIA (14.6% overlap). The worse-case flaring light assessment boundary for the Wandoo Facility does not overlap any loggerhead foraging, migration or mating BIAs, or habitat critical to the survival of the species.		
Relevant Actions from Legislative or Other Requirements	The Recovery Plan for Marine Turtles in Australia 2017-2027 (CoA, 2017) recommend: • Artificial light within or adjacent to habitat critical to the survival of marine turtles will be managed such that marine turtles are not displaced from these habitats; and • Identify the cumulative impact on turtles from multiple sources of onshore and offshore light pollution. National Light Pollution Guidelines for Wildlife (DCCEEW, 2023c) recommend: • Always using Best Practice Lighting Design to reduce light pollution and minimise the effect on wildlife; and • Undertaking an Environmental Impact Assessment for effects of artificial light on listed species for which artificial light has been demonstrated to affect behaviour, survivorship or reproduction.		
EPO(s) manage impacts to acceptable level	The Wandoo Facility will be managed to ensure that the following relevant EPOs are maintained: • EPO-OP-07: Impacts to marine fauna from noise emissions will be limited to temporary behavioural change localised to the noise source, with no species population-level impacts. • EPO-OP-11: Impacts to marine fauna from light emissions will be limited to temporary behavioural change localised to the light source, with no species population-level impacts. • EPO-OP-06: No serious or irreversible change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health. • EPO-OP-12: No serious or irreversible harm to a Threatened or Migratory listed species.		
Planned Project Aspects Relevant to Identified Threats	**Discharges (PFW, Ballast Water, Cooling Water, Chemicals, Hydrocarbons)**	**Light Emissions**	**Noise Emissions**
Threatening Processes Relevant to Aspect	The Recovery Plan for Marine Turtles in Australia 2017-2027 states that chemical and terrestrial discharge is a threat to marine turtle species.	The Recovery Plan for Marine Turtles in Australia 2017-2027 states that artificial light poses a threat to marine turtles because it disrupts critical behaviours, specifically nesting and hatching activities.	The Recovery Plan for Marine Turtles in Australia 2017-2027 states noise interference as a threat to marine turtles. Whilst it is not known how noise affects marine turtles' temporary exposure to loud noise, it may result in avoidance of important habitats and in some situations physical damage to turtles.
Baseline Environmental Condition	Water quality within the Wandoo Facility area is detailed within Section 3.3.2. Marine turtle BIAs/critical habitats are overlapped by other offshore industries (Section 3.4.3.6).	Marine turtle BIAs/critical habitats are overlapped by minor levels of shipping, low commercial fishing effort, and a few existing offshore oil and gas activities (Section 3.5) which have associated activities that may generate artificial light.	Marine turtle BIAs/critical habitats are overlapped by minor levels of shipping, low commercial fishing effort, and a few existing offshore oil and gas activities (Section 3.5) which have associated activities that may generate underwater noise.
Relevant Spatial and Temporal Extent of Wandoo Facility Identified Threats	Localised and short-term discharge plumes overlap internesting BIAs for the flatback turtle from the Wandoo Facility as described in Section 2 (Description of the Petroleum Activity) and assessed in: • Section 5.16 (Discharge of Deck Drainage, Bilge Water, Sewage, Greywater, and Putrescible Waste) • Section 5.8 (Discharge of PFW and Ballast Water)	Localised and short-term artificial light emissions overlapping BIAs (flatback, green, loggerhead and hawksbill turtles) and habitat critical to the survival of the species (flatback, green, hawksbill turtles) from the Wandoo Facility as described in Section 2 (Description of the Petroleum Activity) and assessed in Section 5.14 (Light Emissions).	Localised and short-term underwater sound EMBAs overlapping internesting BIAs and habitat critical for the flatback turtle from the Wandoo Facility as described in Section 2 (Description of the Petroleum Activity) and assessed in Section 5.12 (Noise Emissions).

Key Environmental Matter	Marine Reptiles – Marine Turtles		
	• Section 5.11 (Planned Maintenance, Inspection and Repair Discharges)		
Other Reasonably Foreseeable Projects / Activities Relevant to Aspect	The following aspects from other reasonably foreseeable future activities have the potential to cause cumulative impacts to biologically important activities: • Commercial shipping; • Commercial fishing; • Operations – Jadestone, Santos, Woodside; • Drilling – Woodside; • Survey – Woodside; • Decommissioning –Santos	The following aspects from other reasonably foreseeable future activities have the potential to cause cumulative impacts to biologically important activities: • Commercial shipping; • Commercial fishing; • Operations – Jadestone, Santos, Woodside; • Drilling – Woodside; • Survey – Woodside; • Decommissioning –Santos	The following aspects from other reasonably foreseeable future activities have the potential to cause cumulative impacts to biologically important activities: • Commercial shipping; • Commercial fishing; • Operations – Jadestone, Santos, Woodside; • Drilling – Woodside; • Survey – Woodside; • Decommissioning –Santos
Description of Cumulative Impacts	The Wandoo Facility Operational Area has minimal overlap with turtle BIAs with impacts from discharges considered negligible. Changes to water quality from discharges are assessed in Section 5.16 (Discharge of Deck Drainage, Bilge Water, Sewage, Greywater, and Putrescible Waste); Section 5.8 (Discharge of PFW and Ballast Water); Section 5.11 (Planned Maintenance, Inspection and Repair Discharges), with residual impact ratings of Low to Medium. **Successive and Additive impacts -** Foraging marine turtles transiting through the area may pass through discharge plumes produced from the Wandoo Facility and other reasonably foreseeable projects. Exposure to toxins and other chemicals in operational and subsea discharges are not anticipated to result in injury or mortality to marine turtles. The metocean environment typical of the NWS features energetic surface and intertidal tides, nonlinear internal waves and episodic cyclone activity, resulting in large amounts of vertical mixing which supports the expected rapid dispersion rate of the operational discharges. Therefore, the potential exposure of discharge plumes to mobile species, such as marine turtles, in this open water environment is anticipated to be intermittent and brief and preclude chronic exposure and injury. Impact to marine turtles from discharges from other reasonably foreseeable project activities will be of a similar nature and scale to those predicted from the Wandoo Facility. Overlap in spatial and temporal extent of impacts from activity discharges would only occur if activities were located in very close proximity, i.e. less than 1 km apart, and occurred at the same time. Based on	Impacts to turtle species from Wandoo Facility light emissions are assessed in Section 5.14 (Light Emissions) with a residual impact rating of Medium. **Successive and Additive impacts -** Artificial light emissions generated from the Wandoo Facility and other reasonably foreseeable projects may cause minor disruption to marine turtles transiting through the area or undertaking biologically important activities. The primary impact from artificial light is the disruption to females undertaking biologically important activities, such as disrupting nest site selection and the orientation of females on the beach (Witherington and Martine, 2023), sea-finding of hatchlings (Pendoley and Kamrowski, 2015), and hatchling orientation to reach the sea indirectly causing increased mortality from predation (Salmon and Witherington, 1995). As described in Section 5.14.2, the largest potential impact area identified for the Wandoo Facility was 57 km radius from the boundary of the Operational Area during flaring activities. However, the National Light Pollution Guidelines for Wildlife (DCCEEW 2023c) state that the furthest distance marine turtle hatchlings have been documented to detect and respond to artificial light is 18 km from the light source. The Operational Area is located more than 35 km from the nearest shoreline, and the flaring activities which require the 57 km worst-case light assessment boundary are planned to be intermittent and temporary in nature (15 min). As such, minor disruptions are expected to occur only to marine turtles transiting through the area to biologically important areas, or undertaking biologically important activities such as foraging. Impacts to marine turtles from artificial light emissions from other reasonably foreseeable projects and activities will be similar, if not smaller, in nature and scale to those predicted from the Wandoo Facility. Given that temporary and short-term impacts are expected to only impact individual marine turtles transiting or foraging within the area, impacts at a population level are not expected. In addition, the locations of the Wandoo Facility and other reasonably foreseeable activities are isolated and separated such that areas of behavioural	The Wandoo Facility has minimal overlap with the turtle BIAs with impacts from noise emissions considered low. Impacts turtle species from underwater noise emissions are assessed in Section 5.12 (Noise Emissions) with a residual impact rating of Low. **Successive and Additive impacts -** Individuals transiting through the Operational Area or underwater noise assessment area may be impacted by continuous noise generated from the Wandoo Facility and other reasonably foreseeable projects. Impacts may include behavioural impacts, such as the exertion of more energy to avoid the temporary and localised impulsive sound, TTS, and/or PTS. As described in Section 5.12.3.1, the furthest continuous underwater noise assessment area for marine turtles from the Wandoo Facility sources is 4.58 km to reach the TTS criteria threshold. This is assumed representative of continuous sound sources from other reasonably foreseeable projects and activities. Based on the worst-case distance of 4.58 km, the likelihood of cumulative impacts occurring is low. Vessels / activities external to the Wandoo Facility activities would rarely be within 4.58 km, therefore overlap in continuous underwater noise assessment areas is not expected. Even if several similar activities were being undertaken at once within the marine turtle BIAs, the overall footprint of continuous sound impacts would still be minimal. Furthermore, any behavioural impact to marine turtles, such as avoidance or masking, within the internesting BIAs from multiple continuous sources is not expected to prevent biologically important behaviours from continuing. In addition, the locations of the Wandoo Facility and other reasonably foreseeable activities are isolated and separated such that areas of behavioural impact would not form barriers to the migration of turtle species or other biological important behaviours. **Synergistic impacts –** none identified.

Key Environmental Matter	Marine Reptiles – Marine Turtles		
	Table 6-2, this is not credible, and therefore successive or additive cumulative impacts from planned discharges are not expected. **Synergistic impacts –** none identified.	impact would not form barriers to the migration of turtle species or other biologically important behaviours. As such, successive or additive cumulative impacts from the Wandoo Facility or other reasonably foreseeable projects are not expected to prevent biologically important behaviours from continuing. **Synergistic impacts –** none identified.	
Certainty of Assessment	High certainty in the limited potential for cumulative impacts based on previous impact assessment in: • Section 5.16 (Discharge of Deck Drainage, Bilge Water, Sewage, Greywater, and Putrescible Waste) • Section 5.8 (Discharge of PFW and Ballast Water) • Section 5.11 (Planned Maintenance, Inspection and Repair Discharges)	High certainty in the limited potential for cumulative impacts based on previous impact assessment in: • Section 5.14 (Light Emissions)	High certainty in the limited potential for cumulative impacts based on previous impact assessment in: • Section 5.12 (Noise Emissions)
Existing Control Measures	• Support vessels (and facilities) are required to comply with MARPOL 73/78 Annex I, Annex IV, Annex V, and AMSA Marine Orders 91 and 96. • Vessels >400T or certified for >15 persons must comply with MARPOL 73/78 (Annex IV; Regulation 8) • No bilge discharged from vessels within the 500 m restricted zone. • Drip trays or bunds are used where required to contain potential residual spills. • Bulk hazardous chemicals are transported in chemical cradles. • Drainage from decks in hazardous areas is collected through hazardous drain system. • Maintenance of sewage and food waste macerator systems. • Instrument protective and alarm systems (interface level low level trips in production and second stage separators). • OIW concentration monitored and alarmed in the MCS. • PFW discharge overboard can be diverted inboard. • PFW discharge flow rates are monitored. • Routine external laboratory testing to ensure PFW chemistry is within assumed levels. • Produced Water Adaptive Management Strategy [WNB-7000-RP-0010]. • Ballast water discharge overboard can be deferred to allow for fault finding. • Chemical dosing concentrations are monitored. • Chemical assessment and selection process. • Routine pigging procedures. • Biocide treated water management.	• Lighting will be limited to the minimum required for navigational and safety requirements, with the exception of emergency events.	• The interaction of vessels with cetaceans within the Wandoo Field will be consistent with the EPBC Regulations (2000) where practicable. • For geophysical and hydrographic surveys, the interaction of vessels with cetaceans within the Wandoo Field will be consistent with the EPBC Regulations (2000) where practicable. • Vessel engines and power generation equipment maintained to optimise smooth running. • Vessels operating in the Operational Area must adhere to Part 8 of EPBC Regulation 2000 to minimise exposure of marine fauna to noise impacts.

Key Environmental Matter	Marine Reptiles – Marine Turtles		
	• All hazardous liquid chemicals are stored in bunded areas/chemical cradles. • Sulphamic acid neutralisation.		
Additional Control Measures / Environmental Performance Standards	Recognising the shared responsibility for managing cumulative impacts, VOGA will actively collaborate with other petroleum titleholders, share relevant data and promote coordinated efforts to ensure that all reasonably foreseeable projects and activities adhere to acceptable environmental standards to mitigate cumulative impacts. Additional Controls: Observation, incidents, and opportunities for improvement regarding the interaction with other users will be reported to other petroleum titleholders. This commitment has been adopted and included against 'Consultation/notification with relevant stakeholders including AusCoast/AMSA notification as required.' Each future EP resulting from the Wandoo Facility will undertake a review for additional or significantly revised reasonably foreseeable projects. Additional or significantly revised projects will be assessed as per CIA methodology (Section 6.1). Any cumulative impacts from new, significantly revised or currently unknown activities that results in an unacceptable level of impact to receptors, will be subject to new or revised control measures within the appropriate EP to reduce cumulative impacts to ALARP.		
Aspect Specific Cumulative Consequence	1 (Incidental)	2 (Minor)	1 (Incidental)
Combined Cumulative Consequence	2 (Minor) The combination of multiple temporary and localised activities and the minor behavioural impacts to marine turtles in the NWS will result in short-term impacts to species of recognised conservation value. Short-term minor impacts to foraging marine turtles are not expected to affect population levels.		
EPO Achieved	Yes – the consequence of combined cumulative impacts of Level 2 is considered acceptable because potential cumulative impacts are not inconsistent with the Recovery Plan for Marine Turtles in Australia 2017-2027 (CoA, 2017c) such that marine turtles biologically important behaviours are not prevented from continuing; and the objectives of the North-west Marine Park Network Management Plan (DNP, 2018).		

Section 7 Environmental Performance Outcomes

Section 21 of the OPGGS(E)R requires an EP to include Environmental Performance Outcomes (EPOs), control measures, Environmental Performance Standards (EPSs) and measurement criteria (Section 4). To ensure environmental performance is maintained to ALARP and acceptable levels, EPOs, control measures, EPSs and measurement criteria have been defined for the activity. EPOs are listed in Table 7-1 and control measures, EPSs and measurement criteria are listed in Table 7-2.

Table 7-1: Environmental Performance Outcomes

Reference	Environmental Performance Outcome
EPO-OP-01	No unplanned discharge of hydrocarbons or chemicals to the marine environment.
EPO-OP-02	In the event of loss of hydrocarbons, implement NOPSEMA-accepted spill response documents.
EPO-OP-03	No impact to the environment outside the mixing zone from planned discharge of PFW and ballast water.
EPO-OP-04	No introduction, establishment or spread of a known or potential invasive marine species.
EPO-OP-05	No unplanned overboard loss of waste or solid objects to the marine environment.
EPO-OP-06	No serious or irreversible change in water quality which may adversely impact on biodiversity, ecological integrity, social amenity or human health.
EPO-OP-07	Impacts to marine fauna from noise emissions will be limited to temporary behavioural change localised to the noise source, with no species population-level impacts.
EPO-OP-08	Air emissions requirements from vessels within the Operational Area are consistent with Marine Order 97 requirements.
EPO-OP-09	The Wandoo Facility will not interfere with Australia's GHG commitments to the Paris Agreement under the *Climate Change Act 2022*.
EPO-OP-10	Product generated from the Wandoo Facility will only be sold to customers (first sale) from countries that are signatories to the Paris Agreement or have a net zero commitment, as at the date of the relevant contract of sale.
EPO-OP-11	Impacts to marine fauna from light emissions will be limited to temporary behavioural change localised to the light source, with no species population-level impacts.
EPO-OP-12	No serious or irreversible harm to a Threatened or Migratory listed species.
EPO-OP-13	No interference with other marine users to a greater extent than is necessary for the exercise of right conferred by the titles granted.
EPO-OP-14	No serious or irreversible changes to the seabed which may adversely impact on biodiversity, ecological integrity, social amenity or human health.

Table 7-2: Control measures, Environmental Performance Standards and Measurement Criteria

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-1.1 Primary well control systems.	EPS-1.1.1 Well control shall be maintained at all times during well intervention operations.	MC-1.1.1 The VOGA Well intervention Inspection Checklist (which includes confirmation that monitoring equipment is in place and working) has been completed prior to commencement of well work.	EPO-OP-01
CM-1.2 Secondary well control equipment.	EPS-1.2.1 Well Control and Pressure Control Equipment shall be appropriate for providing control of the well.	MC-1.2.1 The VOGA Rig Inspection Checklist, which includes confirmation that Well Control Equipment is available and in serviceable condition, is completed.	EPO-OP-01
CM-1.3 Well barrier envelope.	EPS-1.3.1 Well barriers are confirmed to contain anticipated pressure during the program and be in accordance with the Well Intervention program.	MC-1.3.1 The required status of well barriers, and their verifications are specified in the Well Intervention Programme. Barrier verifications shall be recorded on a Barrier Verification Sheet, which shall be signed off. Whenever the status of the barriers change, the barrier verification process shall be recorded, and appropriately signed, on a Barrier Verification Sheet.	EPO-OP-01

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
	EPS-1.3.2 All cement slurries when designed to act as barriers shall, following implementation, result in the cured cement providing a barrier which meets the barrier specifications defined in the WCSM.	MC-1.3.2 The results of cementation operations will be verified by VOGA Well intervention Supervisor to confirm that VOGA's barrier specifications have been met.	
CM-1.4 Well design.	EPS-1.4.1 Instrumentation & Casings defined in the containment envelope (barrier). Wellhead and trees shall contain pressurised hydrocarbons.	MC-1.4.1 Records from leak of tests for Wandoo A and B wells (Ref A0001904 to A0001908 and A00002124). Records from Wellhead Maintenance for WNA and WNB Wells (Ref A0001900 to A0001902, A0003018 to A0003021, A00002125 and A00002126)	EPO-OP-01
	EPS-1.4.2 WAVs shall close on demand and contain pressurised hydrocarbons.	MC-1.4.2 Records from leak of tests for Wandoo A and B wells (Ref A0001904 to A0001908 and A00002124). Records from Wellhead Maintenance for WNA and WNB Wells (Ref A0001900 to A0001902, A0003018 to A0003021, A00002125 and A00002126).	

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
	EPS-1.4.3 SSSVs shall isolate well fluids.	MC-1.4.3 Records from leak of tests for Wandoo A and B wells (Ref A0001904 to A0001908 and A00002124). Records from Wellhead Maintenance for WNA and WNB Wells (Ref A0001900 to A0001902, A0003018 to A0003021, A00002125 and A00002126).	
	EPS-1.4.4 GLV shall isolate well fluids.	MC-1.4.4 Records from leak of tests for Wandoo A and B wells (Ref A0001904 to A0001908 and A00002124). Records from Wellhead Maintenance for WNA and WNB Wells (Ref A0001900 to A0001902, A0003018 to A0003021, A00002125 and A00002126).	
	EPS-1.4.5 Production and Surface Annuli shall contain pressurised hydrocarbons should a primary barrier fail.	MC-1.4.5 Records of Production and surface casing. pressures measured and documented in lab records.	
CM-1.5 Instrumentation initiators, alarms and final elements.	EPS-1.5.1 Performance criteria to ensure maintenance and inspection of instrumentation initiators, alarms and final elements relevant to wells, as per the following: • WAN-WNAB-CE-DC-02 - Instrument Protective and Alarm Systems • WAN-WNAB-CE-DC-07 - Integrated Control System • WAN-WNAB-CE-PR-02-02 – WAVs.	MC-1.5.1 Assurance records, as per • WAN-WNAB-CE-DC-02 - Instrument Protective and Alarm Systems • WAN-WNAB-CE-DC-07 - Integrated Control System • WAN-WNAB-CE-PR-02-02 – WAVs.	EPO-OP-01

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-1.6 Well integrity management and monitoring of barrier status.	EPS-1.6.1 Well integrity management systems provide for the inspection, maintenance, monitoring and testing of wells to identify deterioration and ensure ongoing integrity.	MC-1.6.1 Well integrity performance monitoring records	EPO-OP-01
CM-1.7 Equipment maintenance, inspection and testing.	EPS-1.7.1 Performance criteria, as per WAN-WNAB-CP-PR-04-02 – Inspection, maintenance, monitoring and testing. Integrity management systems provide for the inspection, maintenance, monitoring and testing of CEs to identify deterioration and ensure ongoing integrity.	MC-1.7.1 Assurance records (audits and KPIs), as per WAN-WNAB-CP-PR-04-02 – Inspection, maintenance, monitoring and testing.	EPO-OP-01
CM-1.8 Permit to work system.	EPS-1.8.1 To ensure that permitted operations are controlled and conducted accordance with the Work Management Manual [WPA-7000-YG-0021].	MC-1.8.1 Permit to work forms are completed in accordance with the Work Management Manual [WPA-7000-YG-0021].	EPO-OP-01
CM-1.9 Contractor/vendor selection and management.	EPS-1.9.1 Contractors/vendors shall undertake activities without compromising VOGA's HSE performance and objectives. A pre-qualification process exists that ensures contractors/vendors have the capability to meet VOGA HSE performance requirements and objectives.	MC-1.9.1 Records of Contractor HSE prequalification records as per requirements of VOGA Contractor/Vendor Selection and Management Manual [VOG-1000-MN-0001].	EPO-OP-01
CM-1.10 Structures (Super- and Substructures).	EPS-1.10.1 Performance criteria, as per WAN-WNAB-CE-PR-07-01 – All structures shall be designed to provide support to critical control measures.	MC-1.10.1 Assurance records, as per WAN-WNAB-CE-PR-07-01 – All structures.	EPO-OP-01

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-1.11 Asset integrity management.	EPS-1.11.1 Inspections and testing undertaken on export system, as per Performance criteria, as per WAN-WNAB-CP-PR-04-04 – Integrity Management. The integrity of critical elements is maintained at all times.	MC-1.11.1 Assurance records, as per Performance criteria, as per WAN-WNAB-CP-PR-04-04 – Integrity Management.	EPO-OP-01
CM-1.12 Lifting management procedures.	EPS-1.12.1 Crane operations shall be managed as per the Crane Operations, Maintenance and Inspection Manual [WPA-7000-YM-0002] to ensure safe lifting operations to prevent dropped objects or swinging loads.	MC-1.12.1 Crane Operator Checklist completed prior to crane operation.	EPO-OP-01
CM-1.13 Crane maintenance.	EPS-1.13.1 Performance criteria, as per WAN-WNAB-CE-PR-05-01 - Platform Cranes and Man-riding Winch shall be maintained to enable safe lifting operations to prevent dropped objects or swinging loads	MC-1.13.1 Assurance records, as per WAN-WNAB-CE-PR-05-01 - Platform Cranes and Man-riding Winch.	EPO-OP-01
CM-1.14 Emergency communications.	EPS-1.14.1 Performance criteria, as per WAN-WNAB-CE-ES-02-01 – UHF/VHF Radios. To ensure communication between CCR and the Emergency Response Team (at any location on the installations), personnel on WNA, personnel on CALM Buoy and external parties.	MC-1.14.1 Assurance records, as per WAN-WNAB-CE-ES-02-01 – UHF/VHF Radios.	EPO-OP-01

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-1.15.1 Navigation aids.	EPS-1.15.1 Performance criteria, as per: WAN-WNAB-CE-PR-06.01 - Navigation Lights. To provide visual indication to marine vessels of the position of the installation (WNA & WNB) so that they may take timely action to avoid the area. WAN-WNAB-CE-PR-06.02 - AIS. To provide marine vessels the position of Wandoo (WNB) so that they may take timely action to avoid the area.	MC-1.15.1 Assurance records, as per: • WAN-WNAB-CE-PR-06.01 - Navigation Lights. • WAN-WNAB-CE-PR-06.02 - AIS.	EPO-OP-01
CM-1.16.1 Platform location published on Marine Charts.	EPS-1.16.1 Wandoo facilities are marked on marine charts and any changes to Wandoo facilities notified via Notices to Mariners.	MC-1.16.1 Records to confirm that Wandoo facilities are on chart and applicable Notice to Mariners.	EPO-OP-01
CM-1.17 500 m PSZ surrounding the facility.	EPS-1.17.1 500 m PSZ surrounding the facility, as per the Wandoo Marine Operations Manual [WNB-1000-YV-0001].	MC-1.17.1 Wandoo Marine Operations Checklist [WNB-1000-NV-0001].	EPO-OP-01 EPO-OP-13
		MC-1.17.2 Notice to Mariners placed with AHO outlining PSZ and time frames of the major projects.	EPO-OP-13
CM-1.18 Station keeping requirements for vessels.	EPS-1.18.1 Dynamic positioning requirements, as per Section 9 of the Wandoo Marine Operations Manual [WNB-1000-YV-0001].	MC-1.18.1 Wandoo Marine Operations Checklist [WNB-1000-NV-0001].	EPO-OP-01
	EPS-1.18.2 Vessels must maintain safe position relative to the Facility at all times, using DP or alternative approved station-keeping methods appropriate to vessel class, capability, and operational tasking.	MC-1.18.2 Wandoo Marine Operations Checklist [WNB-1000-NV-0001].	EPO-OP-01

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-1.19 Vessel operations restricted in adverse weather.	EPS-1.19.1 Vessel operations restricted in adverse weather, as per the Wandoo Marine Operations Manual [WNB-1000-YV-0001].	MC-1.19.1 Wandoo Marine Operations Checklist [WNB-1000-NV-0001].	EPO-OP-01
CM-1.20 Permission required for field entry, CALM Buoy approach, mooring-up and departure.	EPS-1.20.1 Vessels shall comply with permissioning protocols for vessels entering the field, CALM Buoy approach, mooring-up and departure, as per the Wandoo Marine Operations Manual [WNB-1000-YV-0001].	MC-1.20.1 Wandoo Marine Operations Checklist [WNB-1000-NV-0001]. MC-1.20.2 Marine assurance or internal audits confirm adherence to permissioning protocols prior to vessel entry, mooring, or departure.	EPO-OP-01
CM-1.21 Hawser is fit for purpose.	EPS-1.21.1 Hawser, chains and shackles shall be checked for mechanical damage and wear prior to offtake, as per the SPM Marine Facility Procedures [WPA-7000-YV-0002].	MC-1.21.1 Offtake Maintenance Report.	EPO-OP-01
CM-1.22 Shutdown system.	EPS-1.5.1 Performance criteria to ensure maintenance and inspection of instrumentation initiators, alarms and final elements relevant to wells, as per the following: WAN-WNAB-CE-DC-02 - Instrument Protective and Alarm Systems WAN-WNAB-CE-DC-07 - Integrated Control System WAN-WNAB-CE-PR-02-02 – WAVs.	MC-1.22.1 Assurance records.	EPO-OP-01
	EPS-1.22.2 SIMOPS plan shall cover Emergency Shutdown and Wandoo Emergency Response Plan (ERP) actions between well intervention team and Wandoo operations.	MC-1.22.2 SIMOPS plan is issued and available and Well intervention induction covers ERP and ESD response actions.	EPO-OP-01

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-1.23 Marine breakaway coupling on FHA.	EPS-1.23.1 Marine breakaway coupling shall be installed on FHA and designed to part prior to failure of FHA to minimise volume of oil spill.	MC-1.23.1 Marine breakaway coupling testing record. Offtake Maintenance Report.	EPO-OP-01
CM-1.24 CALM Buoy mooring.	EPS-1.24.1 Physical condition and anomalous effects shall satisfy fitness for service.	MC-1.24.1 Records of inspection and maintenance tsks: • A0002147 1010 • A0002145 1010 • A0002057 1010.	EPO-OP-01
CM-1.25 Weather restrictions apply to offtake activities.	EPS-1.25.1 Offtake operations shall be restricted in adverse weather, as per the SPM Marine Facility Procedures [WPA-7000-YV-0002].	MC-1.25.1 Offtake Maintenance Report.	EPO-OP-01
CM-1.26 Wandoo Mooring Master on board tanker during offtake.	EPS-1.26.1 Wandoo Mooring Master meets minimum competency standard as per contract.	MC-1.26.1 Training records confirmed for Mooring Master.	EPO-OP-01
CM-1.27 Static tow by support vessel to control tanker position.	EPS-1.27.1 A support vessel shall be present to assist with each offtake operation and must remain connected to the Tanker, providing static tow, throughout the offtake as per as per the SPM Marine Facility Procedures [WPA-7000-YV-0002].	MC-1.27.1 OSV on hire records. MC-1.27.2 Safety Checklist.	EPO-OP-01
CM-1.28 Operating within design limits.	EPS-1.28.1 Pre-start checks undertaken, as per the SPM Marine Facilities Procedures [WPA-7000-YV-0002].	MC-1.28.1 Offtake Maintenance Report.	EPO-OP-01

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-1.29 Holdback device on marine breakaway coupling.	EPS-1.29.1 Holdback device installed on Marine breakaway coupling to prevent spurious detachment of FHA.	MC-1.29.1 Inspection records.	EPO-OP-01
CM-1.30 Cautionary zones around the subsea production systems are marked on field navigational charts.	EPS-1.30.1 Anchoring location and cautionary zone identified in the Wandoo Marine Operations Manual (vessels) and SPM Marine Facilities Procedures [WPA-7000-YV-0002] (tankers).	MC-1.30.1 Operations log (tankers).	EPO-OP-01
CM-1.31 Tanker navigation aids.	EPS-1.31.1 Regulatory compliant tanker navigation aids, as per the SPM Marine Facilities Procedures [WPA-7000-YV-0002].	MC-1.31.1 Safety Checklist.	EPO-OP-01
CM-1.32 Tanker communications in place.	EPS-1.32.1 Radio communications in place with production facility and available to support vessel and passing vessels during berthing, loading and unberthing.	MC-1.32.1 Safety Checklist.	EPO-OP-01
CM-1.33 Visual monitoring of FHA during offtake.	EPS-1.33.1 Visual monitoring of hose and connections for leaks during loading, including night time operations via torchlight, as per SPM Marine Facilities Procedures [WPA-7000-YV-0002].	MC-1.33.1 Safety Checklist.	EPO-OP-01
CM-1-34 Emergency shutdown of crude oil transfer in the event of a leak.	EPS-1.34.1 Emergency shutdown of crude oil transfer in the event of a leak, as per SPM Marine Facilities Procedures [WPA-7000-YV-0002].	MC-1.34.1 Safety checklist records that emergency shutdown procedures are agreed upon between tanker and production facility.	EPO-OP-01
CM-1.35 Structural design of the CGS.	EPS-1.35.1 Physical condition and anomalous effects shall remain within acceptable limits.	MC-1.35.1 Assurance records, as per WAN-WNAB-CE-PR-07-01 – All structures.	EPO-OP-01

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-1.36 SPM Marine Facilities Procedures [WPA-7000-YV-0002].	EPS-1.36.1 Tankers and Offtake support vessel shall comply with the SPM Marine Facilities Procedures [WPA-7000-YV-0002]: • Offtake operations shall be restricted in adverse weather, • Wandoo Mooring Master meets minimum competency standard • A support vessel shall be present to assist with each offtake operation and must remain connected to the Tanker, providing static tow, throughout the operation.	MC-1.36.1 Offtake Maintenance Report completed for each offtake, confirming compliance with SPM procedures. SPM Terminal Questionnaire (VOG-7000-RV-0001) completed and accepted prior to tanker arrival. Safety Checklist completed and verified. Training records confirm the Mooring Master meets the competency requirements described in the manual Marine assurance or internal audits confirm: • Offtake operations were restricted in adverse weather • A support vessel remained connected and providing static tow • All procedural steps in WPA-7000-YV-0002 were followed.	EPO-OP-01
CM-1.37 Vessel navigational lights.	EPS-1.37.1 All vessels operating within the Operational Area must display navigation lights in accordance with COLREGS, as implemented by Marine Order 30. Lighting must be appropriate to vessel class, length, and operational status (underway, at anchor, restricted in ability to manoeuvre).	MC-1.37.1 Wandoo Marine Operations Checklist [WNB-1000-NV-0001] verifies compliance with vessel class rules and statutory lighting requirements.	EPO-OP-01

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-1.38 Speed limit for all vessels inside Wandoo restricted zone.	EPS-1.38.1 All vessels operating within the Wandoo 500 m Restricted Zone must comply with the speed limits specified in the Wandoo Marine Operations Manual (WNB-1000-YV-0001). Vessel masters must ensure speeds are reduced to safe manoeuvring limits when approaching, operating within, or departing the Restricted Zone to minimise collision risk and maintain safe separation from the Facility.	MC-1.38.1 Wandoo Marine Operations Checklist (WNB-1000-NV-0001) verifies that vessel masters have acknowledged and are complying with Restricted Zone speed limits.	EPO-OP-01
CM-1.39 Vessels have systems and personnel to assist with tracking and identifying vessels in the general area.	EPS-1.39.1 All vessels contracted by VOGA must be equipped with radar, Automatic Identification System (AIS), and VHF radio, and must maintain a continuous bridge watch in accordance with the Wandoo Marine Operations Manual (WNB-1000-YV-0001). These systems and personnel must provide effective tracking, identification, and situational awareness of vessels in the general area to minimise collision risk.	MC-1.39.1 VOGA inspection or marine assurance audit confirms the presence and operability of radar, AIS, and VHF radio on all vessels entering the Operational Area.	EPO-OP-01
CM-1.41 Vessel pump rating.	EPS-1.41.1 Bunkering hoses must be maintained, inspected, and replaced in accordance with the planned maintenance system, including annual hose change-out and pressure testing of hoses and fittings.	MC-1.41.1 Maintenance records confirm annual hose replacement and completion of pressure testing for hoses and fittings.	EPO-OP-01
	EPS-1.41.2 The pressure rating of the diesel bunkering hose must exceed the maximum discharge pressure of the vessel pump.	MC-1.41.2 Records verify that the hose pressure rating exceeds the maximum vessel pump pressure prior to bunkering.	

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-1.42 Quick close breakaway coupling assembly on bunkering hose.	EPS-1.42.1 Refuelling hoses used for diesel bunkering must be fitted with quick close breakaway coupling assembly to minimise the volume of fuel released in the event of excessive hose tension. The breakaway coupling must separate prior to hose tensile failure, ensuring that any loss of containment is limited to the small residual volume within the hose ends. Any non-conformance is recorded and rectified before bunkering operations commence.	MC-1.42.1 VOGA inspection or marine assurance audit confirms the presence and correct installation of quick close breakaway couplings on all bunkering hoses. Pre-bunkering checklists verify coupling integrity and readiness.	EPO-OP-01
CM-1.43 Bunkering procedure.	EPS-1.43.1 Diesel bunkering must be conducted in accordance with WNB-000-105 Diesel Bunkering Operations. Bunkering activities must include: • Pre-operation hose checks • Continuous monitoring of gauges, hoses, fittings and sea surface. Bunkering may be conducted during hours of darkness; however, operations must commence during daylight hours and only proceed when weather conditions remain within procedural limits.	MC-1.43.1 Records confirm bunkering operations undertaken in accordance with WNB-000-105 Diesel Bunkering Operations. Wandoo Diesel Bunkering Report completed for each bunkering event, verifying: • Pre-operation hose checks completed • Continuous monitoring undertaken throughout the operation • Bunkering commenced during daylight hours • Weather conditions remained within procedural limits.	EPO-OP-01
CM-1.44 Crane pedestal tank has level alarms.	EPS-1.44.1 Crane pedestal inspection and maintenance includes level alarm testing.	MC-1.44.1 Maintenance records.	EPO-OP-01

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-1.45 Pipework and pressure vessel containment.	EPS-1.45.1 Performance criteria, as per Hydrocarbon Containment (Static Equipment) Performance Standard (WAN-WNAB-CP-PR-01): • Pipework and pressure vessels shall be inspected for defects, damage or deterioration.	MC-1.45.1 Assurance records, as per Hydrocarbon Containment (Static Equipment) Performance Standard (WAN-WNAB-CP-PR-01).	EPO-OP-01
CM-1.46 Pressure safety devices to prevent overpressure leading to loss of containment.	EPS-1.46.1 Performance criteria, as per Pressure Relief Devices Performance Standard (WAN-WNAB-CE-PR-04): • Pressure relief devices protecting equipment with defined flammable inventories shall be managed.	MC-1.46.1 Assurance records, as per Pressure Relief Devices Performance Standard (WAN-WNAB-CE-PR-04).	EPO-OP-01
CM-1.47 Vessels are designed and tested to maximum allowable operating pressure.	EPS-1.47.1 Performance criteria, as per Hydrocarbon Containment (Static Equipment) Performance Standard (WAN-WNAB-CP-PR-01): • Pipework and pressure vessels shall be inspected for defects, damage or deterioration.	MC-1.47.1 Assurance records, as per Hydrocarbon Containment (Static Equipment) Performance Standard (WAN-WNAB-CP-PR-01).	EPO-OP-01
MC-1.48 Rotating equipment containment.	EPS-1.48.1 Performance criteria, as per Rotating Equipment Performance Standard (WAN-WNAB-CE-PR-03): • Rotating equipment shall be maintained to prevent the loss of containment of hydrocarbons.	MC-1.48.1 Assurance records, as per Rotating Equipment Performance Standard (WAN-WNAB-CE-PR-03).	EPO-OP-01

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
MC-1.49 Instrumentation initiators, alarms and final elements.	EPS-1.49.1 Performance criteria to ensure maintenance and inspection of instrumentation initiators, alarms and final elements relevant to topsides hydrocarbon containment, as per the following: • Instrument Protective and Alarm Systems (WAN-WNAB-CE-DC-02) • Integrated Control System (WAN-WNAB-CE-DC-07) • Shutdown Valves (WAN-WNAB-CE-DC-03) • Blowdown (Vent and Flare) (WAN-WNAB-CE-DC-04).	MC-1.49.1 Assurance records, as per following performance standards: • Instrument Protective and Alarm Systems (WAN-WNAB-CE-DC-02) • Integrated Control System (WAN-WNAB-CE-DC-07) • Shutdown Valves (WAN-WNAB-CE-DC-03) • Blowdown (Vent and Flare) (WAN-WNAB-CE-DC-04).	EPO-OP-01
MC-1.50 Competency management of Wandoo production team members.	EPS-1.50.1 All production team members shall have the required level of role-specific training and be assessed as competent to perform their duties in alignment with the VOGA Training and Competency Performance Standard.	MC-1.50.1 Training and competency records.	EPO-OP-01
CM-1.51 Isolation controls to ensure adequate drainage, venting and positive isolation prior to performing a process break-in.	EPS-1.51.1 Equipment and/or facilities are adequately prepared for work activities to be performed, including safe and environmentally sound draining, venting, purging and isolation. Equipment and/or facilities are reinstated to a safe and environmentally sound working condition after the work activity is completed, and that appropriate personnel are made aware of the revised equipment status.	MC-1.51.1 Isolation records on permit to work forms are completed in accordance with the Work Management Manual [WPA-7000-YG-0021].	EPO-OP-01

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-1.52 Instrument protective and alarm systems (interface level low level trips in production and second stage separators).	EPS-1.52.1 Level transmitters in production and second stage separators are maintained.	MC-1.52.1 Maintenance records.	EPO-OP-01
CM-1.53 Topsides hazardous drains and bunding on WNB.	EPS-1.53.1 There shall be no significant damage or deterioration of bunded areas and drainage systems on WNB such that the system will not contain hydrocarbons.	MC-1.53.1 Maintenance records.	EPO-OP-01
CM-1.54 Flow lines and risers are designed and tested to maximum allowable operating pressure.	EPS-1.54.1 Flow lines and risers shall contain pressurised hydrocarbons.	MC-1.54.1 Assurance records, as per WAN-WNAB-CP-PR-04-02 – Inspection, maintenance, monitoring and testing.	EPO-OP-01
CM-1.55 Flowlines and risers are fitted with instrumentation initiators, alarms and final elements. Platform ESD will close riser shutdown valve.	EPS-1.55.1 Performance criteria to ensure maintenance and inspection of instrumentation initiators, alarms and final elements relevant to hydrocarbon containing flow lines and risers, as per the following: • Instrument Protective and Alarm Systems (WAN-WNAB-CE-DC-02) • Integrated Control System (WAN-WNAB-CE-DC-07) • Export Riser Shutdown Valves inspected and function tested.	MC-1.55.1 Assurance records, as per following performance standards: • Instrument Protective and Alarm Systems (WAN-WNAB-CE-DC-02) • Integrated Control System (WAN-WNAB-CE-DC-07) • Export Riser inspection and test records.	EPO-OP-01
CM-1.56 Process and procedures for managing process system.	EPS-1.56.1 Ensure that permitted operations are controlled and conducted in a safe manner.	MC-1.56.1 Permit to work forms are completed in accordance with the Work Management Manual [WPA-7000-YG-0021].	EPO-OP-01

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-1.57 Pigging procedure specifies correct valve sequence.	EPS-1.57.1 Pigging procedure specifies correct valve sequence within the Wandoo Platform Operations Manual [VOG-7000-MN-0001].	MC-1.57.1 Records of pigging activity in Pigging Report.	EPO-OP-01
CM-1.58 Codes and standards as per facilities' Basis of Design.	EPS-1.58.1 Performance criteria, as per WAN-WNAB-CE-PR-07-01.01 (Superstructure - Primary Structural Steel); WAN-WNAB-CE-PR-07-02.04 (Substructure - Corrosion control measures).	MC-1.58.1 Assurance records, as per WAN-WNAB-CE-PR-07-01.01 (Superstructure - Primary Structural Steel); WAN-WNAB-CE-PR-07-02.04 (Substructure - Corrosion control measures).	EPO-OP-01
CM-1.59 Vessels to adhere to the navigation safety requirements including the *Navigation Act 2012* and any subsequent Marine Orders.	EPS-1.59.1 Vessels compliant with *Navigation Act 2012* and Marine Order 21 (Safety of navigation and emergency procedures) and Marine Order 30 (Prevention of collisions).	MC-1.59.1 Marine assurance inspection records demonstrate compliance with standard maritime safety procedures.	EPO-OP-01 EPO-OP-13
CM-2.1 Wandoo Emergency Response Plan [VOG-2000-RD-0017]/ Source Control Contingency Plan [WNB-3000-PD-0007].	EPS-2.1.1 The Wandoo Emergency Response Plan [VOG-2000-RD-0017] and Source Control Contingency Plan [WNB-3000-PD-0007] shall meet the performance criteria as per WAN-WNAB-CP-ER-01 – Emergency preparedness, managements and response	MC-2.1.1 Assurance criteria as per WAN-WNAB-CP-ER-01 - Emergency preparedness, managements and response.	EPO-OP-02
CM-2.2 The NOPSEMA-accepted Wandoo Field Oil Spill Contingency Plan Document 2: Oil Pollution Emergency Plan [WAN-2000-RD-0001.02] will be implemented.	EPS-2.2.1 Oil spill response strategies shall be implemented in accordance with the Wandoo Field Oil Spill Contingency Plan Document 2: Oil Pollution Emergency Plan [WAN-2000-RD-0001.02].	MC-2.2.1 IAP records.	EPO-OP-02

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-2.3 The NOPSEMA accepted Wandoo Field Operational and Scientific Monitoring Bridging Implementation Plan [VOG-1100-RG-0002] will be implemented.	EPS-2.3.1 Oil spill operational and scientific monitoring shall be implemented in accordance with the VOGA Operational and Scientific Monitoring Bridging Implementation Plan [VOG-1100-RG-0002].	MC-2.3.1 IAP records.	EPO-OP-02
CM-2.4 Vessels will implement a SOPEP/ SMPEP (equivalent to class) in the event of a spill.	EPS-2.4.1 SOPEP/SMPEP (equivalent to class) procedures shall be available during activities.	MC-2.4.1 VOGA inspection or audit confirms SOPEP/SMPEP (equivalent to class) procedures are available on the vessels during activities.	EPO-OP-02
Insert spill response CMs HOLD			
CM- Instrument protective and alarm systems (interface level low level trips in production and second stage separators).	EPS- Level transmitters in production and second stage separators are maintained.	MC- Maintenance records show level transmitters in production and second stage separators are maintained.	EPO-OP-03
CM-3.1 Automatic shutoff solenoids installed to reduce potential for chemical overdosing.	EPS-3.1.1 Automatic shutoff solenoids are maintained.	MC-3.1.1 Maintenance records show automatic shutoff solenoids are maintained.	EPO-OP-03
CM-3.2 OIW concentration monitored and alarmed in the MCS.	EPS-3.2.1 High and high-high OIW alarm set based on the Acceptable and Unacceptable daily OIW averages for the relevant Flow Regime (Table 5-57).	MC-3.2.1 Calibration records of inline OIW analyser show High and high-high OIW alarm set based on the Acceptable and Unacceptable daily OIW averages for the relevant Flow Regime	EPO-OP-03

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
	EPS-3.2.2 OIW performance shall be reported internally and reviewed daily in accordance with Platform Operations Manual [VOG-7000-MN-0001].	MC-3.2.2 Wandoo daily report shows OIW performance.	EPO-OP-03
	EPS-3.2.3 In the event the inline OIW analyser is out of service, manual OIW analysis will be undertaken (twice daily during normal operations, six times daily if diverting PFW inboard), in accordance with Platform Operations Manual [VOG-7000-MN-0001].	MC-3.2.3 OIW test records shows manual OIW analysis undertaken in the event the inline PIW analyser is out of service.	EPO-OP-03
	EPS-3.2.4 OIW levels are monitored so as to not reach unacceptable 24-hour OIW limits in accordance with Platform Operations Manual [VOG-7000-MN-0001].	MC-3.2.4 24-hour inline OIW analyser records Recordable incident reports for Unacceptable Limit exceedances.	EPO-OP-03
	EPS-3.2.5 Deviation of inline OIW analyser results from manual OIW analysis results will be managed in accordance with Produced Water Adaptive Management Strategy [WNB-7000-RP-0010].	MC-3.2.5 OIW test records from the offshore laboratory show deviation of OIW results managed in accordance with Produced Water Adaptive Management Strategy [WNB-7000-RP-0010].	EPO-OP-03
CM-3.3 Produced Water Adaptive Management Strategy [WNB-7000-RP-0010].	EPS-3.3.1 In the event the Produced Water Adaptive Management Strategy [WNB-7000-RP-0010] is triggered, adaptive management including identifying causes of constituent excursions will be implemented.	MC-3.3.1 Records show the Produced Water Adaptive Management Strategy [WNB-7000-RP-0010] is implemented when triggered. Records show process of identification of constituent excursions as per the Produced Water Adaptive Management Strategy [WNB-7000-RP-0010].	EPO-OP-03

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-3.4 PFW discharge overboard can be diverted inboard.	EPS-3.4.1 PFW OIW exceedances shall be managed in accordance with WNB-012-502 - Measurement and Reporting of Produced Formation and Ballast Water Oil in Water Content: • PFW shall be diverted inboard if the rolling average (or any 4 hourly manual laboratory sample) exceeds the Unacceptable limit. • Any such event shall be recorded in the OIW Event Log • Continue to diverting inboard until such time the OiW concentration is below the unacceptable limit.	MC-3.4.1 OIW exceedances recorded in the OIW Event Log. Recordable incident reports for Unacceptable Limit exceedances show management in accordance with WNB-012-502 - Measurement and Reporting of Produced Formation and Ballast Water Oil in Water Content.	EPO-OP-03
CM-3.5 PFW discharge flow rates are monitored.	EPS-3.5.1 Discharge flow rate shall be monitored and maintained such that maximum limits are not exceeded in accordance with Platform Operations Manual [VOG-7000-MN-0001].	MC-3.5.1 Wandoo daily report shows discharge flow rate monitored and maintained.	EPO-OP-03
CM-3.6 Routine external laboratory testing to ensure PFW chemistry is within assumed levels.	EPS-3.6.1 A PFW representative sample shall be sent to a National Association of Testing Authorities (NATA) accredited laboratory on a monthly basis for OIW analysis to confirm accuracy of daily measurement methodology.	MC-3.6.1 Monthly laboratory records of PFW.	EPO-OP-03
	EPS-3.6.2 PFW chemistry monitoring is undertaken on a yearly basis, or more frequently if adaptive management is triggered in accordance with Table 8-13 of this EP.	MC-3.6.2 Laboratory analysis records shows annual PFW chemistry monitoring.	
	EPS-3.6.3 The toxicity of an end-of-pipe PFW sample is assessed on a two yearly basis, or more frequently if adaptive management triggered in accordance with Table 8-13 of this EP.	MC-3.6.6 Laboratory analysis records shows DTA undertaken on two yearly basis, or more frequently if required.	

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-3.7 Chemical assessment and selection process.	EPS-3.7.1 Chemicals used in the production process that will be discharged to the marine environment are selected in accordance with the Process Chemical Management Manual (WNB 7000 YC 0001).	MC-3.7.1 Chemical assessment records.	EPO-OP-03
		MC-3.7.1a Assessment of existing chemicals is outlined in the review of current process chemicals.	
	EPS-3.7.2 Incumbent process chemicals NICNAS registration and OCNS substitution warnings will be reviewed annually.	MC-3.7.2 Records show incumbent process chemicals NICNAS registration and OCNS.	
	EPS-3.7.3 Chemicals used in the production process that will be discharged to the marine environment are selected in accordance with the VOGA chemical assessment process.	MC-3.7.3 Chemical changes/new chemical to have approved MoC. Assessment of existing chemicals is outlined in the review of current process chemicals.	EPO-OP-06
		MC-3.7.3a Chemical assessment records.	
	EPS-3.7.4 AFFF utilised at the Wandoo Facility is selected to exclude Persistent Organic Pollutants (POPs) such as PFOS and PFOA, in alignment with the Stockholm Convention.	MC-3.7.4 Assessment of existing chemicals is outlined in the review of current process chemicals.	
	EPS-3.7.5 Chemicals that will be discharged to the marine environment are selected in accordance with VOGA's Chemical Assessment Process (Section 8.11).	MC-3.7.5 Completed chemical assessments show chemicals discharged to the marine environment meet the criteria of VOGA's Chemical Assessment Process.	

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-3.8 Instrument protective and alarm systems (interface level low level trips in production and second stage separators).	EPS-3.8.1 Level transmitters in production and second stage separators are maintained.	MC-3.8.1 Records show instrument protective and alarm systems are maintained.	EPO-OP-03
CM-3.9 WNB-012-502 - Measurement and Reporting of Produced Formation and Ballast Water Oil in Water Content.	EPS-3.9.1 WNB-012-502 - Measurement and Reporting of Produced Formation and Ballast Water Oil in Water Contentoutlines a process to identify and record OIW excursions.	MC-3.9.1 Causes for OIW excursions are reviewed as per the WNB-012-502 - Measurement and Reporting of Produced Formation and Ballast Water Oil in Water Content.	EPO-OP-03
CM-3.10 Ballast water discharge overboard can be deferred to allow for fault finding.	EPS-3.10.1 OIW levels are shall be monitored via the 24-hour OIW inline OIW analyser so as to not reach unacceptable 24-hour OIW limits in accordance with WNB-012-502 - Measurement and Reporting of Produced Formation and Ballast Water Oil in Water Content.	MC-3.10.1 24-hour OIW inline OIW analyser records.	EPO-OP-03
CM-4.1 Vessels comply with Australian Ballast Water Management Requirements (DAWE, 2020).	EPS-4.1.1 Australian Ballast Water Management Requirements (DAWE, 2020) consistent with the International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Management Convention) (IMO, 2004).	MC-4.1.1 Ballast water management plan or record of exemption. Valid ballast management certificate or record of exemption.	EPO-OP-04

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-4.2 Vessel and immersible equipment complete the VOGA Biofouling Risk Assessment Process consistent with National Biofouling Guidelines for the Petroleum Production and Exploration Industry and IMO Guidelines for the control and management of a ships' biofouling to minimise the transfer of invasive aquatic species.	EPS-4.2.1 Vessels will complete a VOGA Biofouling Risk Assessment, identifying a low risk before mobilisation to the Operational Area: • Biofouling risk based on a range of information including presence of a biofouling management plan and record book, last port of call, age of anti-fouling coating etc. If a risk category of moderate, uncertain or high is scored, the process requires an independent IMS expert to be engaged and further risk assessment and/or management measures undertaken.	MC-4.2.1 Records of VOGA Biofouling Risk Assessments maintained for all vessels and relevant immersible equipment entering the Operational Area demonstrating low risk status.	EPO-OP-04
CM-4.3 Vessels, including tankers, comply with Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships.	EPS-4.3.1 Anti-fouling Systems on tankers and vessels are maintained in compliance with International Convention on the Control of Harmful Anti-Fouling Systems on Ships (IMO, 2001): • Prohibits the use of harmful organotins in antifouling paints used on ships and establishes a mechanism to prevent the potential future use of other harmful substances in anti-fouling systems.	MC-4.3.1 Records indicate ship anti-fouling systems have not used harmful organotins.	EPO-OP-04
	EPS-4.3.2 IMS inspection of project infrastructure to validate absence of invasive marine pests on a 5 yearly basis.	MC-4.3.2 IMS inspection records.	EPO-OP-04
CM-5.1 Non-hazardous and hazardous wastes are managed in accordance with VOGA's Waste Management Procedure [WPA-7000-YH-0009]	EPS-5.1.1 Hazardous and non-hazardous wastes shall be segregated into recyclable and non-recyclable.	MC-5.1.1 VOGA audit or inspection confirms hazardous and non-hazardous wastes are segregated into recyclable and non-recyclable wastes.	EPO-OP-05

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
	EPS-5.1.2 Waste shall be stored in clearly marked containers, and hazardous wastes bunded, in accordance with the relevant Safety Data Sheet (SDS).	MC-5.1.2 VOGA inspection or audit confirms compliance.	EPO-OP-05
	EPS-5.1.3 Wastes for onshore disposal shall be transported in suitable containers.	MC-5.1.3 Inspection or audit confirms waste is transported onshore in relevant containers.	EPO-OP-05
	EPS-5.1.4 All non-hazardous (except putrescible waste and waste-water) and hazardous waste shall be transported to shore and disposed of in appropriately licensed facilities.	MC-5.1.4 Waste disposal receipts confirm appropriate disposal of wastes (type and volume).	EPO-OP-05
CM-5.2 Facility and vessel inductions include control measures and training for crew in dropped object prevention.	EPS-5.2.1 Crew training/inductions, and job safety analyses where relevant, will include a component on preventing dropped objects to increase awareness of requirements in accordance with Section 0.	MC-5.2.1 Records show training to minimise the potential for dropped objects is provided to the facility and vessel(s) crew.	EPO-OP-05
CM-5.3 Slop crude oil is reprocessed through WNB process.	EPS-5.3.1 Slop crude oil is reprocessed through WNB process.	MC-5.3.1 Platform visual inspection checks and waste manifests.	EPO-OP-05
CM-5.4 Facility and vessel procedures are compliant with MARPOL Convention Annex V, Prevention of Pollution by Garbage from Ships and Marine Order 95.	EPS-5.4.1 The facility and all vessels licensed to carry more than 15 persons or over 400 gross tonnage shall have and implement a Waste Management Plan and maintain a Garbage Record Book in accordance with MARPOL Convention Annex V, Prevention of Pollution by Garbage from Ships and Marine Order 95.	MC-5.4.1 VOGA inspection or audit of facility and vessels to ensure compliance with Waste Management Plan. Garbage Record Book details the wastes (type and volume) disposed.	EPO-OP-05

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-5.5 Facility work procedures for lifts, bulk transfers and cargo loading.	EPS-5.5.1 Facility work procedures require: • The security of loads to be checked prior to commencing lifts • Loads to be covered if there is a risk of losing loose materials • Lifting operations to be conducted using systems to manage the specific risks of that lift, including consideration of weather and sea state.	MC-5.5.1 Completed handling and transfer procedure checklist, Permit to Work and/or risk assessments verify that the procedure is implemented prior to each transfer.	EPO-OP-05
CM-5.6 Recovery of dropped objects where practical to do so.	EPS-5.6.1 Any hazardous solid waste dropped to the marine environment will be recovered where safe and practicable to do so. Where safe and practicable for this activity, consider: • Risk to personnel to retrieve object • Whether the location of the object is in recoverable water depths • The object's proximity to subsea infrastructure • Ability to recover the object (i.e. nature of object, lifting equipment or ROV availability, and suitable weather	MC-5.6.1 Incident reports detail the recovery attempt consideration and status of any hazardous waste lost to the marine environment.	EPO-OP-05
CM-6.1 Routine pigging procedures.	EPS-6.1.1 Biocide treated water is degraded and/or diluted prior to discharge via routing to storage (CGS) or PWTS where feasible, or assessed via MOC process to reduce to ALARP in accordance with the Wandoo Platform Operations Manual [VOG-7000-MN-0001].	MC-6.1.1 Records of dilution of pigging discharges to baseline levels prior to discharge.	EPO-OP-06
CM-6.2 Biocide treated water management.		MC-6.2.1 Records of approved procedure developed prior to activity includes environmental assessment via MOC.	EPO-OP-06

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-6.3 All hazardous liquid chemicals are stored in bunded areas/chemical cradles.	EPS-6.3.1 Bunds show no visible sign of damage or deterioration that would impair their ability to contain spills.	MC-6.3.1 Visual inspection during operator walk-around show no sign of bund impairment.	EPO-OP-06
CM-6.4 Sulphamic acid neutralisation.	EPS-6.4.1 Sulphamic acid used for chemical cleaning is neutralised and tested prior to discharge.	MC-6.4.1 Testing records demonstrate sulphamic acid is neutralised prior to discharge.	EPO-OP-06
CM-6.5 Non-routine discharge management.	EPS-6.5.1 Non routine discharges with chemical additives are assessed via MOC process to reduce risk to ALARP prior to discharge in accordance with the Wandoo Platform Operations Manual [VOG-7000-MN-0001].	MC-6.5.1 Management of change records show assessment of non-routine discharges.	EPO-OP-06

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-6.6 Firefighting systems (portable or in built), to be consistent with IMO SOLAS Chapter 11-2, Part C, Regulation 10 amendments related to the use and storage of firefighting foams containing perfluoroctane sulfonic acid (PFOS), as outlined in MSC.532(107), including: • For vessels constructed on or after 1 January 2026, no use or storage of extinguishing media containing PFOS. • For vessels constructed before 1 January 2026, no use or storage of extinguishing media containing PFOS, beyond the date of first survey on or after 1 January 2026.	EPS-6.6.1 Firefighting systems consistent with IMO SOLAS Chapter 11-2, Part C, Regulation 10 amendments related to the use and storage of firefighting foams containing PFOS, as outlined in MSC.532(107).	MC-6.6.2 Records demonstrate survey vessel firefighting systems are consistent with IMO SOLAS Chapter 11-2, Part C, Regulation 1 – amendments related to the use and storage of firefighting foams containing PFOS, as outlined in MSC.532(107).	EPO-OP-06

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-6.7 Secondary containment – bunds and drip trays managed in accordance with the Wandoo Work Management Manual (WPA 7000 YG 0021).	EPS-6.7.1 Deck drainage must be managed in accordance with the Wandoo Work Management Manual (WPA 7000 YG 0021). • Any damage or defeat of the bunding and containment integrity must be repaired at the earliest opportunity, unless appropriate alternative controls are put in place. • Portable equipment fitted with combustion engines (e.g., welders, temporary air compressors, generator packages) must be fitted with adequate containment—such as drip trays or integrated drainage systems—to ensure spills during routine operation or refuelling are captured. • Drip trays must be inspected at regular intervals and maintained at minimum levels to prevent overflow during washdown or rainfall. • Contaminated liquids are collected, and managed in accordance with the Waste Management Procedure [WPA-7000-YH-0009].	MC-6.7.1 A0001131-1010 'Mechanical Bunding Inspection – 12 Month PM' has been executed. Worksite inspections verify portable equipment is fitted with drip trays or equivalent containment. Worksite inspections confirm drip trays are checked regularly and maintained at minimum levels. Any accumulated liquids are disposed of in accordance with facility drainage and waste-management procedures. Non-conformances are recorded and corrective actions implemented prior to continuation of work.	EPO-OP-06
CM-6.8 Bilge must be discharged outside 500 m restricted zone, as per the Marine Operations Manual [WNB-1000-YV-0001].	EPS-6.8.1 No vessel bilge water shall be discharged inside the 500 m restricted zone.	MC-6.8.1 VOGA Marine Operations Manual [WNB-1000-YV-0001] provided to all vessels contracted.	EPO-OP-06

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-6.9 Facility and support vessels are required to comply with MARPOL 73/78 Annex I, Annex IV, Annex V, and AMSA Marine Orders 91, 95 and 96.	EPS-6.9.1 Vessel contractor procedures include the requirements to comply with MARPOL 73/78 (Annex IV; Regulation 8) as required by class: • Equipped with either a sewage treatment plant or sewage comminuting and disinfecting system or a sewage holding tank. • Wastes shall be macerated to <25 mm prior to discharge. • Untreated sewage will be stored on-board in suitable holding tanks and disposed of onshore at reception facility or to carrier licenced to receive the waste or discharged at a distance of more than 12 nm from the nearest land. Vessel contractor procedures include the requirements to comply with MARPOL 73/78 (Annex I; Regulation 15) as required by class: • Deck drainage and bilge water will be treated in an oil water separator and discharged.	MC-6.9.1 Vessel international Sewage Pollution Prevention Certificate.	EPO-OP-06
CM-6.10 Maintenance of sewage and food waste macerator systems.	EPS-6.10.1 Sewage and food waste systems are maintained in accordance with maintenance procedures.	MC-6.10.1 Maintenance records.	EPO-OP-06
CM-6.11 Bulk hazardous chemicals are transported in chemical cradles.	EPS-6.11.1 Bulk hazardous chemicals on vessels are transported in chemical cradles.	MC-6.11.1 Visual inspection.	EPO-OP-06

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-7.1 The interaction of vessels with cetaceans within the Wandoo Field and Operational Area will be consistent with the EPBC Regulations (2000) to minimise exposure of marine fauna to noise impacts where practicable.	EPS-7.1.1 Compliance with EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.05 and 8.06) which requires that: • A vessel will not travel greater than 6 knots within 300 m of a whale or turtle (caution zone) and not approach closer than 100 m from a whale. • A vessel will not approach closer than 50 m of a dolphin or turtle or 100 m of a whale. • A vessel will not approach closer than 300 m to a calf (whale or dolphin) (the caution zone). • If a calf appears in the caution zone the vessel must be immediately stopped and must: • Turn off the vessel's engines, or disengage the gears, or withdraw the vessel from the caution zone at a constant speed of less than 6 knots.	MC-7.1.1 Cetacean interactions and vessel response incidents reported to VOGA.	EPO-OP-07
CM-7.2 Vessel engines and power generation equipment maintained to optimise smooth running.	EPS-7.2.1 All MODU and vessel engines and power generation equipment shall be serviced in accordance with the relevant Contractor's PMS to limit excessive noise generation.	MC-7.2.1 VOGA inspection or audit confirms application of contractor's PMS. Contractor's servicing and maintenance records are up to date.	EPO-OP-07
CM-7.3 For geophysical and hydrographic surveys, the interaction of vessels with cetaceans within the Wandoo Field will be consistent with the EPBC Regulations (2000) where practicable.	EPS-7.3.1 Records demonstrate no breaches of EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans.	MC-7.3.1 Cetacean incidents reported to VOGA.	EPO-OP-07

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-7.4 Helicopter contractors to ensure that helicopters comply with EPBC Regulations 8.07.	EPS- Helicopter contractors shall ensure that all helicopter operations conducted for the Wandoo Facility comply with EPBC Regulations 8.07, including maintaining required minimum altitudes over cetaceans and avoiding disturbance to protected marine fauna.	MC- Contractor flight procedures, pilot briefings, and aviation manuals confirm compliance with EPBC Regulation 8.07, including minimum altitude requirements.	EPO-OP-07
CM-7.5 Valid Flag State (Class Issued) Certificate indicates vessel engines and equipment is maintained.	EPS- All vessels engaged in the activity shall hold a current Flag State Certificate of Class (or equivalent Class-issued certificate) confirming that engines, machinery, and critical equipment are maintained in accordance with the vessel's classification society requirements and remain in a seaworthy condition.	MC- Marine assurance records verify that each vessel has a valid Certificate of Class (or equivalent Flag State documentation) prior to mobilisation, and that the certificate remains current for the duration of the activity.	EPO-OP-07
CM-8.1 The sulphur content of diesel fuel complies with Regulation 14 of MARPOL 73/78 Annex IV and AMSA Marine Order 97.	EPS-8.1.1 Fuel purchased in Australia shall meet Australian standards.	MC-8.1.1 Fuel bunkering records showing low sulphur fuel usage.	EPO-OP-08 EPO-OP-09

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-8.2 Vessels comply with Regulation 14 of MARPOL 73/78 Annex VI and AMSA Marine Order Part 97.	EPS-8.2.1 Marine diesel engines meet NO_x emission requirements and limits as set out by MARPOL 73/78, Annex VI, Regulation 13, and have an International Air Pollution Prevention (IAPP) certificate. Onboard incinerators (if present) will meet IMO standards and are identified in the vessels' IAPP certificate. Equipment and systems that contain ODS comply with MARPOL 73/78, Annex VI, Regulation 12, are identified in the vessels' IAPP certificate and an ODS record book is maintained (where applicable). Vessels >400 GT have a Ship Energy Efficiency Management Plan (SEEMP).	MC-8.2.1 Vessel IAPP certificate. ODS Record Book. Records of SEEMP.	EPO-OP-08
CM-8.3 Contractor PMS in place to maintain power generation systems and ancillary diesel engines.	EPS-8.3.1 All vessel engines and power generation equipment shall be serviced in accordance with the relevant Contractor's PMS. Contractor's servicing and maintenance records shall be validated by VOGA to ensure they are up to date.	MC-8.3.1 VOGA inspection or audit confirms application of contractor's PMS. Contractor's servicing and maintenance records are up to date.	EPO-OP-08
CM-8.4 Contractor PMS in place to maintain refrigeration systems within the use of ODS.	EPS-8.4.1 Refrigeration systems shall be maintained in accordance with contractor's PMS to ensure refrigerant emissions are minimised. Contractor's servicing and maintenance records shall be validated by VOGA to ensure they are up to date.	MC-8.4.1 VOGA inspection or audit confirms application of contractor's PMS. Contractor's servicing and maintenance records are up to date.	EPO-OP-08
CM-8.5 Report atmospheric pollutant emissions as required under the NPI.	EPS-8.5.1 Submit annual reports where required by NPI.	MC-8.5.1 NPI reports.	EPO-OP-08

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-9.1 VOGA will review emissions performance and emissions reduction opportunities to improve emissions intensity. This process involves the screening of emissions reduction opportunities, assessing these against a range of parameters including an internal cost of carbon, and implementing those that are practicable.	EPS-9.1.1 Emissions performance is reviewed and emissions reduction opportunities are identified, assessed, and implemented where reasonably practicable to ensure emissions intensity is managed to ALARP.	MC-9.1.1 Records demonstrate the emissions performance of the Wandoo Facility has been conducted annually and emissions reduction opportunities identified, assessed, and implemented where reasonably practicable to ensure emissions intensity is managed to ALARP.	EPO-OP-09
CM-9.2 When gas production exceeds fuel gas demand, surplus gas will be re-injected during routine operations and therefore reducing flaring of surplus gas during routine production operations.	EPS-9.2.1 During routine operations, when fuel gas demand exceeds gas production, surplus gas will be re-injected.	MC-9.2.1 Records show maintenance of gas re-injection equipment is conducted in accordance with procedures and maintenance system requirements.	EPO-OP-09
CM-9.3 Routine maintenance on turbines and replacement based on service life which will maintain the efficiency of the turbines.	EPS-9.3.1 Maintenance program is in place for the turbines.	MC-9.3.1 Records show maintenance of turbines and replacement based on service life which will maintain the efficiency of the turbines.	EPO-OP-09

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-9.4 During normal operation, the operating philosophy of the flare is to minimise flare gas and to operate with the pilot light burning (which is a critical safety function), i.e. flare load is intermittent based on operations and maintenance activities.	EPS-9.4.1 No flaring (except pilot light) during normal operations.	MC-9.4.1 Records showing gas consumption by the flare.	EPO-OP-09
CM-9.5 Report GHG emissions and energy used and produced as required under the NGER scheme.	EPS-9.5.1 Submit annual reports where required by the NGER scheme.	MC-9.5.1 NGER reports	EPO-OP-09
CM-10.1 Product generated from the Wandoo Facility will only be sold to customers (first sale) from countries that are signatories to the Paris Agreement or have a net zero commitment, as at the date of the relevant contract of sale.	EPS-10.1.1 Wandoo Facility sales contracts limited to customers from countries that are signatories to the Paris Agreement or have a net zero commitment.	MC-10.1.1 Records demonstrate that customer countries are current signatories to the Paris Agreement or have a net-zero commitment.	EPO-OP-10
CM-11.1 Lighting will be limited to the minimum required for navigational and safety requirements, with the exception of emergency events.	EPS-11.1.1 Reduce unnecessary vessel lighting to only those required for safe work and navigational use, in accordance with the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023c).	MC-11.1.1 Inspection verifies no unnecessary excessive light other than usage for safe work and navigation.	EPO-OP-11
CM-12.1 Use of coverings on open top storage skips on WNA.	EPS-12.1.1 Covers intact and fitted to all open top storage skips on WNA.	MC-12.1.1 Guidelines for visiting WNA Checklist (WNA-014-103) records.	EPO-OP-12

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-12.2 Inspection for entrapped, injured and deceased birds on WNA.	EPS-12.2.1 Inspection for entrapped, injured and deceased birds on WNA undertaken.	MC-12.2.1 Guidelines for visiting WNA Checklist (WNA-014-103) records.	EPO-OP-12
CM-12.3 Vessels contracted by VOGA operating in the Operational Area must adhere to Part 8 of EPBC Regulation 2000 to minimise exposure of marine fauna.	EPS-12.3.1 Compliance with EPBC Regulations 2000 – Part 8 Division 8.1 (Regulation 8.05 and 8.06) which requires that: • A vessel will not travel greater than 6 knots within 300 m of a whale or turtle (caution zone) and not approach closer than 100 m from a whale. • A vessel will not approach closer than 50 m of a dolphin or turtle, or 100 m of a whale (with the exception of animals bow-riding). • A vessel will not approach closer than 300 m to a calf (whale or dolphin) (the caution zone) • If a calf appears in the caution zone the vessel must be immediately stopped and must: • turn off the vessel's engines, or disengage the gears, or withdraw the vessel from the caution zone at a constant speed of less than 6 knots.	MC-12.3.1 Records demonstrate no breaches of EPBC Regulations 2000 – Part 8 Division 8.1 Interacting with cetaceans.	EPO-OP-12
CM-12.4 Vessels contracted by VOGA operating in the Operational Area must adhere to separation distances defined by the Biodiversity Conservation Regulations 2018 (WA) to minimise exposure of marine fauna.	EPS-12.4.1 Compliance with Biodiversity Conservation Regulations 2018 (WA) which requires that: • A vessel will maintain a separation distance of 30 m from a whale shark.	MC-12.4.1 Records demonstrate no breaches of the separation distances defined for whale sharks with the Biodiversity Conservation Regulations 2018 (WA).	EPO-OP-12
CM-12.5 Speed limit for all vessels inside Wandoo restricted zone.	EPS-12.5.1 As per EPS-1.38.1.	MC-12.6.1 As per MC-1.38.1.	EPO-OP-01

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
CM-12.6 Environmental induction.	EPS-12.6.1 Crew inductions, and job safety analyses where relevant, will include a component on preventing dropped objects to increase awareness of requirements.	MC-12.6.1 Induction records.	EPO-OP-12
CM-12.7 Bird Management Plan for Wandoo offshore facilities (VOG-1100-YH-0013) implemented	EPS- Bird management plan implemented which includes: • Existing and proposed deterrents that will be utilised in different periods to prevent habituation • Roles and responsibilities • Awareness requirements • Reporting requirements • Monitoring requirements for deterrent effectiveness • Review requirements.	MC- Approved Bird Management Plan (VOG-1100-YH-0013). Monitoring of effectiveness of bird deterrent systems recorded in Wandoo Platform Operations Manual Guidelines for Visiting WNA (WNA-014-103) checklist.	EPO-OP-07, EPO-OP-11 and EPO-OP-12
CM-12.8 Marine fauna collisions reported to National Ship Strike Database.	EPS- Marine fauna collisions shall be reported to National Ship Strike Database.	MC- Incident reports confirm Marine fauna collisions reported to National Ship Strike Database.	EPO-OP-12
CM-13.1 Functional communication equipment on board vessels and facilities to communicate with commercial and recreational shipping vessels in the vicinity of the activities.	EPS-13.1.1 Communication equipment on board vessels, shall be functional and maintained in accordance with the contractor's Preventative Maintenance System (PMS).	MC-13.1.1 VOGA inspection or audit confirms application of contractor's PMS. Communication equipment on board vessels are included in the contractor's PMS.	EPO-OP-13
CM-13.2 Consultation/notification with relevant stakeholders including	EPS-13.2.1 Records of communication with stakeholders will be stored.	MC-13.2.1 Records of communication with stakeholders.	EPO-OP-13

Control Measure	Environmental Performance Standard	Measurement Criteria	EPO Reference (Table 7-1)
AusCoast/AMSA notification as required.	EPS-13.2.2 Facility to be operated in strict adherence with any agreements with stakeholders.	MC-13.2.2 Register of stakeholder assessment.	EPO-OP-13
CM-14.1 Grout selection process will include lowest toxicity	EPS-14.1.1 Grout selection and approval process is documented.	MC-14.1.1 Records of selection and approval.	EPO-OP-14
CM-14.2 Unexpected finds of potential underwater cultural heritage sites/features are to be reported.	EPS-14.2.1 In the event an underwater cultural heritage site or feature is identified, the Minister will be identified within 21 days through the Australasian Underwater Cultural Heritage Database tool.	MC-14.2.1 Record of relevant person correspondence.	EPO-OP-14

Section 8 Implementation Strategy

8.1 Overview

The primary goals of VOGA's Wandoo Facility EP implementation strategy is to direct, review and manage operational activities so that environmental impacts and risks are continually being managed to ALARP and acceptable levels, and to ensure that performance outcomes and standards are being met over the life of the project.

The VOGA HSE Management System (HSE MS) provides the procedures and practices that will be followed to ensure environmental risks of operations are reduced to ALARP.

The following approaches are used to ensure VOGA's HSE MS, practices and procedures are implemented:

- Activities will be undertaken in accordance with VOGA's HSE MS (Section 8.2.1)
- Activities will be undertaken in accordance with VOGA's HSE Policy (Section 8.2.3)
- Activities will be assessed in accordance with the VOGA Risk Management Manual [VOG-2000-MN-0001] (Section 4)
- Contractors are managed (Section 8.3)
- Roles and responsibilities are outlined (Section 8.4)
- All personnel working in the Operational Area will undertake the VOGA site-specific induction which contains information on the EP, environmental legislation and environmental sensitivities (Section 8.5.1)
- There is ongoing hazard identification and evaluation (Section 8.14)
- Environmental performance outcomes, standards and measurement criteria are implemented (Section 8.6)
- Chemicals used in offshore applications are appropriately managed (Section 8.11)
- An inspection and audit plan developed and implemented (Section 8.14.1)
- Non-conformance and changes are appropriately managed (Section 8.7)
- ERPs are in place (Section 8.9)
- Spill response will be regularly tested (Section 8.10)
- Environmental performance reporting is undertaken (Section 9)
- There is ongoing engagement with relevant Stakeholders (Section 10)
- Opportunities for continual improvement are identified (Section 8.10.7.3)

8.2 HSE Management System

8.2.1 Overview

The VOGA HSE MS provides the procedures and practices that will be followed to ensure that the environmental risks associated with its activities are reduced to ALARP.

The HSE MS has been developed to be consistent with the requirements of the following standards:

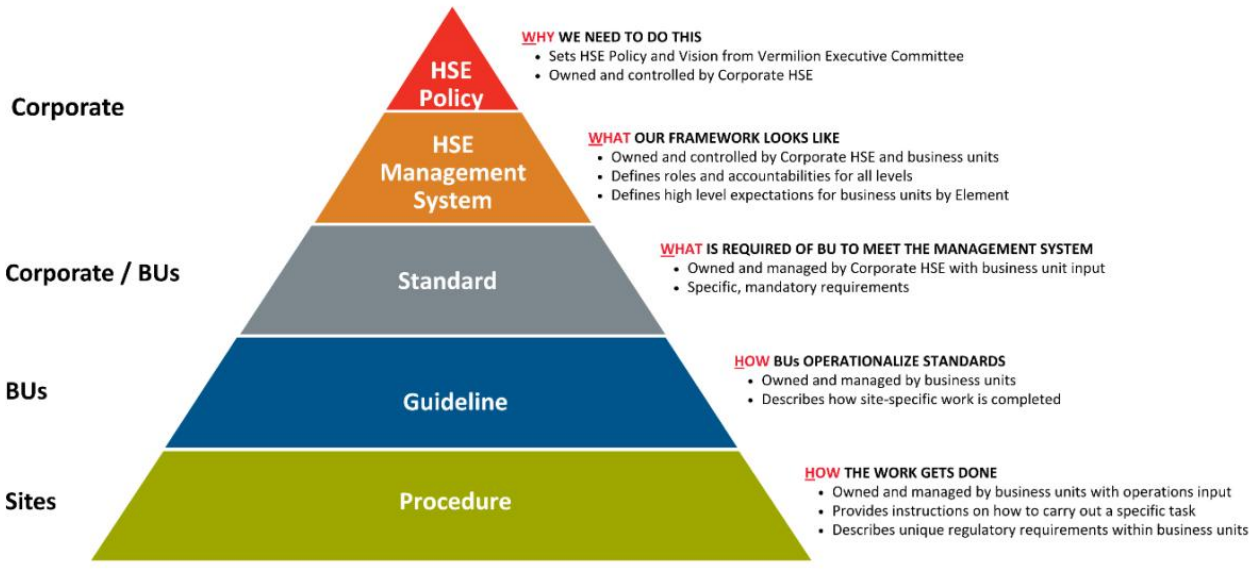
- ISO 14001: Environmental Management System
- OHSAS 18002:2000 Occupational Health & Safety Management Systems (an international standard equivalent to AS/NZS 4801)
- API 9100 Model Environmental, Health and Safety Management System.

HSE MS is also consistent with AS/NZS 4360:2004 Risk Management although it has not been developed specifically to meet that standard.

8.2.2 Structure

The following section describes the structure of the HSE MS, how it integrates top level management through to operational activities on the facilities, and how the elements of the HSE MS are linked in a logical manner to all activities. The overall HSE MS documentation hierarchy is illustrated in Figure 8-1.

Figure 8-1: HSE MS framework



8.2.3 HSE Policy

The VOGA HSE Policy applies to all VOGA activities. The written policy statement provides an overall commitment in terms of key principles for managing health, safety and the environment.

The Policy sets the overall HSE intentions of the organisation and contains a commitment to continuous improvement. The Policy is the starting point for setting VOGA's HSE objectives and targets. A copy of VOGA's HSE Policy is provided in VOGA Health, Safety and Environment (HSE) Policy.

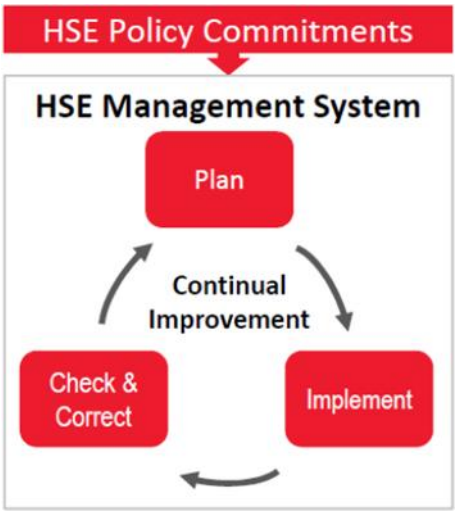
8.2.4 Contents

VOGA has developed an HSE MS that consists of three phases as follows:

- Phase 1: Plan
- Phase 2: Implement
- Phase 3: Check and correct.

As outlined in Figure 8-2, the three-phase structure provides a continual improvement feedback cycle consistent with management system concepts that underlie the various standards. Each phase has one or more component element, and each element has multiple expectations.

Figure 8-2: Outline of HSE MS Process – Plan-Implement-Check and Correct



The HSE MS is structured into 12 elements as outlined in Table 8-1; each element has been developed within the overall three-phase HSE MS process (Plan-Implement-Check and Correct). As such, each element connects to one or more of the other elements within the overall continual improvement cycle.

Table 8-1: Elements of HSE MS and objectives

Phase	HSE MS Elements	Objectives
Plan	Element 1: Management, Leadership and Policy	Management provides vision, resources and the environment for HSE MS success. All employees understand and are held accountable for the success of HSE MS. Performance excellence in HSE is recognised as a priority and prerequisite to successful business results.
	Element 2: Corporate and Social Responsibility and Communication with Stakeholders	VOGA is committed to protecting health, safety and the environment, and reducing and managing the HSE risks associated with its operations. In doing so, it is important that VOGA commit to an open dialogue with employees, the communities in which they operate, and other relevant stakeholders with respect to HSE issues associated with VOGA operations.
	Element 3: Risk Management	VOGA will ensure that risks are identified and managed to minimise the potential for incidents and liabilities.
	Element 4: MoC	Risks associated with change to personnel, organisations, procedures, practices, designs, facilities and regulatory requirements are identified, evaluated and managed.
Implement	Element 5: Training and Competency	Personnel are required to have the necessary skills and competencies to carry out their responsibilities in a safe and effective manner. Managers will ensure all employees have the appropriate skills and knowledge and will provide training where necessary.
	Element 6: Operations and Maintenance	HSE practices and procedures are necessary for the construction and operation of each asset. Practices and procedures are prescriptive “how to’s” of job tasks. The purpose of this element is to identify the requirements for practices and procedures necessary for each business/facility to ensure employees, contractors, the general public and the environment are protected from accidents/incidents.
	Element 7: Contractor Management and Procurement	It is important that controls are in place to ensure that activities undertaken by contractors, vendors and service providers are carried out in an efficient, safe and environmentally responsible manner.
	Element 8: Emergency Preparedness Management and Response	All operating areas have the necessary ERPs, skills and equipment to respond quickly to any emergency associated with our operations.
	Element 9: Incident Management	Reporting, investigating, analysing, follow-up and sharing information from incidents (and near misses) are used to minimise future occurrences.

Phase	HSE MS Elements	Objectives
	Element 10: Environmental Management	Incorporate responsible environmental practices into all operations, ensuring activities are planned and executed to prevent pollution, minimise disturbance and support long-term environmental stewardship.
	Element 11: Security Management	VOGA protects its people and assets from security risks and threats.
	Element 12: Documentation and Records	Operating regions ensure relevant documentation and records required to meet regulatory and VOGA business entity internal performance requirements, are maintained, organised and accessible.
Check and Correct	Element 13: Performance Assessment	Continual improvement is assured through regular assessments, audits and reports to management.

8.2.5 Review of the HSE MS

To ensure ongoing effectiveness and continual improvement of the HSE MS, VOGA and Vermilion Energy Inc. periodically review the elements of the HSE MS, including Element 12. This review process is intended to provide a mechanism for making changes to the HSE MS as necessary to achieve the organisational goals and meet the expectations of stakeholders. VOGA and Vermilion Energy Inc. Senior Management review VOGA HSE MS performance in order to achieve the following:

- Determine its continuing suitability, adequacy and effectiveness
- Address possible needs for changes to the HSE Policy, procedures, objectives, targets and other elements of the management system
- Identify opportunities for continual improvement.

VOGA and Vermilion Energy Inc. Senior Management review the effectiveness of the VOGA management system and provide formal feedback to assure continual improvement through:

- An annual review of VOGA HSE MS performance
- Monthly review of HSE Key Performance Indicators (KPIs)
- Incident reports (as required)
- Audit reports (as required).

Checklists detailing content, inputs and outputs of the annual review and monthly review of HSE KPIs are provided in Management System Manual: Performance Assurance Manual [VOG-1100-YG-1201.02].

8.3 Contractor Management

Many of the risks associated with the Wandoo Facility operations, maintenance and inspection and project activities are embedded in processes that are controlled by service or contractor

organisations and contractor personnel. VOGA selects contractors and service providers in accordance with the VOGA Contractor and Vendor Selection and Management Manual [VOG-1000-MN-0001]. Each high-risk contractor is assessed to ensure they meet a minimum level of service capability, inclusive of management systems to ensure acceptable QHSE performance and personnel competency. If shortcomings are identified during the assessment process, they are reviewed with the contractor in question and, where necessary, management processes are applied to address critical areas of concern.

When carrying out activities on a VOGA-contracted facility, all contractors are required to work in accordance with the Wandoo Facility Safety Case Revisions for which compliance with the HSE MS and this EP are fundamental requirements.

VOGA requires that:

- The specifications of equipment or materials that have potential QHSE impacts are reviewed to verify suitability for the intended use and to mitigate against the introduction of additional risks
- All requisitions for materials and equipment specify, where relevant, appropriate certification and inspection requirements
- Induction programs are in place to ensure that personnel are aware of the management systems in use during the operations and to communicate any major HSE risks and their management strategies.

VOGA commissions pre-mobilisation inspections to ensure their compliance with applicable standards and contractor management systems and to confirm that they can operate in a safe and environmentally responsible manner. Further detail on inspections and audits undertaken is provided in Section 8.14.

8.4 Key Roles and Responsibilities

Figure 8-3 and Figure 8-4 show the onshore and offshore organisational structure with roles and responsibilities relevant to the implementation of this EP summarised in Table 8-2.

All personnel are responsible for undertaking their activities in accordance with the EP to ensure environmental risks are identified, assessed and managed effectively. Responsibility for environmental performance applies at all levels of the organisation.

Overall:

- Accountability for environmental performance rests with the VOGA Managing Director
- Responsibility for implementation of the EP rests with relevant line managers, including the Operations Manager, Engineering Manager, and Finance Manager
- Execution of specific environmental controls is assigned to operational and support personnel

Table 8-2: EP key roles and responsibilities

Role	Responsibilities
VOGA Managing Director	• Review and approve EP and OSCP. • Ensures that appropriate resource and competence levels are available to deliver safe, efficient and effective operations within VOGA's organisation. • Ensures overall compliance with the VOGA HSE MS. • Ensures overall compliance with the EP and OSCP with advice from the HSES Advisor. • Responsible for facilitating an emergency response strategy in the event of an incident.
Operations Manager	• Setting expectations and providing resources for successful implementation of the HSE MS, which include this EP. • Reviewing the HSE performance to ensure it meets company objectives and expectations. • Review performance against environment performance standards outlined in this EP. • Ensuring all individuals for whom they are responsible are adequately skilled for tasks they are expected to perform, and work processes used are fit for purpose. • Ensuring compliance with EP. • Involving all personnel in the relevant activity-specific HSE plans for Operations/Projects/Well Construction. • Effective review and corrective action tracking in place for all incidents, defects, hazards, inadequacies of procedures and suggested improvements that are escalated. • Ensures that all personnel (including contractors) are aware of their responsibilities in regard to ensuring compliance with the Commitments Register and that processes are in place to meet them. • Oversees all aspects of contracting, procurement, logistics, QHSE, planning, design, execution and review for maintenance, inspection and project activities. • Ensures appropriate resources and competence levels are available to deliver safe, efficient and effective operations, maintenance, inspection and project activities. • Ensures that effective emergency response systems are in place for operations. • Ensures that VOGA's stated obligations are met during all operations, maintenance and inspection and project activities. • Ensures that the policies and procedures of contractor companies are consistent with the VOGA Management Systems. • Ensures activities specified in the Commitments Register are appropriately closed out. • Ensures that all significant changes that may increase risk to environment are managed via the MOC Process.
Engineering Manager	• Fulfilling emergency response and crisis management roles as defined in the Wandoo ERP and Wandoo Field OSCP. • Ensures that all significant changes that may increase risk to environment are managed via the MOC Process. • Ensures that VOGA's stated obligations are met during all operations, maintenance and inspection and project activities.
Field Superintendent	• Ensuring compliance with VOGA HSE MS, EP and Wandoo Field OSCP. • Leads/participates in audits and inspections. • Ensures that environmental incidents are:

Role	Responsibilities
	○ reported to statutory authorities ○ reported as per Event Management Manual requirements ○ also ensures that incident investigations are conducted, and corrective actions are completed. • Ensures drills and exercises for emergency response are completed. • Ensures corrective actions arising from audits and emergency response drills are complete. • Manages coordinating and controlling of all field operational activities (production, maintenance, procurement and logistics). • Acts as Permit to Work custodian and ensures that the potential impact of a SIMOPS environment is considered during the preparations for all activities. • Provides leadership and stewardship for environment protection. • Meets all operational and HSE Key Performance Indicators (KPIs) as set by VOGA. • Ensuring or establishing adequate HSE management and action plans existing for every activity and site for which they are responsible. • Appropriately involving employees and HSE committees in the development of HSE management plans. • The development, review and close out of corrective actions in response to lessons learnt, incidents, defects, hazards, inadequacies of procedures and suggested improvements reported within their area of responsibility. • Providing appropriate resources for compliance with HSE laws and management of HSE risks in accordance with their delegated authorities. • The escalation of issues to the next level of management when the issue impacts other areas. • Fulfilling emergency response and crisis management roles as defined in the Wandoo ERP and Wandoo Field OSCP. • NOTE: Upon activation of the Wandoo ERP, the on-site Field Superintendent has authority. Outside of an emergency situation, the Field Superintendent works in accordance of HSE-MS requirements and seeks approvals to for changes in accordance with MoC processes.
Logistics Coordinator	• Ensures all VOGA purchased/supplied materials and equipment for use in Wandoo operations meet VOGA standards prior to acceptance and dispatch. • Maintains records of independent review and inspection activities associated with the purchase/supply of materials and equipment. • Ensures appropriate logistical resources are available in the field and in the supply base to deliver safe, efficient and effective operations. • Coordinates the efficient unloading of materials and unloading of waste in accordance with procedures outlined in the EP.
Team Leader/ Supervisor	• Ensuring adequate HSE management and action plans exist for every activity and site for which they are responsible. • Ensuring employees and HSE committees are appropriately involved in the development of HSE management plans. • Ensuring all individuals for whom they are responsible are adequately skilled for tasks they are expected to perform. • Ensuring work processes are fit for purpose. • The use of company-wide procedures in the site's HSE management plans.

Role	Responsibilities
	• The development, review and close out of corrective actions in response to lessons learnt, incidents, defects, hazards, inadequacies of procedures and suggested improvements reported within their area of responsibility. • Providing appropriate resources for compliance with HSE laws and management of HSE risks in accordance with their delegated authorities. • The escalation of issues to the next level of management when the issue impacts other areas. • Implementation of leadership requirements as specified in the HSE MS. • Fulfilling emergency response and crisis management roles as defined in the Wandoo ERP.
HSE Manager	• Providing advice and guidance on the implementation of the HSE MS, which include this EP. • Assisting in the development of the EP and Wandoo Field OSCP. • Preparing and ensuring delivery of HSE content at inductions. • Preparing monthly report to NOPSEMA outlining non-conformances with environmental performance standards outlined in this EP. • Ensuring EP compliance report is prepared and submitted to NOPSEMA. • Maintaining EP commitment register. • Undertaking chemical assessment process. • Leading and participating in incident investigation and analysis. • Promoting, facilitating and driving the implementation and continuous improvement of the HSE MS. • Providing general support for, and coordination of HSE MS related assessments, audits and training activities. • Stewarding HSE MS follow up action logs for the site. • Liaising with regulatory and other government departments as required. • Coordinating incident reporting internally and communicating to external agencies. • The custodianship and administration of HSE MS Element 10 – Security Management. • Fulfilling emergency response and crisis management roles as defined in the Wandoo ERP and Wandoo Field OSCP.
HR Coordinator	• Ensuring training and competency by developing and implementing a process to identify, evaluate and review competency needs for each level and function. • Ensuring all personnel are inducted to the requirements of the HSE MS including this EP. • Developing and maintaining a training matrix. • Selection and recruitment to ensure personnel meet the demands of their position.
Contract Manager	• Considering HSE and operation performance in the selection of contractors, vendors and service providers and ensures services and products. • Informing all contractors, vendors and service providers of VOGA's HSE and operation expectations including relevant procedures and practices and emergency plans. • Regularly monitoring contractors, vendors and service providers to ensure compliance with VOGA expectations.
All VOGA personnel and contractors	• Following procedures that implement the requirements of the VOGA HSE MS, including this EP. • Following instructions and training and carrying out their work in a manner which does not present a risk to themselves, others or the environment.

Role	Responsibilities
	• Participating in HSE activities and systems. • Reporting all incidents, defects, hazards and inadequacies of procedures so that appropriate review and corrective action can be taken. • Fulfilling emergency response and crisis management roles as defined in the Wandoo ERP.
Vessel master	• Ensures that all operations on board the vessel are carried out in accordance with environmental legislative requirements, commitments, conditions and procedures as provided in this EP. • Ensures monitoring is undertaken in accordance with EP requirements. • Report all incidents to the VOGA Field Superintendent.

Figure 8-3: Onshore Organisational Chart

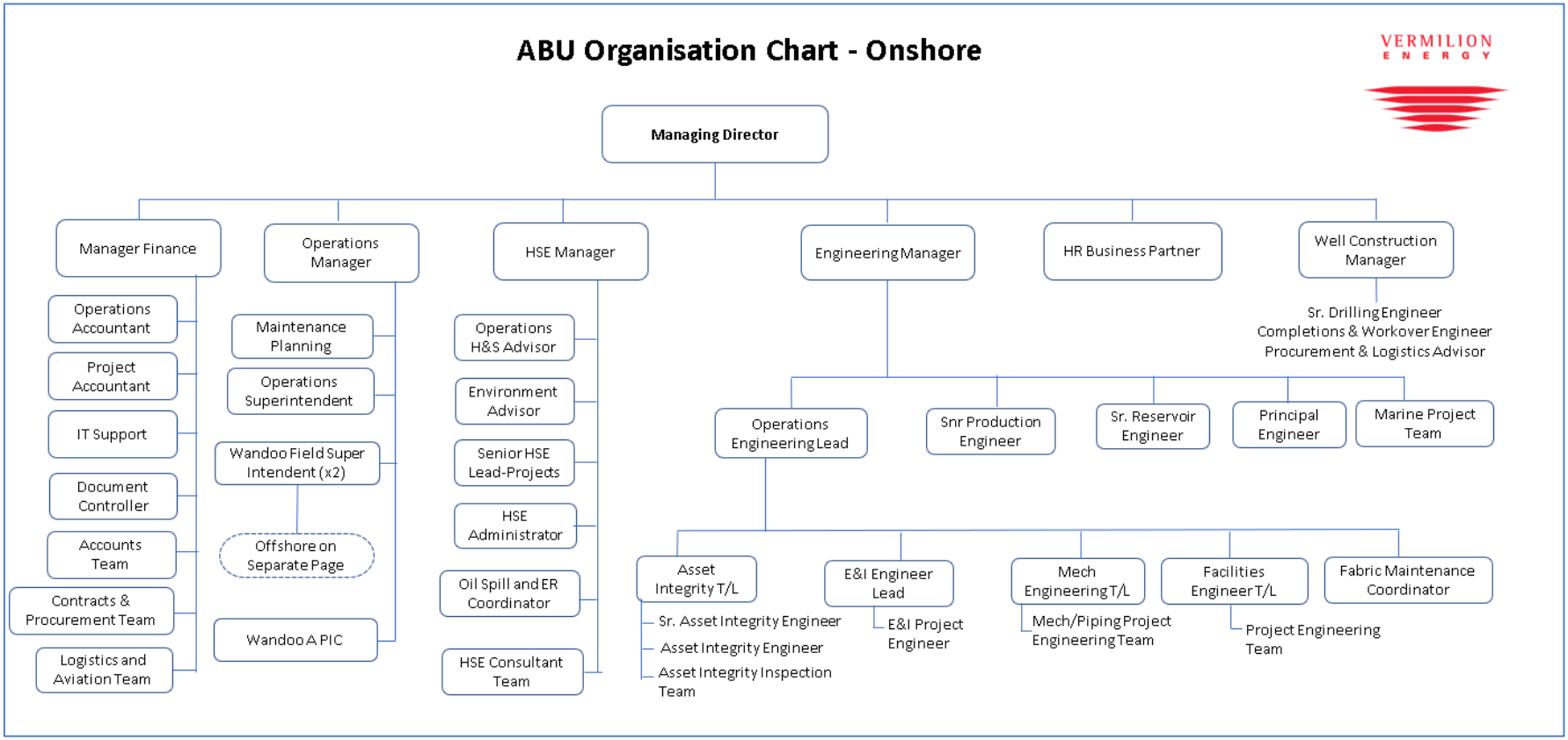


Figure 8-4: Offshore Organisational Chart



8.5 Training and Competency

The Operations Manager has responsibility for ensuring the competency of personnel involved in operations activities, in accordance with Element 5 of the HSE MS. The competence of VOGA personnel involved in operational activities is assured through the employee selection processes. Recruitment process records are maintained.

Ongoing training requirements are identified through individual training needs analysis to ensure competency requirements are maintained. Annual performance reviews undertaken on VOGA staff includes a review of HSE performance.

Information session are undertaken as required to ensure all employees are kept aware of HSE MS requirements, including compliance with environmental performance standards outlined in this EP.

8.5.1 Induction

All personnel working on activities under this EP will receive an induction that includes the following information:

- VOGA's HSE Policy
- Major project risks and their associated mitigation strategies
- Emergency response
- Regulatory and procedural requirements
- Environmental sensitivities of the area
- Waste management
- Chemical and hydrocarbon spill prevention and spill response measures.

Inductions will be conducted on WNB to communicate and assign responsibility for field-based Wandoo Field EP environmental performance standards; and emergency response roles and responsibilities.

8.6 Implementation of Performance Standards

8.6.1 Overview

The process of defining and determining VOGA's environmental performance outcomes, standards and measurement criteria are defined in Section 7. The implementation framework is based on the right-hand side loop of the Performance Standards cycle in Figure 8-5 'Sustain Performance of Critical Control Measures,' as part of the Ongoing Operations and Risk Management component of the performance improvement process. The framework includes four key areas:

- **Apply and maintain control measures**: Addressed through the implementation of VOGA's HSE MS and operations and maintenance routines
- **Verify and monitor compliance**: Conducted using the Wandoo Facility EP Commitment Register
- **Investigate, assess and manage performance deviations**: When a control fails to meet its defined environmental performance standard the Operations team utilises the MoC process to assess the change in risk and identify appropriate risk management strategies
- **Management of change**: Changes to the facility for operational purposed, changes due to investigation into a performance deviation and changes to environmental performance standards themselves are all assessed through VOGA's MoC process which addresses the potential impact of the change to the environment.

8.6.2 Wandoo Facility EP Commitment Register

The Wandoo Facility EP commitment register has been developed to verify compliance with environmental performance outcomes and standards outlined in this EP. The commitment register outlines performance outcomes, standards and measurement criteria, the VOGA personnel responsible for monitoring compliance with each environmental performance standard and the EP risk number the performance standard applies to.

The Operations Manager will ensure that all personnel (including contractors) are aware of their responsibilities with regard to ensuring compliance with environmental performance outcomes and standards and that processes are in place to meet them.

Verification of compliance with performance standards and objectives will be undertaken by internal and/or external audits and inspection.

8.7 Management of Performance Deviations

VOGA recognises that it is important to manage deviations from performance standards to ensure that changes in risk levels are understood and continually managed.

Critical Controls are management controls that have a key role in preventing, detecting, controlling or mitigating a MAE, or CEE. Many of the Critical Controls are shared between the Safety Case and EP. Due to the potential high level of impact, VOGA has a more stringent oversight and approval process for performance deviations. The management of deviations is outlined in VOGA's Risk Management Manual [VOG-2000-MN-0001] and Deviation Risk Assessment [VOG-2000-RD-0014].

The Deviation Risk Assessment (DRA) procedure involves a systematic evaluation of risks associated with a deviation; with the subsequent implementation of mitigation measures where necessary, which will ensure the identified risks associated with an environmental event assessed to have a catastrophic impact under the VOGA risk matrix remain ALARP.

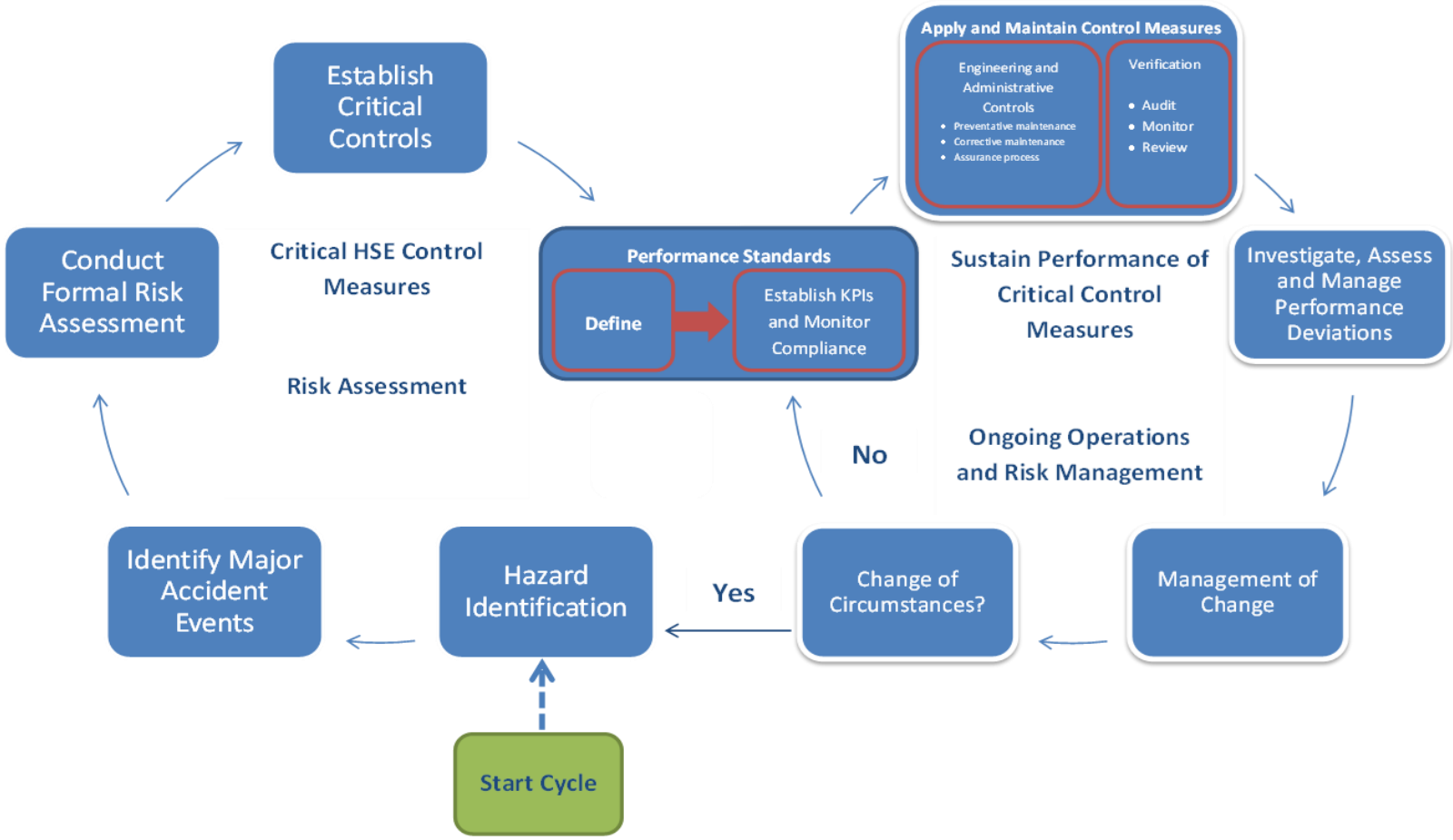
The EP defines the approved operating envelope which is informed by risk assessments. The purpose of the DRA process is to ensure that VOGA activities are conducted within the safe operating envelope. In the event that there is, or expected to be, a deviation from the safe operating envelope, a DRA should be conducted.

Deviations to activities, management controls or environmental risks will be reviewed to confirm that any changes assessed as significant will trigger a revision to the EP.

The DRA process also identifies risk management strategies required to ensure risk levels are tolerable and ALARP.

Deviations are managed by VOGA's 'Deviation Risk Assessment Form'. The DRA is a documented risk assessment tool that addresses deviation risk management requirements outlined above. Review and approval of the DRA is obtained from Engineering, HSE and operations representatives. Where required implementation of contingency actions is managed by the MoC process (Section 8.8) contained within the Wandoo Work Management Manual [WPA-7000-YG-0021]. Operation directives may be issued to communicate contingency actions to relevant VOGA personnel.

Figure 8-5: Performance standards and continuous improvement (adapted from NOPSEMA Control Measures and Performance Standards' Guidance Note, 2011)



8.8 Management of Change

8.8.1 Overview

VOGA has implemented Element 4 to manage physical changes, staffing changes, organisational changes and operational changes at Wandoo. MoC is a critical management system process as it ensures that all modifications associated with the Wandoo facilities are subjected to appropriate scrutiny, review and assessment.

The expectations of HSE MS Element 4 include:

- A practice exists to assess, approve and manage all changes related to HSE matters, temporary and permanent, affecting personnel, organisations, design parameters, operations, procedures, materials, products, services, and work practices
- A system exists which identifies and incorporates changes to laws, regulations and non-regulatory requirements into designs, operations, procedures, and work practices
- Affected personnel understand the impact of changes being made and have appropriate skills and knowledge to manage the associated hazards
- Risk assessments are updated during any type of change
- Drawings and other documents verifying changes are identified, current, and accessible.

The MoC form/checklist and the Change Management Process within the Work Management Manual [WPA-7000-YG-0021] are used to ensure that changes are evaluated, approved and documented prior to implementation. Field changes are initiated to resolve an operational problem or to improve safety, environmental performance or efficiency. They include modifications to facilities, changes to operating conditions and procedures, non-routine critical operations, and major plant and equipment testing.

8.8.2 Process

VOGA manages temporary and permanent changes through the same MoC process which utilises a business/technical approval form (MoC) and MoC Checklist.

The MoC form provides a documented record of the change, including justification for the change, duration of change, engagement and communication, implementation, monitoring and review and authorisation and sign-off.

The MoC checklist is completed for every proposed change. The checklist includes high level screening of those changes which may impact on environmental aspects of:

- Regulatory compliance (mandatory for all changes)
- Environmental (review triggered if there are changes in impact or management of emissions or spill hazards)
- Chemical storage, usage and handling (review triggered on introduction of a hazardous good).

Actions required to assess the impact of the change are identified through the MoC checklist and recorded on the MoC Form.

If a change requires further investigation into the acceptability or impact of an environmental consequence, that investigation is done in accordance with the assessment methodology described in Section 4 and where required compared against the outcomes in Section 7.

Updates to the Wandoo Facility EP are identified within the MoC checklist process and assessed whether the update to the Wandoo Facility EP requires a submission to the Regulator for acceptance.

Section 7 of the MOC process identifies whether proposed change requires updates to, or development of, key documentation such as management system procedures or equipment maintenance and inspection plans.

8.8.3 Regulatory Compliance

For those changes which have been assessed as having the potential for environmental regulatory compliance aspects the following questions are addressed:

- Could the change modify an existing Environment Performance Outcome or Standard within the EP?
- Does the change propose significant modification, new stage of activity or are the activities to be carried out different from the activities contemplated in the accepted EP?
- Could the change result in a significant change in the overall level of risk and impacts identified in EP?
- Does the proposal change the HSE MS or an implementation plan within an accepted EP?
- Does the change require modifications to water treatment equipment or the composition of water discharge?

Consistent with Regulation 38 and 39 of the OPGGS(E)R VOGA will revise the Wandoo Facility EP and submit for regulatory acceptance if there is a proposed change which will result in at least one of the following:

- A new activity
- A significant modification or new stage of the activity
- A new or increased environmental impact or risk.

In accordance with the NOPSEMA Guideline – When to submit a proposed revision of an EP (N04750-GL1705), VOGA considers the following aspects when determining whether a modification, meaning how the activity is being managed and/or conducted, is significant:

- There is a change to the spatial or temporal extent of the activity not provided for within this EP
- Continual reduction of the impacts and risks of the activity to ALARP
- The effect the change has on the ability to demonstrate environmental performance outcomes and standards are being met

- The criticality of the aspect being changed (i.e. a management system change is likely more critical because of its coverage of all impacts and risks as opposed to an individual item of equipment)
- The degree of deviation from how the activity was described in the EP.

A new stage of an activity is considered to be any change to the timing or spatial limits detailed in the accepted EP.

For individual changes, VOGA considers a change to be a "significant change to impact or risk" if:

- There is a resultant step change in overall risk level (see Section 4.6) of an environmental hazard – whether by reassessment with updated information or an actual increase in impact or risk, or
- A change in environmental impact profile from emissions introduces new relevant stakeholders or requires additional communication and agreements with existing relevant stakeholders.

For the changes assessed as "significant":

- If planned, the change will not be implemented without Regulatory acceptance, or
- If unplanned, e.g. initiated by incident, the change may be managed and implemented prior to resubmission. In this instance a report and notification to the Regulator will be made in accordance with Section 9. Depending on the situation a resubmission of the Wandoo Facility EP to the Regulator maybe required post the event. Cumulative impact of minor changes are reviewed as part of the annual reporting process. For these items, changes will have most likely been implemented prior to Regulatory submission.

8.8.4 Continuous Improvement

Continuous improvement is the process of enhancing the VOGA HSE MS to achieve improvements in overall environmental performance. The VOGA HSE Policy and the VOGA HSE MS provides criteria for ongoing assessment of environmental performance. This is achieved through the HSE MS Performance Assessment Element, which outlines the monitoring and assessment tools and processes VOGA uses to monitor HSE performance and compliance.

Performance assessment is conducted to monitor effectiveness, provide assurance and identify improvement opportunities. Assessment of HSE performance generally encompasses:

- Monitoring, measurement, analysing and reporting HSE data
- Conducting HSE audits and inspections, according to performance standards, pre-established intervals and ad hoc safety critical situations
- Tracking and close-out of HSE actions
- Conducting management reviews.

Performance monitoring is primarily achieved by establishing and reporting on leading and lagging KPIs. VOGA annually reviews and sets the HSE KPIs for Wandoo, with the performance reported monthly to management. Quarterly HSE performance reports are provided to the HSE Subcommittee of the Vermilion Energy Board in Canada.

In addition, HSE report on key production items such as OIW performance and critical equipment out of service in the daily and weekly reports.

HSE MS documents are updated as required to include changes of procedure, corrective actions and new guidelines. The HSE Manager will look at methods of ensuring continual improvement over the duration of operations, focusing on incorporation of lessons learnt.

8.9 Emergency Management

8.9.1 Wandoo Emergency Response Plan

8.9.1.1 Overview

The Wandoo ERP [VOG-2000-RD-0017] provides details on the response arrangements and responsibilities VOGA has for the management of emergencies which may occur during Operations. Incidents are categorised in relation to the response required:

- **Level 1 incidents:** Generally able to be resolved through the application of local or initial resources only (e.g. first strike response)
- **Level 2 incidents:** More complex in size, duration, resource management and risk and may require deployment of jurisdictional resources beyond the initial response
- **Level 3 incidents:** Characterised by a degree of complexity that requires the Incident Commander to delegate all incident management functions to focus on strategic leadership and response coordination and may be supported by national and international resources.

More detailed response plans have been developed to address particular events (e.g. the Wandoo Field OSCP [WAN-2000-RD-0001], Wandoo Source Control Contingency Plan [WNB-3000-PD-0007] and Concrete Gravity Structure Source Control Plan [VOG-3000-YH-0001].

8.9.2 Source Control Plans

8.9.2.1 Wandoo Source Control Contingency Plan [WNB-3000-PD-0007]

The Source Control Contingency Plan [WNB-3000-PD-0007] if focused on source control for wells. The plan provides campaign-specific details relating to reservoir conditions, blowout taskforce team structure, and logistics. The purpose of the document is to have as much planning as possible conducted upfront to minimise the response time of remedial measures.

There are several generic phases to bring an uncontrolled hydrocarbon release under control:

- Phase 1: Initial response, convene ICT and gather information
- Phase 2: Determine most efficient well kill method
- Phase 3: Detailed planning of the well kill operation
- Phase 4: Execute well kill operation
- Phase 5: Clean-up operation
- Phase 6: Incident Investigation.

8.9.2.2 Concrete Gravity Structure Source Control Plan [VOG-3000-YH-0001]

The CGS Source Control Plan [VOG-3000-YH-0001] provides a response framework to implement to minimise the volume of oil spill originating from CGS. The response is under the Wandoo ERP [VOG-2000-RD-0017] and runs in parallel to the oil spill ICT. Arrangements are further described in Section 8.10.

8.10 Oil Pollution Response

8.10.1 Overview

Under Regulation 22(8), the implementation strategy must contain an oil pollution emergency plan (OPEP) and provide for updating the OPEP. Regulation 22(9) outlines the requirements for the OPEP which must include adequate arrangements for responding to and monitoring oil pollution. As part of the implementation strategy, VOGA has developed an OPEP (WAN-2000-RD-0001.02).

A summary of how this EP, the OPEP and supporting documents address the various requirements of Environment Regulations relating to oil pollution response arrangements is shown in Table 8-3.

Table 8-3: OSR Regulations

OPGGS(E)R Reference	Regulation	Relevant Section of EP
22(2b)	Details of (oil pollution response) control measures that will be used to reduce the impacts and risks of the activity to ALARP and an acceptable level	EP (Section 5.4.5) documents the ALARP assessment of response strategies. Assurance and capability management process described in the EP (Section 8.10.7) ensures that environmental impacts and risks of spill response activities will be continuously identified and reduced to ALARP.
22(8)	The implementation strategy must contain an oil pollution emergency plan and provide for the updating of the plan.	OPEP (WAN-2000-RD-0001.02) and EP Section 8.10 EP (Section 8.10.7.3) describes plan review and update process
22(9)	The oil pollution emergency plan must include adequate arrangements for responding to and monitoring oil pollution, including: (a) the control measures necessary for timely response to an emergency that results or may result in oil pollution; (b) the arrangements and capability that will be in place, for the duration of the activity, to ensure timely implementation of the control measures, including	EP (Section 5.4.5) and Critical Procedure Performance Standard – Oil Spill Response WAN-WNAB-CP-ER-02 and WAN-WNAB-CP-ER-03 – Appendix 5) documents control measures and performance criteria for oil spill response, with corresponding assurance activities to measure performance. This includes control measures for ongoing maintenance of response capability (WAN-WNAB-CP-ER-02-01 OSR Arrangements). Arrangements for ongoing maintenance of

OPGGS(E)R Reference	Regulation	Relevant Section of EP
	arrangements for ongoing maintenance of response capability; (c) the arrangements and capability that will be in place for monitoring the effectiveness of the control measures and ensuring that the environmental performance standards for the control measures are met; (d) the arrangements and capability in place for monitoring oil pollution to inform response activities.	response capability are documented in EP (Section 8.10.7) Arrangements and capability to implement control measures, including monitoring oil pollution to inform response activities, are described as follows: OPEP Sections 2 & 3 detail the resources needed, timeframes and guidance on implementation. Logistics Management Plan (VOG-7000-RH-0008), described in EP (Section 8.10.6) details the specification for each resource requirement, identifies contracts and arrangements required to be in place, and details the process for sourcing, activation and mobilisation. Oil Spill Response Capability Review [VOG-7000-RH-0009] contains up-to-date capability assessment of equipment and personnel. Arrangements and capability to monitor effectiveness of the control measures and ensure performance standards are met are the assurance activities documented in Critical Procedure Performance Standard – Oil Spill Response WAN-WNAB-CP-ER-02 and WAN-WNAB-CP-ER-03 and described in EP Section 8.10.2.
22(10)	The implementation strategy must provide for monitoring of impacts to the environment from oil pollution and response activities that: (a) is appropriate to the nature and scale of the risk of environmental impacts for the activity; and (b) is sufficient to inform any remediation activities.	OSMP (WAN-2000-RD-0001.03)
22(11)	The implementation strategy must include information demonstrating that the response arrangements in the oil pollution emergency plan are consistent with the national system for oil pollution preparedness and response.	EP Section 8.10 OPEP
22(12)	The implementation strategy must include arrangements for testing the response arrangements in the oil pollution emergency plan that are appropriate to the response	EP Section 8.10.7

OPGGS(E)R Reference	Regulation	Relevant Section of EP
	arrangements and to the nature and scale of the risk of oil pollution for the activity.	
22(13)	The arrangements for testing the response arrangements must include: (a) a statement of the objectives of testing; and (b) a proposed schedule of tests; and (c) mechanisms to examine the effectiveness of response arrangements against the objectives of testing; and (d) mechanisms to address recommendations arising from tests.	EP Section 8.10.7
22(14)	The proposed schedule of tests must provide for the following: (a) testing the response arrangements when they are introduced; (b) testing the response arrangements when they are significantly amended; (c) testing the response arrangements not later than 12 months after the most recent test; (d) if a new location for the activity is added to the environment plan after the response arrangements have been tested, and before the next test is conducted—testing the response arrangements in relation to the new location as soon as practicable after it is added to the plan; (e) if a facility becomes operational after the response arrangements have been tested and before the next test is conducted—testing the response arrangements in relation to the facility when it becomes operational.	EP Section 8.10.7

8.10.2 Spill Management Arrangements

8.10.2.1 Jurisdictional Authority

The jurisdictional authority is the State, Territory or Commonwealth agency with jurisdictional authority for marine pollution in its area of jurisdiction. NOPSEMA is the jurisdictional authority for offshore oil and gas exploration and production activities in Commonwealth waters, while AMSA is the jurisdictional authority for vessel-based activities in Commonwealth waters.

The Department of Mines, Industry Regulation and Safety (DMIRS) is the jurisdictional authority for offshore oil and gas exploration and production activities in State waters, while the DTMI is the jurisdictional authority for vessel-based activities in State waters and is also the HMA for

Marine Oil Pollution. In the event of marine pollution in State waters, the HMA (DTMI) is the designated jurisdictional authority, regardless of the source.

In the event that a spill is predicted to move outside Australia's economic zone, the Australian Government is required to notify the international governments. In this situation VOGA will notify DIIS who will notify the Department of Foreign Affairs and Trade, who will in turn notify the relevant foreign government. VOGA plans a response (and supporting arrangements) based on the potential spill trajectory and will work with Federal Government and spill response agencies to coordinate the response across international boundaries.

8.10.2.2 Control Agency

The National Plan describes the control agency as the agency or company assigned by legislation, administrative arrangements or within the relevant contingency plan, to control response activities to a maritime environmental emergency. The control agency will have responsibility for appointing the Incident Controller (VOGA uses the term 'Incident Commander').

As outlined in Table 8-4, VOGA is the Control Agency for oil spills wholly confined to Commonwealth waters from production facilities, meaning VOGA is responsible for assuming Incident Control and providing an Incident Controller (Commander). In the event that a spill has any potential to enter State waters; the WA DTMI will be notified as soon as reasonably practicable. For spills arising from ships and vessels within Commonwealth waters, VOGA may undertake initial response actions and will hand over Incident Control to AMSA.

In accordance with State Hazard Plan - MEE, the Controlling Agency for a Level 1 MOP emergency in State waters resulting from an offshore petroleum activity is VOGA. The Controlling Agency for a Level 2/3 MOP emergency in State waters resulting from an offshore petroleum activity is DTMI.

Cross jurisdictional response activities are those activities that arise as a result of an incident originating in Commonwealth waters and requiring DTMI to exercise its HMA obligations in State waters. A partnership between VOGA and DTMI is required to ensure response activities across the entire incident are carried out.

Where State waters are impacted by a Level 2/3 MOP emergency resulting from an offshore petroleum activity in Commonwealth waters, DTMI will only assume the role of Controlling Agency for that portion of the response activity that occurs within State waters.

Approval for the use of dispersant in State waters during an incident shall be pursuant to the Dispersant Use Consent Framework. Administered by DTMI, the process will include input from the Environmental Scientific Coordinator (ESC) and require written consent from the HMA/SMPC prior to any dispersant being applied to State waters (WA DoT, 2024b).

Table 8-4: Control agency by location

Spill response/ impact location	Spill source	Control agency	Relevant OSCP
Commonwealth waters	VOGA facilities	VOGA	Wandoo Field OSCP
	Ships and vessels	VOGA/AMSA	Wandoo Field OSCP/ National Plan
State waters	VOGA facilities	VOGA	Wandoo Field OSCP

		DTMI	WA DTMI OSCP
	Vessels not connected to the facility	DTMI	WA DTMI OSCP

8.10.3 Interface with Other Plans

8.10.3.1 VOGA Plans

To assist responders in the event of a spill, the Wandoo Field OSCP is split into two documents:

- The Wandoo Field Oil Spill Contingency Plan – Document 1: Planning and Preparedness (WAN-2000-RD-0001.01)
- The Wandoo Field Oil Spill Contingency Plan – Document 2: Oil Pollution Emergency Plan (WAN-2000-RD-0001.02) including the supporting Wandoo Field Operational and Scientific Monitoring Plan (WAN-2000-RD-0001.03).

In the event of a spill, responders will immediately refer to the OPEP.

Document 1, Planning and Preparedness, is focused on outlining the basis of preparation of the OPEP and the processes for monitoring and maintaining response arrangements. The relevant sections of Document 1 are provided in this section of this EP.

The Wandoo Field OSCP interfaces with the following VOGA plans:

Wandoo Facility Emergency Response Plan [VOG-2000-RD-0017] – This plan describes the immediate 'actions-on' for an unplanned emergency incident at one of VOGA's facilities. The Wandoo Facility Emergency Response Plan (ERP) is the plan that will be initially put in place to manage the immediate, life-threatening consequences of an emergency (e.g. fire, collision, etc.) and immediately mitigate, as far as possible, the consequences of these actions. The Wandoo Facility ERP will always have primacy over other plans.

CGS Source Control Plan [VOG-3000-YH-0001] - The CGS Source Control Plan provides a response framework to implement to minimise the volume of oil spill originating from CGS. The response is under the Wandoo Facility ERP and runs in parallel to the oil spill ICT. Both teams interface at the incident command level of the emergency response structure.

Wandoo Well Construction EP [WPA-7000-YH-0001] – The Wandoo Well Construction EP caters for well intervention and construction activities associated with the WNA and WNB platforms. The Wandoo Well Construction EP identifies the environmental risks and impacts associated with the activities covered within the plan, including oil spill response. The OSCP addresses all the response and recovery measures from the potential oil spill risks identified in the Wandoo Well Construction EP. The OPEP details the risk controls required to manage the environmental risks associated with the response activities.

Oil Spill Response Capability Review [VOG-7000-RH-0009] – The report provides a capability review for all oil spill response spill scenarios associated with production and well construction activities within the Wandoo Permit Area WA-14-L. The capability assessment details the specification for each resource requirement (e.g. skills, vessels, equipment), basis of capability determination and identifies what contracts and arrangements are in place, or required, to meet the resource requirements. The requirements are ascertained and assessed through workshops, surveys and review of existing contracts.

8.10.3.2 Government and Industry Plans

The OPEP interfaces with the following Australian Government, State Government and Industry plans:

Australian Marine Oil Spill Plan (AMOS Plan) - This plan is managed by the Australian Marine Oil Spill Centre (AMOSC) and will be activated by VOGA when the response to an oil spill incident is regarded by VOGA to be requiring resources beyond those of the company. The plan coordinates the participation of the oil industry in response through the mobilisation of AMOSC personnel and/or equipment, which can be supplemented by personnel and equipment owned directly by other industry companies. As members of AMOSC, Chevron and Santos will respond with equipment and/or personnel to respond to a VOGA spill impacting on Barrow or Lowendal Islands respectively.

National Plan for Maritime Environmental Emergencies (National Plan) - AMSA manages the National Plan for Maritime Environmental Emergencies (National Plan), Australia's key maritime emergency contingency and response plan (AMSA, 2020). AMSA fulfils its obligations under the National Plan for non-ship source pollution incidents on the formal request from the respective Offshore Petroleum Incident Controller/s (AMSA, 2021).

AMSA is to be notified immediately of all ship-source incidents through the AMSA Rescue Coordination Centre (RCC) Australia. The AMSA National Plan Incident Management System Policy (NP-POL-003) (AMSA, 2022a) describes the incident management system which is applied by AMSA, State Control Agencies and the offshore industry Australia wide for all marine oil spill response incidents and implemented through the National Plan for Maritime Environmental Emergencies.

The Department of Transport and Major Infrastructure (DTMI) is a signatory to the inter-governmental agreement under the National Plan. The State Response Team are members of the National Response Team and are trained and competent in roles ranging from team leader for equipment operations and shoreline response to ICT roles. The MEER Unit has access to AMSA's National Plan equipment to respond to spills in State waters. This equipment is located in Dampier and Fremantle.

WA State Hazard Plan - Maritime Environmental Emergencies (MEE) - The WA State Hazard Plan – Maritime Environmental Emergencies (MEE) provides an overview of arrangements for the management of marine oil pollution and marine transport emergencies in Western Australia. It enables the WA Government through the DTMI to prevent, prepare for, respond to and recover from maritime environmental emergencies as listed in the *Emergency Management Act 2005* (WA) and prescribed in the Emergency Management Regulations 2006 (the EM Regulations).

For the purposes of the Wandoo Field OSCP, State Hazard Plan - MEE describes the response arrangements that the WA State Government will put in place for oil spills from the Wandoo Field, should they enter, or be predicted to enter, State waters and any shorelines or wildlife therein. This includes performing the function of Controlling Agency for response activities in State waters resulting from Level 2/3 incident in Australian Government waters as per the WA DoT Offshore Petroleum Industry Guidance Note MOP: Response and Consultation Arrangements (July 2020).

WA DTMI Incident Management Plan - Marine Oil Pollution (MOP) -

- This plan describes the activities and actions that the WA DTMI will undertake to mount a credible and proportionate response to oil pollution in State waters. For the purposes of the VOGA Wandoo OSCP, the DTMI Incident Management MOP is complimentary in that it will be used to assist and guide the actions and activities that take place in State waters by the DTMI in response to a spill from the Wandoo Field.
- The DTMI MEER Unit will work with the VOGA to determine protection priorities and undertake an initial and ongoing environmental impact assessments to determine the most appropriate response in State waters. These protection priorities determined at the time of a spill may differ from those originally identified in the accepted OSCP.
- The MEER Unit, convenes the State-level maritime environmental emergency coordination committee, which includes representatives from relevant agencies and authorities involved in marine oil spill response. When a spill has the potential to impact State waters, the Department of Transport coordinates notification of the committee representatives and other key State roles in accordance with the State Hazard Plan for Maritime Environmental Emergencies and the Department of Transport Oil Spill Incident Management Guideline.

Third Party Vessel Shipboard Oil Pollution Emergency Plans (SOPEPs) - These plans contain details about the ship, roles and responsibilities in the event of a spill, and spill response equipment on board. MARPOL 73/78 requires that every oil tanker of 150 tonnes gross tonnage and above, and every ship other of 400 gross tonnes and above, carry a SOPEP approved by the Administration. It is the same Shipboard Marine Pollution Plan that is required under the Oil Pollution, Preparedness, Response and Cooperation (OPRC) Convention.

Shipboard Marine Pollution Plans also include noxious liquid substances and should more correctly be called “Shipboard Marine Pollution Emergency Plan”. The plans must be prepared in accordance with vessel class and flag State requirements and guidelines as lain down by the International Maritime Organisation (IMO).

All vessels that are involved in the activity will implement their SOPEP to assist in mitigating any spills from their shipping activities, which contributes to the mitigation of the overall oil spill risk from the petroleum activity.

8.10.4 Approach to Response Planning

VOGA’s oil spill response planning process is based on impact and consequence scenario planning which involves establishing the context and risk; evaluating, demonstrating and defining response strategies and resources; implementation; and first response, as described in Table 8-5 and illustrated in Figure 8-6.

The process is divided into two phases: planning and spill response. The spill response is supported by the incident action planning process to ensure response is commensurate to potential impact; OPPs 1 and 2 are initial IAPs based on existing impact assessments for the spill and response activities within the relevant EPs.

8.10.4.1 Planning Phase

As outlined in Table 8-5, preparing for spills involves the following steps to achieve the Wandoo Field OSCP outcomes:

- Step 1: Understanding the hazard profile - Outcome 1 of the Wandoo Field OSCP
- Step 2: Identifying parameters to assess applicable response strategies and scale of the event - Outcome 2 of the Wandoo Field OSCP
- Step 3: Identifying suitable response strategies - Outcome 2 of the Wandoo Field OSCP
- Step 4: Understanding the impacts associated with response strategies - Outcome 2 and 3 of the Wandoo Field OSCP
- Step 5: Ensuring capability and plan supports management of risks to ALARP - Outcome 4 and 5 of the Wandoo Field OSCP
- Step 6: Define the environmental performance standards within the respective EPs.

The outcome of this approach is that:

- Oil spill hazards associated with VOGA's activities are addressed and risks are managed to ALARP
- Response strategies (Table 8-1) and resources are based on the nature and scale of the incident
- Oil Spill Trajectory Modelling (OSTM) outputs for the operations and well construction loss of well control scenarios compared to ascertain a worst-case scenario for response planning by considering:
  - minimum time to impact defined environmental sensitivities
  - probability of shoreline impact to defined environmental sensitivities
  - maximum quantity of oil impact to defined environmental sensitivities
  - maximum length of oil impact to defined shoreline environmental sensitivities.
- Response strategies are risk assessed and management controls outlined in both the Well Construction and Wandoo Facility EPs are considered in the OPEP.

8.10.4.2 Response Phase

Initial response actions are described in the OPPs. These actions are based on the strategies, resources and capability identified in the planning process. Resources are activated and the outputs from monitoring and evaluation are used to assess spill response impact, via the NEBA process, to confirm that the risks associated with response activities are consistent within the EPs and the Wandoo Field OSCP. If they are, then response effectiveness Key Performance Indicators (KPIs) are developed and response measures implemented. The incident action planning process provides for the opportunity to determine if response operations are effective and if termination criteria are met.

The incident action planning process used by the ICT allows for the effectiveness of each strategy to be reviewed, adjusted or halted if the objectives of the response are not being met or the environmental impacts were not addressed in the SIMA thus fulfilling Outcome 3 of the OSCP. If the impact of a response strategy is significantly higher than what is considered in the EP, then either impact of the strategy is unacceptable, or an EP revision is required for acceptance. An example of where a revision to an EP may be required is where new technology such as that for in-situ burning or bioremediation becomes available to VOGA.

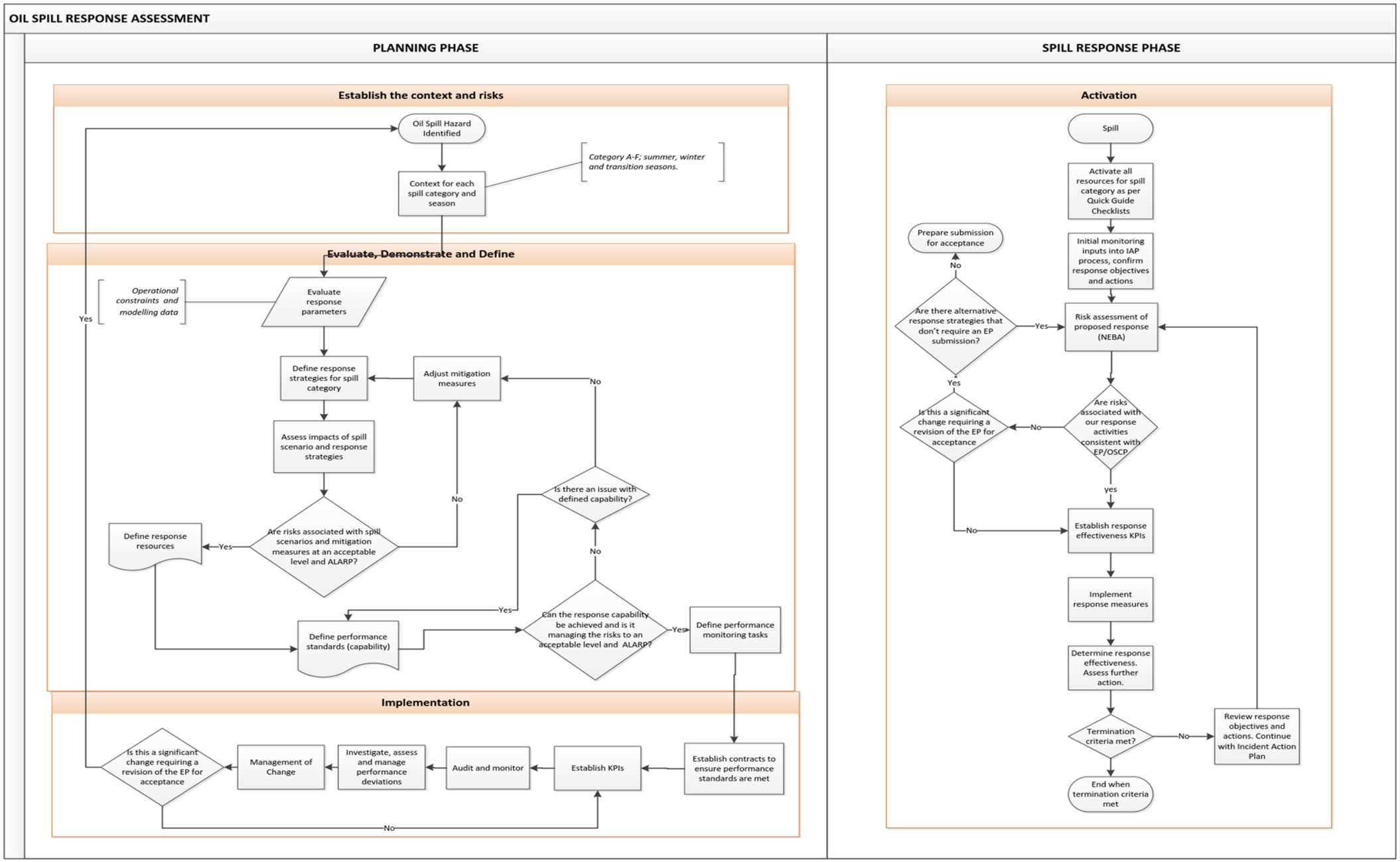
To support this approach and provide a timely response, OPPs detail initial IAP's enabling response resources to be activated whilst event specific assessments are conducted. Resources are identified and capability to achieve timeframes has been reviewed to ensure first response actions are able to be implemented.

Table 8-5: Response planning

Response Planning Steps	Where step is addressed in EP and/or OSCP
Step 1: Oil spill hazard is identified and context for each spill category and season described. This requires understanding the potential events (scenarios) which requires knowledge of: • API type, composition of reservoir/fluids assay. • reservoir modelling of oil type or another geotechnical analysis. • release rate, quantity, duration. • location of activity and potential spill sources. • metocean data matching the location and timing of activity. • location of environmental receptors and method of impact from oil. • toxicity of oil. • timing of spill (season). • thresholds. • EMBA of the activity.	To support a hazard-based approach to planning, oil spill scenarios outlined in this EP were initially grouped into spill categories based on fluid type, duration, and volume. Details for each scenario are provided in the following sections in this EP: • liquid hydrocarbon release from wells (Section 5.1) • Crude release from offtake export system (Section 5.2) • diesel release from Shaft 2 (Section 5.3) • diesel spill to sea (Section 5.5) • liquid hydrocarbon release from topsides process (Section 5.6).
Step 2: Evaluate response parameters, is also about consideration of the hazard, as response preparation requires understanding the potential consequence including: • probability of oiling defined environmental sensitivities. • minimum time to impact defined environmental sensitivities. • quantity of oil to impact defined environmental sensitivities. • length of shoreline impacted. • response operating area.	As a part of the hazard assessments in Section 6 of the EP, modelling was undertaken which was used to determine potential impacts and to identify the parameters for the response.
Step 3: Define response strategies for spill categories, involves designing the most appropriate response plan, such that the impacts, in the event of a spill, are reduced to ALARP. VOGA uses an assessment process for oil spill planning and response and in doing so consider: • the oil spill hazard. • the context for each spill category and season. • operational constraints. • assess the impacts of the hazard and the response activities. • assess whether impacts from the hazard and the response activities are ALARP, by considering all alternatives and their relative benefits and costs. • where not determined to be ALARP, the response strategies are adjusted as part of an iterative process. • this iterative process considers capability and in doing so looks at the potential benefits and costs of doing more sooner.	Oil spill scenarios identified are grouped into two OPPs based on the fluid type, duration and volume. The response strategies planned are described in the respective OPPs. The response strategies are also assessed in Section 5.4 of this EP. This section describes the response strategy and assesses the risk of the hazard. It also identifies the critical stages of the response strategy and schedule for implementation which are evaluated further to determine if undertaking more of the techniques will provide additional benefit and/or if anything can be done sooner.
As a part of the planning the response, **in Step 4: Assess impacts of spill scenario**, VOGA also assesses the impacts of the spill response. This not only contributes to making choices about the response strategies, but also informs how the response should be undertaken to ensure that the risks and impacts of the response are managed to ALARP. This step involves: • environmental risk and impact assessment. • OSTM of surface, entrained and subsurface oil with and without response strategies. • identification of the controls (including environmental performance outcomes, standards and measurement criteria) to be implemented as a part of the spill.	The potential impacts of each spill response strategy have been assessed in Section 5.4 of this EP, and it is demonstrated that they are ALARP.
To ensure that VOGA has a level of preparedness to implement the response strategy **Step 5: Define the response resources** is undertaken next. In this step, VOGA considers:	OPP's detail the resources needed, timeframes and guidance on oil spill response

Response Planning Steps	Where step is addressed in EP and/or OSCP
• operational limitations (equipment functional capacity/coverage, safety of response personnel). • constraints of equipment effectiveness. • scale of the spill event. • skill-sets required for specific roles.	Logistics Management Plan [VOG-7000-RH-0008] details the specification for each resource requirement (e.g. skills vessels, equipment) and identifying what contracts and arrangements are required to be in place; details provided in Section 8.10.6 Oil Spill Response Capability Review [VOG-7000-RH-0009] is undertaken annually based on the response activities outlines in the OPEP. For each statutory EP submission, the latest information from the Capability Review at time of the revision is provided in the OPEP. Assurance and capability management for OSR is detailed in Section 8.10.7 of this EP.
Step 6: Define the performance standards. Some of the spill scenarios have been identified by VOGA to be CEE with "emergency preparedness, management and response" identified as a critical control, requiring a specific Critical Procedure Performance Standard. The Critical Procedure Performance Standard (Element 8 - Emergency preparedness, management and response) has the objective "to ensure that measures are in place to provide effective response in the event of an emergency situation at Wandoo facilities". To meet this objective, there are a number of key requirements of this overarching control, and performance criteria to set a level of performance, with corresponding assurance activities to measure performance identified. By working towards the objective, this Critical Procedure Performance Standard guides the manner in which VOGA plans for a response and ensures that the response is appropriate and will reduce the impacts to ALARP.	Section 5.5.1 of this EP documents control measures and performance criteria for oil spill response, with corresponding assurance activities to measure performance.

Figure 8-6: Response planning diagram



8.10.5 Incident Management Process

8.10.5.1 Response Structure

VOGA has an emergency management response structure that is based around three levels of organisational control: tactical, operational and strategic. The premise behind these levels of control is that those parties within VOGA with the greatest expertise to manage that aspect of the emergency are empowered to do so, with operational or strategic levels stood up to provide support in terms of planning, resources and the management of extraneous issues that while important, are managed at the lower levels of control.

There are three teams within the emergency management response structure:

- Corporate Command Team (CCT)
- Incident Command Team (ICT)
- On-site Command Team (OCT).

Figure 8-7 represents the VOGA emergency management response structure and depicts the three levels of the Calgary based CCT, the Perth based ICT, and the On-site command team, including the links between teams.

The goal of the three teams within the VOGA emergency management response structure is to implement reasonable and proportionate response strategies until such time as the response may be terminated.

The teams will do this through an incident action planning cycle. Prudent over-caution is used by VOGA in responding to oil spills, i.e. CCTs and ICTs will be notified with a view to being stood up for oil spills, then stood down after size and scale have been assessed and verified.

VOGA's ICT runs an incident control system analogous to the Australasian Inter-Service Incident Management System (AIIMS) to which the National Plan is also aligned.

The chain of command for incident response is depicted within the VOGA emergency management response structure, as presented in and Table 8-6. Personnel appointed to these functions are selected from within VOGA or, for protracted incidents that run for weeks or months, using trained National Response Team members, AMOSC and the AMOSC Core Group, international OSR support organisations, and from within the international resources of VOGA. Where required the DoT Incident Controller has input into the team composition and structure.

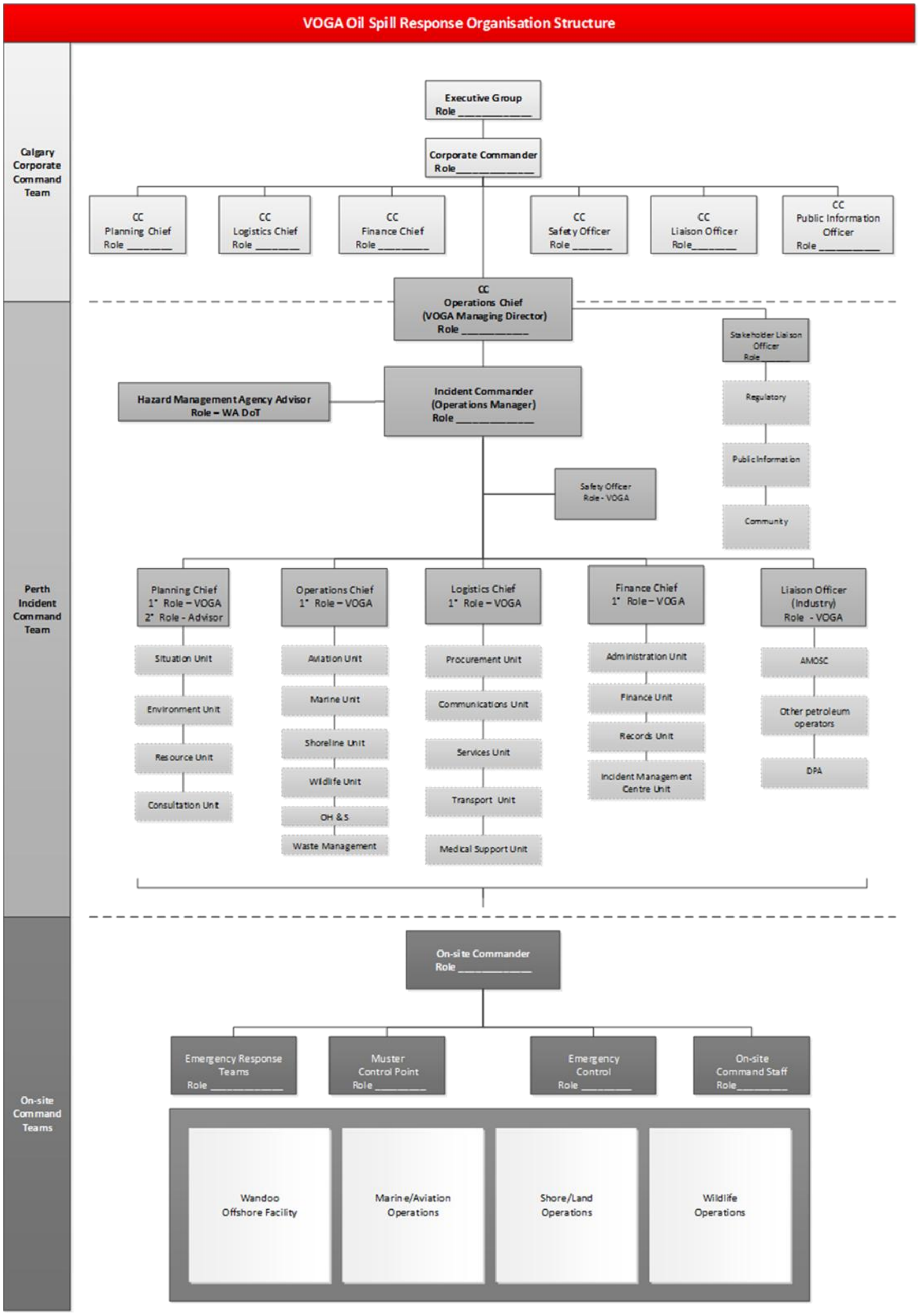
Table 8-6: Key ICT functions for Oil Spill Response

Role	Functional responsibilities
VOGA Incident Commander/ICT Leader	First point of contact for Person in Charge (PIC) offshore. Assists PIC to manage the response and calls out the ICT if required. Responsible for ensuring that an effective response is mounted by the On-site Command Team, and the onshore ICT. Approve IAP and where required engage State Maritime Environmental Emergency Coordinator/ DTMI Incident controller for agreement/endorsement of plan for activities within, or potentially impact, WA waters.

Role	Functional responsibilities
DoT Incident Controller (Hazard Management Agency) and State Maritime Environmental Emergency Coordinator	DTMI Incident Controller (Hazard Management Agency) is the State appointed incident controller for oil spill response activities within, or potentially impact, WA waters. The State Maritime Environmental Emergency Coordinator provides overall strategic management of the response and executive level support and guidance to the DTMI Incident Controller.
Planning Chief Situation Resources Environment	Supervises the VOGA ICT and leads the IAP process. Records and displays data for information, planning and programming, allocation and justification. Documents and maintain records of all Wandoo Offshore Installation and VOGA ICT actions. Manages critical information requirements.
	Interfaces with State Maritime Environmental Emergency Coordinator or State Environmental and Scientific Coordinator (ESC) for input into IAP for activities impacting state waters.
	The collection, processing and organisation of operational monitoring information, e.g. OSTM, weather, sea state.
	Tracking of the deployment of resources.
	Responsible for the collection and collation of environment data/advice, e.g. obtains environmental data from OSRA and scientific monitoring (DoT ESC and local sources) with support from an Environment Unit Lead role.
Logistics Chief Procurement Services Transport Communications Medical	Develops logistics plan to support operations and provides overall resource support to emergency incident sites. Establishes and maintains lists of personnel, supplies and materials which might be required to support the emergency/disaster. Responsible for establishing any Simultaneous Operations (SIMOPS) Plan to manage the risk generated by multiple activities.
	Acquisition of personnel and equipment.
	Acquisition of services and facilities, including waste management resources.
	Provision of air, land and sea transport services.
	Communications Sub-Plan and for ensuring the provision of communications services/support.
	Provision of medical services where needed.
Operations Chief Marine Aviation Shoreline Wildlife Occupational Health & Safety (OH&S) Waste management	Assumes responsibility for executing approved Action Plans. Responsible for all tactical command and coordination of in-country incident response assets in the assistance and support of the On-site Commander. Ensures that operational objectives and assignments identified in Action Plans are carried out effectively. Monitors operations; ensures necessary operational support is provided when and where required; allocates resources.
	Coordination and direction of all activities undertaken by waterborne craft and equipment.
	Coordination and direction of all activities undertaken utilising aircraft, e.g. aerial dispersant spraying, aerial surveillance and transport.
	Planning and coordination of shoreline assessment and clean-up activities (in consultation with the DTMI, planning, specifically the environmental specialists). Implementation of shoreline clean-up activities.

Role	Functional responsibilities
	Implementation of the WA Oiled Wildlife Plan, i.e. the collection, treatment and rehabilitation of oiled wildlife in consultation with DBCA via the State ESC.
	Development and implementation of the OH&S Plan.
	Coordination of the containment, storage, transport and disposal of recovered oil and oily waste. Also, instruction in on-site handling, storage and/or separation and treatment.
Finance Chief	Provides monetary, insurance, legal, risk and human resources, related administrative functions to support emergency operations and to preserve vital records documenting work performed and associated costs in the event of disaster or major emergency.
Safety Officer	Assesses unsafe situations and develops measures for assuring personnel safety. Confirms safety regulatory authorities and applicable departments have been notified. Ensures implementation of safety measures and monitoring and recording of personnel exposures to hazardous products. Supports accident investigations, recommends corrective action, and prepares accident report.
Corporate Command Team (CCT)	Focus of the CCT is on ensuring ICT are responding in accordance with corporate requirements, liability/insurance, business continuity, media/investor relations, and financial management/support of response.
Corporate Command Operations Chief	Provides the interface between the ICT and CCT. Provides updates to the CCT regarding IAPs and communicates any needs for support if required. Responsible for ensuring VOGA's corporate objectives are communicated to the ICT and are also reflected in the IAP.
Stakeholder Liaison Officer	Responsible for managing regulatory engagement and coordinating any regulatory approvals required to implement response strategies. Coordinates engagement of stakeholders who are impacted from the spill or response activities. Coordinates investigation of reportable events. Acts as the functional interface between these various parties. Implements VOGA Communications Plan, providing media information support and serving as the dissemination point for all VOGA media releases.
Liaison Officer (Industry)	Identifies the assisting and cooperating companies and agencies, including communications link and location; provides list to the CCT. Functions as "point of contact" for assisting and cooperating agency representatives. Responsible for ensuring that parties who have agreed to undertake specific functions under the OPEP are undertaking the functions consistent with the OSR strategies, performance standards and objectives of the VOGA Wandoo Field OSCP.

Figure 8-7: VOGA oil spill response structure



8.10.5.2 ICT Response Resources

VOGA engaged a third-party expert to research and provide an appropriate method that could be used for VOGA to determine the level of ICT personnel required to undertake an effective response to VOGA's identified oil spill events. In summary, the research identified that:

- Other emergency management frameworks in Australia:
  - Did not have a publicly available method of quantifying the numbers of ICT personnel required to respond to incidents
  - Relied on the scalability of the ICS system with a focus on the minimum competence of staff to fill critical positions.
- Spill response case studies provide minimal instruction or value in determining the level of ICT personnel to support an oil spill clean-up because:
  - Different jurisdictions have different national response frameworks with some being led by government, others by industry, and others cooperatively
  - Often the numbers of ICT staff are reported without any indication of the prior competence or training of personnel
  - No correlations could be drawn between the response strategies employed in a response and the level of ICT staffing required to support a particular strategy
  - There are too many variables (e.g., spill size, location, release point, personnel competence, environment effected, population density, political pressure) to be able to reasonably allocate case study ICT personnel numbers to any other situation.
- The only correlations across case studies could be that:
  - Cooperative national frameworks, such as those in Australia, tend to rely on lower overall ICT personnel numbers with a focus on ensuring minimum levels of competence are required for critical roles
  - Spills at locations with higher population densities tended to engage higher numbers of ICT personnel.
- In Australia, the National Plan relies on fewer numbers of highly competent and broadly qualified individuals who can operate in a cooperative national system for its response operations. This is demonstrated by the training syllabus in the AMSA administered national oil spill response qualifications.

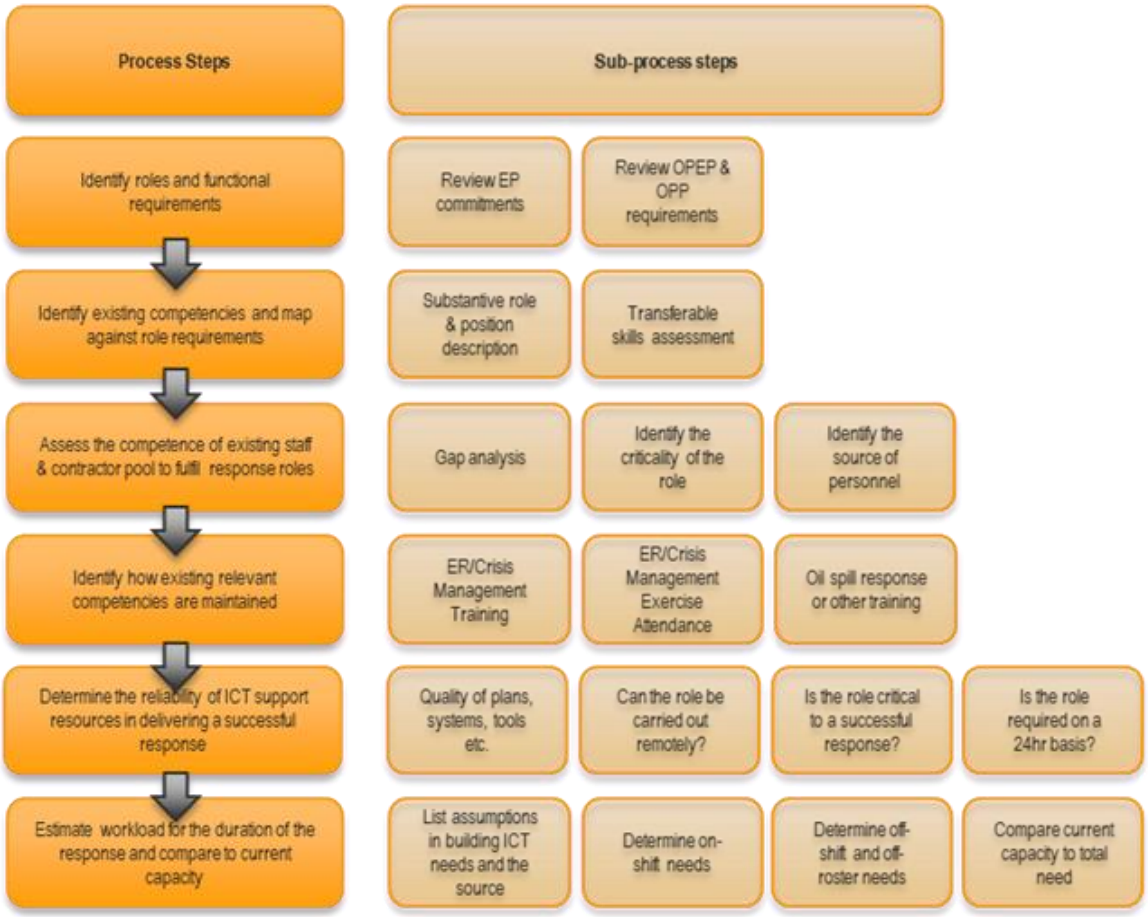
Based on this research VOGA has decided that, to be consistent with the National system for oil spill response in Australia, a methodology based primarily on ensuring competence personnel are positioned in the critical roles is the most appropriate for its activities.

Whilst a secondary consideration, it is also important that we have a method of determining the quantity of personnel required for our largest incident and that we have the arrangements in place to meet this need, catering for rosters in longer responses, potential 24hr ICT operations, personnel absences, and contingency capability.

The method in Figure 8-8 has been developed for VOGA to assess, and periodically review its ICT capability both in terms of competence and quantity. The method can also be used by the ICT in a response to validate plans and/or build new plans depending on the specific spill circumstances.

It has been designed to determine an ICT capability for the largest demand of each response strategy collectively.

Figure 8-8: Process for determining the competence and quantity of ICT personnel



This process involved estimating the workload associated with a Level 2/3 event.to recognise that one person can perform multiple workload is low in them all. It also recognises that some roles will be fully or partially filled by other agencies. For example, the WA DTMI will run all aspects of the shoreline response meaning that the workload for the shoreline unit in the VOGA ICT is low. Assumptions about the expected workload on each functional role have been made at the 1-Day, 2-day, 5-day, 10 day, and 20-day intervals.

The process has also considered that some roles could be completed remotely and that VOGA's primary Tier 3 oil spill response organisation, AMOSC, has identified that their operating model for providing support is to provide its own ICT support for its own resources. This reduces the workload demand on the VOGA ICT and decreases the availability of AMOSC staff in other roles. These changes in response arrangements have been reflected in the process. The ICT resource activation plan is provided in Section 5 of the OPEP. Oil spill exercises and testing are expected to further refine the assumptions and adjust the process over time.

VOGA manages our business and capability arrangements to ensure we have sufficient contingency, through training majority of office staff and managing leave; ensuring we have sufficient capacity to maintain access to VOGA numbers as outlined in OPEP Table 5-2. Should

situations arise where these numbers cannot be achieved a 'recordable' incident will be raised and will trigger review of operational activities to manage changes in risk profile.

The Oil Spill Response Capability Review [VOG-7000-RH-0009] process described in Section 8.10.7.2 ensure that VOGA maintains access to internal and external arrangement to meet the ICT resource requirements outlined in the OPEP Section 5.

8.10.5.3 Source Control Technical Support Teams

In the event of a well control incident the VOGA Incident Command Team (ICT) are responsible for managing the response in accordance with the Source Control Contingency Plan and the ERP. The ICT will be based in the VOGA Perth office and supported on technical aspects by dedicated technical support teams.

The Incident Commander will authorize the assembly of the following dedicated technical teams to undertake the well kill and relief well planning and execution activities:

- Well Control Response Team
- Subsurface Team
- Relief Well Planning Team.

Each of these teams will be under the direction of the Well Construction Manager who will report to the Incident Commander to ensure a clear chain of command.

These teams will consist of VOGA personnel and/or potentially service contractors, dependent on the well control event category and if the event occurs during drilling or well intervention programs. VOGA has a consultant based offshore drilling team available during well construction and intervention programs that could be utilized for drilling a relief well. There are several consulting firms in Perth who specialise in the supply of suitably qualified personnel at short notice if VOGA decide more engineering support is required in their office or for offshore supervision.

VOGA has the option, with its international offices, to call on additional internal engineering support. VOGA's Perth office has agreements in place with most major service companies for equipment and personnel and can draw on a range of specialised personnel to assist in blowout response.

Table 5-29 of this EP details the resource requirements and arrangements of the technical support teams. The competency level required of the technical teams is managed through the well construction management process.

8.10.5.4 Cross Jurisdictional Arrangements

In all cross jurisdiction MOP emergencies beyond Level 1, DTMI will establish an IMT and VOGA will be required to provide an appropriate number of appropriately qualified personnel for the DTMI IMT. This is an initial 11 personnel in accordance with the DoT Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements (July 2020). Figure 8-9 and Table 8-6 displays how the VOGA ICT Representatives will be integrated within the DTMI IMT and the cross jurisdictional arrangements across a Commonwealth and State waters event.

VOGA will conduct initial response actions in State waters as necessary in accordance with their OPEP and continue to manage those operations until incident control can be established by DTMI. Upon establishment of incident control by DTMI, VOGA will continue to provide planning and resources in accordance with the OPEP. This will include response assets and contracts specified in their OPEP, such as those pertaining to waste management, transport and personnel as well as response arrangements with the Australian Marine Oil Spill Centre (AMOSC) and other third party responders.

In fulfilling its obligations as Controlling Agency, DTMI will require VOGA to work in partnership with DTMI to ensure an adequate response is provided across the entire incident. DTMI and VOGA will determine the most appropriate response in State waters by working together on the IAP, protection priorities and net environmental benefit assessment of response activities.

VOGA utilises an Initial NEBA Spreadsheet Tool that provides information on sensitivities at risk, and feasibility and impact of response strategies based on the spill category and season. This and The Initial Incident Action Plan prepared by VOGA can be provided to DTMI at the time of initial notification of a spill potentially entering state waters.

To facilitate this overarching coordination between the two Controlling Agencies and their respective IMT's a Joint Strategic Coordination Committee (JSCC) will be established. The JSCC will be jointly chaired by the WA DTMI State Maritime Environmental Emergency Coordinator and a VOGA nominated senior representative, and comprise of individuals deemed necessary by the chairs to ensure an effective coordinated response across both jurisdictions. The control coordination arrangements for a Cross Jurisdiction MEE are outlined in Figures 2-1 and 2-2 below.

Figure 8-9: Cross jurisdictional response structure

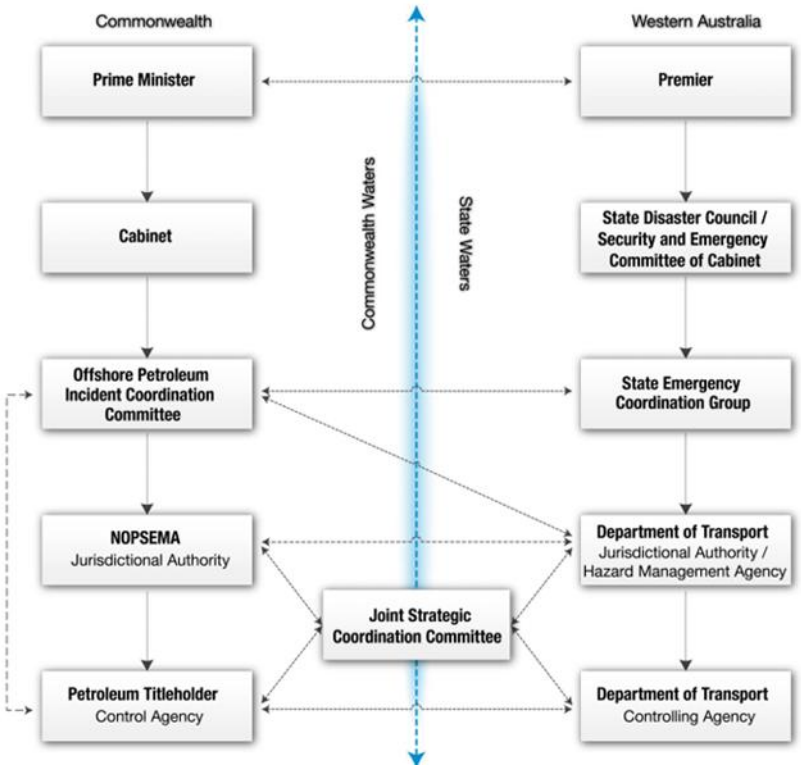
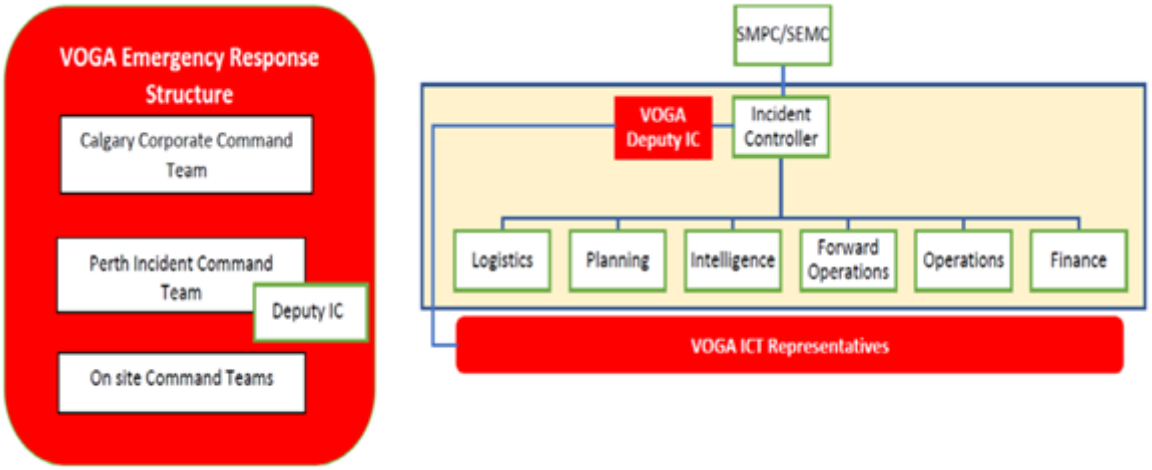


Figure 8-10: VOGA integration into DTMI Incident Management Team



8.10.6 Logistics Management Plan

8.10.6.1 Overview

The VOGA Emergency Response Logistics Management Plan [VOG-7000-RH-0008] contains outputs from the identification of resources required and the scope of works/services required to deliver those resources. It is maintained as live document based on the resources identified and the Contractor Scope of Works in the OSR Capability Review [VOG-7000-RH-0009]. The plan provides details of the logistics support available to support the implementation of the Oil Pollution Plans (OPP) outlined in the OPEP. Logistics requirements for smaller spills can be scaled down from this.

On activation of the ICT for OSR, incident specific logistic plans will be developed to support effective logistics management and deployment. Depending on the size of logistics activities, SIMOPS plans may be developed to manage the hazards associated with multiple logistics interfaces within a confined area. The Logistics Officer is responsible for managing the logistics and SIMOPS plans.

8.10.6.2 Roles and Responsibilities

Logistics Chief

The Logistics Chief is a member of the ICT and is responsible for providing facilities, services and material in support of the incident. The Logistics Chief participates in the development and implementation of the IAP, activates and supervises the branches and units within the logistics section.

The function of this section is to provide support for the control of the incident through the obtaining and maintaining of human and physical resources, facilities, services, and materials.

Responsibilities of the Logistics Chief include:

- Developing the logistics component of the IAP ensuring that Planning Chief is provided with a list of resources available
- Planning organisation of the logistics section
- Allocating tasks to section personnel
- Supporting control of the incident through the procurement and maintenance of human and physical resources, facilities, services and materials
- Facilitating effective liaison and cooperation with all relevant persons
- Providing progress reports on logistical support for the incident to the Incident Commander and the ICT
- Estimating future service and support requirements
- Facilitating the establishment and maintenance of staging areas (if required) in support of the Operations Section.

Logistics Units

Procurement Unit - The Procurement Unit acquires and distributes equipment and materials for infrastructure support. Ensures supplies are appropriately stored and maintained. Obtain extra resources (people, vehicles, equipment etc.) as required. Includes supporting the incident with the provision of food and drinks to personnel involved in the incident across the Incident Command Centre (ICC) and all on-ground sites across different meal times and duty shifts (taking into account specific dietary requirements).

Communications Unit - Provide input into the acquisition, installation and maintenance of communications equipment. Assist the Planning Section to produce the Communications Plan for the effective use of incident communications equipment and facilities; installation and testing of communications equipment; supervision of the Incident Communications Centre; distribution of communications equipment to incident personnel; and the maintenance of communications equipment.

Services Unit - The Services Unit obtains and manages the necessary facilities and accommodation to support operations and incident control and maintains them in working order. Responsible for the setup, maintenance and demobilisation of incident facilities, e.g. Base, ICC and staging areas, as Well as security services required to support incident operations. Provides sleeping and sanitation facilities for incident personnel and manages Base operations. Each facility is assigned a manager who reports to the facilities unit leader and is responsible for managing the operation of the facility.

Transport Unit - The Transport Unit is responsible for providing transport for personnel, equipment, supplies and food, together with fuelling, mechanical maintenance and security of all equipment and vehicles at the incident. Develop and implement a Traffic Management Plan for in and around the incident.

Other Functions that Support the Logistics Unit

Resource Unit (a Unit within the Planning Section that works closely with the Logistics Section) - This function gathers, maintains and presents information on incident resources and contributes to the plans for demobilisation. The Resource Unit Leader is responsible for maintaining the status of all assigned tactical resources and personnel at an incident. This is achieved by overseeing the check-in of all tactical resources and personnel, maintaining a status keeping system indicating current location and status of all these resources. Includes the tasks of resource management, resource tracking, changeover management and demobilisation (in accordance with demobilisation plan). VOGA plans to utilise planners to fulfil this role with offshore planners (if demobbed) to provide back-up support.

Responsibilities include:

- Establish and maintain a Resource Management System for the tracking of resources
- Display resources as allocated (working), available (within a short time frame), enroute, resting, demobilised or unserviceable
- Work closely with Staging Area Manager to ensure communication flow
- Participate in mobilisation and demobilisation plans
- Process requests from Operations Division(s) for additional resources in liaison with Logistics Coordinator
- Provide records/information to Media Liaison Officer.

8.10.6.3 Resource Arrangements

Two categories of contractors and support organisations have been identified to support VOGA respond to oil spills.

- Oil spill response specific support organisations; (including national, state and industry resources)
- Existing operational contractors that can be engaged for emergency response activities.

AMOSC and AMSA are the first support agencies to be called, followed by Oil Spill Response Limited (OSRL) and the WA DTMI if required. The first contractors to be called are likely to be the providers of aircraft and vessels.

During the development of the Incident Action Plan (IAP) the Planning Chief will be working with the Logistics Chief with the to identify the available resources and deployment time. The IAP will outline the priority response strategies and their locations, based on the potential incident escalation, impact of response activities and available resources.

Contact details for oil spill response agencies, organisations and key contractors are available in the VOGA Emergency Contact List (VOG-2000-RD-0050) and further contractors and service provider details is maintained on an Oil Spill Contracts List spreadsheet managed by the VOGA Logistics team.

Table 8-7 lists the spill response resource arrangements, in alphabetical order, that VOGA has in place across the business that may be called on to assist in a VOGA-led spill response.

Oil spill response organisation and contractor capability is confirmed through the assurance and capability management process detailed in Section 8.10.7.

Level 3 Response Support

Managing a Level 3 response to an oil spill will require considerable quantities of resources to be dispatched to the affected areas. Requirements and resources for labour hire, staging areas, accommodation and transport have been considered and arrangements put in place.

Oil spill response operations may extend from Dampier to Port Hedland and Exmouth, and offshore including Montebello Islands, Barrow Island and the Dampier Archipelago. VOGA has arrangements in place to accommodate and support the welfare of personnel working offshore and onshore in response activities

Oil spill equipment will usually be moved to the response site or staging area by road, but may also be moved by vessel or air. The vehicle-accessibility of the destination, time to transport the equipment to its destination and the means of unloading the equipment has been considered.

VOGA have a contract with a logistics company to provide supply base and logistical services in the event of an oil spill. These arrangements include the provision of transport and drivers, supply base areas and equipment, waste disposal equipment and laydown areas, mechanical equipment, and emergency accommodation camps for remote deployment of personnel on an island or along remote sections of the WA mainland.

Support organisations and contractor equipment can be deployed to the logistics contractor yard in Dampier, who will appoint a staging area manager to log the delivery of equipment and the deployment of equipment from the stockpile. Alternative staging areas and overflow is available in Dampier.

VOGA plans on establishing an initial staging area in Dampier from which response activities can be organised and deployed including briefing team members, distribution of equipment and PPE, and monitoring of resources.

Additional staging areas for oiled wildlife and shoreline clean-up operations may also need to be set up depending on the spill trajectory. Sites may be identified through the development of Tactical Plans for shoreline response activities and are expected to be required in the Dampier region initially.

Accommodation is required for the following key groups of personnel:

- Emergency response coordination based in Dampier Port/surrounds
- Emergency response personnel deploying equipment at sea based out of Dampier and Exmouth
- Shoreline clean-up crews ranging from North West Cape to Port Hedland.

Personnel for shoreline cleanup are available via labour hire contractors. Contractors have access to a work force suitable for labour intensive shoreline cleanup activities. Large numbers of suitable personnel are available primarily from Perth within the time required for the peak shoreline cleanup phase. Trained team leaders sourced from oil spill response organisations will be able to

undertake inductions that VOGA has prepared for shoreline and oiled wildlife personnel on their arrival.

AMOSC Core Group has around 70 field operators. Within the field operators section, there is capacity to expand out a response based on the in-company trained supervisory skills of many of the field operators.

Accommodation will be focus on Karratha/Dampier and Exmouth location. VOGA also has arrangements for a contractor to provide emergency camp accommodation for remote deployment of personnel on island. Initial accommodation for the Environmental Pre-Impact Survey and Shoreline spill teams will be provide by the support vessels.

Accommodation can also be sourced onshore through camp providers that supply accommodation and catering. Where camping on islands is not possible, vessels or flotels may be used to accommodate teams working offshore.

The road transport of personnel to onshore locations can be provided by local businesses or to remote locations via contracted and opportunistic vessel providers.

Road transport of personnel will be by hire cars (small teams) and charter buses for large movements of teams such as shoreline responders. Providers are available in Karratha for more immediate use, that can be supplemented from the wider region within the 10 to 20 days required for the peak shoreline clean up phase.

Table 8-7: Key resource arrangements summary

Organisation	Services
Aerial surveillance contractors	Aerial logistical support for aerial surveillance and spill assessment. Additional aviation support may be provided through AMSA.
Airstrip	The primary air base option is Karratha International Airport.
AMOSC	Staffed 24/7 Duty Officer support; • AMOSC Staff availability – 8 staff provided at best endeavours within 3 hours and guaranteed onsite (terrestrially) within 12 hours as per SLA. • Equipment availability per monthly status reporting at http://amosc.com.au/member-login/ & performance indicators as per AMOSC website. • Core Group availability per monthly reporting status at http://amosc.com.au/member-login/ includes; ○ The Core Group has around 5-10 Incident Control Advisers, 30-40 Incident Management Team personnel and 50-70 field operators ○ AMOSC Oiled Wildlife Team ○ Aerial observers. • Mutual aid for equipment at http://amosc.com.au/member-login/. • Access to the National Plan via AMSA within 1 hour on a 24/7 basis. • Access to the Fixed Wing Aerial Dispersant capability within 1 hour on a 24/7 basis (includes air attack supervisors). • Access to RPS Trajectory Modelling within 60 minutes. • Access to KSAT Satellite imagery within 60 minutes of notification – imagery to be determined at the time of request will dictate supply timeframes depending on satellite availability.
AMSA	AMSA manage the National Plan and can provide both oil spill response equipment and personnel as appropriate to the required level. AMSA's full inventory of equipment can be found at https://amsa-forms.nogginoca.com/public/equipment.html.
Labour hire contractors	Unskilled personnel for shoreline response - 100 people by Day 10 and 400 by Day 20 are accessible via a number of providers based primarily in Perth.

Organisation	Services
Logistics contractor	• Supply base/warehousing. • Emergency accommodation/camps for shoreline personnel • Transport (personnel and equipment) • Staging areas • Labour and equipment for shoreline response.
Marine contractors	Supply vessels to convey and deploy oil spill equipment.
OSRL	Contracted oil spill response equipment and personnel appropriate to the required level to support response strategy deployment, satellite surveillance and operational monitoring. As a member of OSRL, VOGA has access to OSRL's full range of equipment and is entitled to 50% of the OSRL global stockpile, plus access to the Global Dispersant Stockpile. OSRL's monthly inventory of equipment can be found at https://www.oilspillresponse.com/activate-us/equipment-stockpile-status-report.
OSM contractors	Deliver the activated OMPs and SMPs for the duration of a spill event in accordance with the OSMP-BIP (WAN-2000-RD-0001.03). Services include operational readiness to enable fast deployment of personnel and resources during a response.
RPS Group	Spill modelling to determine real-time predictions at the time of the spill. The spill trajectory and probability information is used in planning and implementing response options. VOGA has an agreement in place with RPS to allow rapid marine hydrocarbon spill modelling capability to be activated at any time during activities, which will be undertaken for any spill greater than Level 1. AMOSC can also run modelling on behalf of VOGA, if required, as part of contracting arrangements with RPS.
Source control specialist contractors	Relief well planning and operations Dynamic well kill and flow modelling Structural and subsea engineering Subsea inspection and repairs.
Waste management contractor	Waste and hazardous waste collection and disposal, including oily water.

8.10.7 Assurance and Capability Management

VOGA manages oil pollution response capability and assurance requirements through:

- Training and competency of key response personnel and contractors
- Assessing and maintaining response capability
- Assurance tasks such as exercises and third-party inspections.

8.10.7.1 Training and Competency

Onsite Emergency Response personnel are trained in emergency control and leadership to ensure they are suitability prepared for decision-making in an emergency situation.

Training requirements are identified for Onsite Command and Incident Command teams to ensure rotate testing of scenarios and equipment. Records are is kept to track training of personnel.

Relevant members of VOGA's ICT will have completed incident management training. Full details on ICT personnel training, resource and competency requirements are provided in OPEP Section 5, summary of requirements for VOGA is in Table 8-8. As part of the onsite emergency management requirements the nominated Onsite Commander on Wandoo B (usually the Wandoo Field Superintendent) is required to have PMAOHS511A or suitable equivalent.

Table 8-8: VOGA ICT OSR resource and training requirements

Source and Role	Number required trained in PMAOMIR322 + OSR Training* (or IMO 2)					Number required trained in **PMAOMIR418 + OSR*** (or IMO 3)				
	Day 1	**Day 2**	**Day 5**	**Day 10**	**Day 20**	**Day 1**	**Day 2**	**Day 5**	**Day 10**	**Day 20**
VOGA Local (total)	**7**	**11**	**17**	**17**	**17**	**1**	**1**	**1**	**2**	**2**
As directed by DOT	0	3	3	3	3	-	-	-	-	-
Environment Unit Lead	1	1	1	2	2	-	-	-	-	-
Incident Commander	-	-	-	-	-	1	1	1	2	2
Logistics Chief	1	1	1	2	2	-	-	-	-	-
Operations Chief	1	1	1	2	2	-	-	-	-	-
Planning Chief	1	1	1	2	2	-	-	-	-	-
Safety Officer	1	1	1	2	2	-	-	-	-	-
Stakeholder Liaison Officer	1	1	1	2	2	-	-	-	-	-
Finance Chief	-	-	-	-	-	-	-	-	-	-

**Oil Spill Response (OSR) Training*
To supplement Incident Management Training, identified ICT members must also complete Oil Spill Response Training. May be completed through participation in a bespoke training program for VOGA, completion of training delivered by AMOSC (or another training provider) or AMSA. Key aspects that must be addressed in this training include:
1. Understand jurisdictional control arrangements
2. Understand different oil spill response objectives and strategies
3. Understand the different environmental, sociological and economic considerations of oil spill response
4. Understand the oil spill incident action planning process
5. Understand how to effectively monitor and evaluate oil spill strategies.
***ICT Support Roles are Scribe, Safety Officer, Stakeholder LO, Industry LO, Forward Base Lead.*

The Planning Chief is supported by an Environment Unit, with the minimum competency requirement for the Environment Unit Team Leader role being as follows:

- Bachelor's degree in environmental management/ science or equivalent
- > 5 yrs experience in environmental management
- PMAOMIR320 or AMOSC IMO 2.

Specialised skill sets such as those required for monitoring (e.g. fluorometry, shoreline surveys), aerial observation, OWR and specialised equipment operations will be sourced from the resources available within the AMOSC Core Group, AMSA National Response Team and ESC Network, the DTMI State Response Team or service providers.

8.10.7.2 Capability Management

Capability can be demonstrated by the creation and testing of mechanisms to access and activate resources during a spill response. These include the testing of contracts, agreements, MOUs, and directories to demonstrate VOGA's capability to implement the response strategies which is undertaken and documented at a minimum of annually under the Oil Spill Response Capability Review [VOG-7000-RH-0009] . For each Environment Plan revision submitted to NOPSEMA the most current information from the review is provided as part of the ALARP demonstration (see Section 8.14).

Determining capability for oil spill response requires an understanding of the strategies to be implemented and the associated resources. Resources required to support the implementation of each response strategy are identified in the OPEP (i.e. OPP2) and demonstrated as suitable in Sections 5.1 and 5.4 of this EP. VOGA manages ongoing capability required for what it considers to be the highest demand spill scenarios, with the assumption that a capability which applies to worst-case spill scenarios should be sufficient in terms of resource preparedness for less significant spill scenarios.

Capability assessment is a step in the response planning process described in Figure 8-6 and utilised as an ongoing self-assurance and continuous improvement process. Once a capability is defined, arrangements are then tested to ensure it can be achieved and that risks are being managed to ALARP. If testing suggests the capability cannot be achieved, then an assessment of the response strategy and specified capability is undertaken. The following questions are considered to determine capability requirements to support management of risk to ALARP:

- Are there additional tasks that can be undertaken for this strategy?
- When and where the resource would be required, based on the results of consequence modelling (e.g. time to impact, thresholds and probability)?
- How long would the resources be required for use?
- Where and what are the size of stockpiles available to VOGA?
- What are the mobilisation times for equipment from these stockpiles and contractor resources?
- What are the logistical requirements for safe deployment of materials and equipment?
- Is there any benefit of either increasing resource and/or reducing mobilisation times?

- What are the costs of either increasing resource and/or reducing mobilisation times?
- Is there any benefit in increasing the amount of resources?
- Is there a better way to undertake activities associated with this strategy?

If the capability cannot be achieved, then response strategies will be reviewed as part of the IAP process to identify alternative response strategies that reduce risks to ALARP.

In addition to the testing documented in Table 8-9 and the Oil Spill Response Capability Review [VOG-7000-RH-0009], exercises, inspections/audits and action management are undertaken as a key aspect of performance management:

- Exercises - the VOGA Emergency Response Schedule [VOG-1100-YH-0001] addresses the scope and requirements for conducting exercises for the onsite and incident command teams and provides details regarding the reporting of recommendations arising out of exercises including changes of procedure, corrective actions and new guidelines. Table 8-9 presents the exercise schedule.
- Inspections and audits - VOGA's auditing schedule includes all elements of VOGA's HSE MS, including environment performance. The auditing schedule includes three types of auditing processes: Internal inspections of VOGA's response capabilities and commitments: External inspections of VOGA's response capabilities and commitments; and Inspections of third-party providers. The frequency of the inspection is dependent on VOGA's activity, requirements of mutual aid partners and size/capability of the organisation and is provided in Table 8-10. Note that this is in addition to the annual capability testing documented in the Oil Spill Response Capability Review [VOG-7000-RH-0009] and detailed in Section 8.10.7.2.
- Action management - Recommendations arising out of OSCP reviews, capability reviews, inspections, audits are reviewed and where recommendations are to address an increase spill response risk exposure identifies interim measures to manage the risk to ALARP whilst any agreed action is being completed.

Table 8-9: Testing schedule

Objectives that VOGA will test	Evidence and supporting documentation required	Well Construction activities	Wandoo Field activities	Within three months after a significant change to spill profile	Joint industry, OSRA, or OSRO exercises
		Within three months before activity starts	Annually		
Aim 1: Provide situational experience for core incident command team personnel and enabling them to be aware of their assigned roles and responsibilities during a response					
To provide an oil spill event to test the onsite or incident command team roles specifically listed in Section 5 of the OPEP.	VOGA ICT exercise scenario description and attendance list.	X	X	-	-
	VOGA onsite command team scenario description and exercise report.	-	X	-	-
Aim 2: Assess the effectiveness, achievability and timeliness of incident action planning for the duration of expected response					
Test the incident response cycle as documented in the OSCP.	VOGA ICT exercise scenario description, IAP and decision/event log and post scenario lessons learned.	X	X	X	-
	VOGA onsite command team scenario description and exercise report.	-	X	-	-
Aim 3: Testing interfaces and deployment of equipment and resources					
Test the mobilisation ability and logistic assumptions around equipment and personnel movement, timings and capability as per the OPEP.	ICT member/s observer's role or participates in mobilisation exercise with OSRA or OSRO with lessons learned documented.	-	-	-	X
	Updates to Oil Spill Response Capability Review (refer Section 8.10.7.2 for objectives and scope).	X	X	X	-
To test the VOGA on-site equipment capability.	Maintenance records for simulated deployment of satellite tracking buoy.	-	X	-	-

Objectives that VOGA will test	Evidence and supporting documentation required	Well Construction activities	Wandoo Field activities	Within three months after a significant change to spill profile	Joint industry, OSRA, or OSRO exercises
		Within three months before activity starts	Annually		
To assess that the ICT are aware of notification protocols in place to contact other agencies, regulatory authorities and OSRAs and OSROs.	VOGA ICT exercise scenario description, IAPs, decision/event log and stakeholder/notification contact list.	X	X	X	-
To participate in equipment deployment exercises (AMOSC, AMSA, DoT, contractors, other industry operators) as observers or ICT members.	ICT member/s observers' role or participates in joint industry exercise: Shore-based equipment field deployment exercise.	-	-	-	X

Table 8-10: Inspection frequency and scope

Item	Third Party oil spill response providers				
	Oil Spill Response Organisations	Key OSMP provider	OWR Agency	Local/Regional Oil Spill Equipment Provider	Global dispersant
Frequency	3-yearly	3-yearly	3-yearly	2-yearly	3-yearly
Equipment: Maintenance management, logistics, training, readiness for activation/deployment.	Included	Included	Included	Included	Included
People: training and competency management, quantity and availability.	Included	Included	Included	Included	-
Activation Process: Notification processes, activation and mobilisation of people and equipment, exercises and testing.	Included	Included	Included	Included	Included
Documentation: Contracts, agreements, specialist services, authorisation lists, capturing of learning and input into training materials.	Included	Included	Included	-	Included
Management and organisation: Organisational management of change process, lessons learnt, contracts and liability.	Included	-	-	-	-

8.10.7.3 Continuous Improvement

The OSCP requires review:

- Following a significant change to a spill risk profile
- Following significant changes to OSR capability or performance standards
- Post-significant event (i.e. incident, change to risk profile, change to activities, change to preparedness/capability both within VOGA and external service providers).

Reviews will consider any issues arising from events or exercises, any changes in legislation, and also incorporate findings and recommendations from industry incidents locally and globally (if and when information is made public).

Recommendations arising out of OSCP reviews, capability reviews, inspections, audits are reviewed, assessed and considered for implementation if it is consistent with the ALARP principles outlined in the VOGA EPs. A schedule of reviews is provided in Table 8-11.

Table 8-11 Review schedule

Objective	Activity type	Wandoo Facility Operations			
		Annually	After significant changes to OSR capability	After a significant change to spill profile	Post-significant event
To ensure response capability is maintained	Review OSR Capability Review [VOG-7000-RH-0009] (refer Section 8.10.7.2)	X	X	X	X
To ensure response strategies are consistent with oil spill mitigation requirements	OSCP review	-	X	X	X

8.11 Chemical Assessment Process

VOGA has a chemical assessment and selection process to manage the risks and impacts associated with discharge of chemicals to the marine environment to ALARP during operations.

Chemicals proposed to be selected will be managed in accordance with the requirements set out by the Australian Government under the Industrial Chemicals Environmental Standard (IChEMS). The IChEMS is a key component of several National reforms to improve approaches to how industrial chemicals are used, produced, imported and managed. Industrial chemicals will be listed on the IChEMS Register in one of 7 schedules according to their environmental risk.

Chemicals proposed for selection in this activity will be assessed against those listed in the IChEMS register under one of the 7 schedules according to their environmental risk. The selection and management of any chemical will adhere to the specific risk management measures, storage, use and handling requirements outlined in the corresponding schedule.

VOGA uses the chemical ranking scheme developed through the OSPAR Commission decision 2000/2 and the OSPAR list of substances considered to PLONOR to the environment to determine the risk of discharge of chemicals to the environment in order to select the lowest toxicity chemicals practicable.

Under the OSPAR list, chemicals are ranked using the CHARM model. The CHARM model calculates the ratio of Predicted Effect Concentration against Predicted No Effect Concentration (PEC:PNEC). This is expressed as a HQ, which is then used to rank the product. HQ is converted to a colour banding to denote its environmental hazard (refer to Table 8-12) which is then published on the Definitive Ranked Lists of Approved Products by the OCNS.

Products not applicable to the CHARM model (i.e. inorganic substances, hydraulic fluids or chemicals used only in pipelines) are assigned an OCNS grouping, A-E. Group A includes products considered to have the greatest potential environmental hazard and Group E the least.

Any chemical that will be discharged to the marine environment during operations activities shall meet at least one of the following criteria:

- The chemical is listed on the OSPAR List of Substances Used and Discharged Offshore which are considered to PLONOR, or
- The chemical has a HQ banding of Gold or Silver or an OCNS grouping of E or D in accordance with the OCNS Definitive Ranked List of Registered Substances.

If the chemical is not OCNS listed the ecotoxicity data will be assessed in accordance with the OCNS system. The OCNS system requires bioaccumulation, biodegradation and aquatic toxicity data from relevant species such as algae, crustacea or fish to be assessed. Once appropriate ecotoxicity values are obtained they will be evaluated against the OCNS grouping data.

An ALARP justification is required for any chemicals not OCNS listed, if listed with a substitution warning, if there is no available ecotoxicity data, or if ecotoxicity is available but:

- LC50 <10 mg/l or EC50 <10 mg/l
- the bioaccumulation octanol-water partition coefficient (log Pow)>3, or
- the percentage biodegradation within 28 days is <20%.

The ALARP justification assesses the chemical requiring approval and available alternative options in accordance with the following factors (in order of priority):

- Health and safety criteria (Dangerous Goods Class and Safe Work Australia risk phases)
- Ecotoxicity criteria (aquatic toxicity, bioaccumulation and biodegradation data for relevant species)
- Effectiveness on Wandoo process
- Cost.

The change of chemical will be risk assessed and documented in a MOC in accordance with process outlined in Section 8.8.

Table 8-12: OCNS HQ and colour bands

Minimum HQ value	Maximum HQ value	Colour banding	
>0	<1	Gold	Lowest hazard
≥1	<30	Silver	
≥30	<100	White	
≥100	<300	Blue	
≥300	<1000	Orange	
≥1000		Purple	Highest hazard

8.12 Produced Water Adaptive Management Strategy

This framework outlines the routine PFW monitoring and actions undertaken if the monitoring results exceed the defined adaptive management trigger criteria (Section 8.12.6), these criteria are based on the assessment criteria described in Section 5.8. The aim of the strategy is to minimise the likelihood of limits (assessment criteria and adaptive management trigger criteria) being exceeded by taking a phased approach with escalating corrective actions as performance of water treatment system degrades (such as OIW increases).

The following sections provide a summary of the strategies to manage PFW and ballast water, and any deviations, as described within the Produced Water Adaptive Management Strategy [WNB-7000-RP-0010]. The management strategy addresses:

- Managing OIWs within limits to minimise exceedance of acceptable levels (Section 2.5.8.6)
- OIW and PFW measurement and monitoring (Sections 2.5.8.8, 8.12.1 and 8.12.2)
- Alarm philosophy (Section 8.12.3)
- Process excursions and upsets (Section 8.12.4)
- Equipment calibration and monitoring deviations (Section 8.12.5)

In the event the adaptive management triggers are exceeded (Section 8.12.6), adaptive management contingency actions will be implemented (Section 8.12.7)

8.12.1 Monitoring Inline OIW Analysers and Manual Analysis

Performance of PFW and ballast water treatment and OIW exceedances of the acceptable and unacceptable limits (Table 5-57) are monitored and corrective actions implemented in accordance with the Platform Operations Manual [VOG-7000-MN-0001].

The primary method of quantifying OIW in PFW and ballast water is based on inline OIW analysers. The analysers provide real-time OIW values to the WNB control room. Actuals are logged and recorded within servers located on WNB (called the MCS). This history can be recalled for OIW performance review.

The objective of the two daily manual laboratory samples are to act as a verification of the inline OIW analyser performance. The optimal cleaning requirement for the inline OIW analysers to maintain accuracy is two times daily.

The 24-hour MCS OIW average, average daily manual laboratory samples and OIW targets are reported on the Wandoo daily report for PFW and ballast water.

8.12.2 Monitoring Discharge Flow Rates

The PFW and ballast water discharge flow rates will be monitored via production averages. If flow rate trending towards exceeding the maximum PFW limit, production will be trimmed back on wells as required to not exceed the daily Unacceptable PFW limit.

The 24-hour total PFW volume, total produced liquids and ballast water discharged (via total oil volume) are reported on the Wandoo daily report for PFW and ballast water.

8.12.3 Alarm Philosophy for Inline OIW Analysers

Early detection of OIW excursions allow earlier intervention and reaction to ensure overboard discharge of PFW remains within specification. Alarm points are set via programmed values based on the accepted 24-hour maximum OIW limits.

Continuous monitoring of the produced and ballast water flows are maintained by the inline OIW analysers. These instruments provide continuous reading back to the MCS in the Central Control Room (CCR). The MCS records and trends the OIW readings from the inline OIW analysers and is configured to alarm if either water stream goes out of specification.

The alarms are set via programmed values based on the Acceptable and Unacceptable daily OIW averages for the relevant Flow Regime. The MCS calculates and records the following:

- Instantaneous OIW content
- 20-minute average OIW content
- Rolling 24-hour (daily) average OIW content.

The above readings are displayed and trended on the MCS to aid the operation of the PWTS and are alarmed to alert the CCR Operator. Based on these alarms, the CCR Operator is to initiate corrective actions to prevent the 24-hour (daily) average exceeding the Unacceptable Limit, should process upsets or disruptions to the ancillary systems (i.e.. chemical injection or sediment ingress) cause excursions or deviations of the OIW content from the normal operating range.

8.12.4 Process Excursions and Upsets

To continually manage OIW to ALARP an internal OIW excursion event 'Flag' system has been implemented. The 'Flag' is a communication tool used to record the short duration process excursions based on a pre-determined time weighted OIW average. If a 'Flag' occurs, details are noted within a log sheet by WNB control room personnel and potential influencing factors are noted. Flagged excursions are then reviewed by WNB operators for trends to assist in identifying contributing factors and minimising future events.

If high OIW levels persist over time, WNB operators respond in accordance with the High Oil in Water Optimisation Procedure in the Measurement and Reporting of Produced Formation and Ballast Water Oil in Water Content [WNB-012-502]. WNB has limited capacity within Shaft 4 to handle diverted out of specification PFW therefore a sustained OIW excursion may lead to production curtailment or shutdown so the daily Unacceptable OIW limit is not exceeded.

8.12.5 Equipment Calibration and Monitoring Deviations

Equipment for monitoring of OIW, including calibration and cross-checking of laboratory equipment and inline OIW analysers, is regularly calibrated and tested in accordance with testing protocols that are compliant with American Society for Testing and Materials (ASTM) procedures.

Deviation of the instantaneous inline OIW analyser reading from the twice daily manual laboratory results will be managed in accordance with Table 8-13. If cleaning and calibration of the inline OIW analyser does not reduce the amount of deviation, regular (four hourly) manual samples will be undertaken until the deviation is resolved.

A deviation between the manual laboratory results and NATA laboratory analysis will be managed in accordance with Table 8-13. Historically the levels of TRH and PAH have been compared against the OIW manual laboratory and inline analyser at the time of sampling. The total NEPM TRH are the most closely aligned with the offshore OIW monitoring methodologies. Only trace amounts of PAH were detected within the PFW and ballast water samples.

For the past three years, monthly NATA laboratory total TRH samples have been predominantly below those estimated by the offshore methods. This suggests that the offshore OIW readings are conservative.

Offshore monitoring of OIW will continue to be compared against the monthly NATA laboratory analysis total TRH and NEPM TRH. If the manual laboratory results exceed the NATA laboratory results (combined average of TPH totals), then the historical daily results will be reviewed to determine if the HACH manual analyser requires recalibration (Table 8-13). Any issues with the HACH manual analyser however would most likely be identified from the daily samples being compared against the inline OIW analyser.

8.12.6 Adaptive Management Trigger Criteria

Adaptive management trigger criteria for OIW, PFW and ballast water flow rate, and PFW chemistry and toxicity are detailed in Table 8-13.

The following subsections provide further details on how the trigger criteria are derived for metals, inorganics, alkylphenols, radionuclides, hydrocarbons, production chemicals and whole-effluent PFW toxicity levels (toxicity testing).

8.12.6.1 Metals, Inorganics, Alkylphenols and Radionuclides

A variety of metals may be present in PFW in varying concentrations, therefore a suite of total and dissolved metals/metalloids have been selected to monitor annually. Where available, metals will be compared against ANZG PC99 and PC95 values (Table 8-13).

There are no impact criteria for inorganics in Australian guidelines or legislation, therefore inorganic concentrations will be assessed against background levels. Ammonia concentrations exceed ANZG Guidelines, therefore concentrations will continue to be monitored monthly and managed via the adaptive management strategy (Table 8-13).

Alkylphenols were added to the annual chemical testing suite in 2014. To date no alkylphenols have been detected within the PFW, however will continue to be monitored for detection.

Radionuclides have been assessed periodically within the Wandoo PFW since 1994. There are no impact criteria for radionuclides in Australian guidelines or legislation, therefore the assessment criteria for radionuclides are based on a comparison against background levels.

8.12.6.2 Hydrocarbons

O&G and TPH within the PFW sample will be monitored both monthly and annually. Concentrations will be assessed against background levels and used in the management of discrepancies between offshore manual sampling and the NATA laboratory results (Table 8-13).

PAH and BTEX concentrations will be sampled annually. To date, BTEX has not been detected within the Wandoo PFW since sampling was initiated in 1998. Small concentrations of PAH have been detected historically. However, no PAH analytes have been detected since 2012. PAH and BTEX concentrations will be assessed against the ANZG PC99 and PC95 levels (where available). If no guideline values exist, concentrations will be assessed against background levels.

8.12.6.3 Production Chemicals

VOGA has a chemical assessment process to manage the risks and impacts associated with discharge of chemicals to the marine environment to ALARP during operational activities (see Section 8.11).

Corrosion inhibitor is the only process chemical whose concentration rate may exceed the product toxicity value. Quaternary amine compounds will be monitored annually.

8.12.6.4 Toxicity Testing

Aquatic toxicity testing, by its nature, involves the dissolution of the PFW under test in the water media used and then maintenance of a stable bioavailable exposure concentration over the course of the test (UN GHS, 2011).

Every two years VOGA will undertake DTA testing (≥5 species) based on the ANZG guidelines (ANZG 2018) on the PFW effluent and compare against historical levels and undertake a desktop assessment against the annual NATA laboratory chemical analytes testing.

Every two years (alternating with DTA testing) VOGA will undertake an ecotoxicity screening test to compare against the most recent DTA test.

Based on the United Nations Globally Harmonized System (UN GHS), fish, molluscs and algae can be tested as surrogate species covering a range of trophic levels and taxa as a screening test. Alternatively, single species may be tested as a surrogate to detect increases in sample toxicity.

When undertaking screening tests routinely, or triggered as an adaptive response (Table 8-13), advice from the laboratory will be sought for the most appropriate species selection.

8.12.7 Adaptive Management Contingency Actions

Appropriate contingency actions will be triggered via the adaptive management process within Table 8-13.

Should a significant increase in, or new impact or risk be identified that is not described or provided for by the accepted Wandoo Facility EP, then an ALARP and acceptability evaluation will be carried out to assess whether the existing control measures are sufficient to manage the impact or risk to ALARP and an acceptable level. No further action will be required if it is determined that there has not been a significant increase in impact.

Should the ALARP and acceptability evaluation determine that existing controls within the accepted Wandoo Facility EP do not manage the expected increase in, or new impact or risk to an ALARP and acceptable level, then additional controls including disposal, processing and engineering options are to be evaluated.

A revision of the Wandoo Facility EP is required for submission to NOPSEMA if significantly greater or new impact or risk is determined. That is, if an impact or risk is identified or expected from the proposed change to operations, but is not identified in the in the Wandoo Facility EP, then a revision of the Wandoo Facility EP will be submitted to NOPSEMA for assessment and acceptance, thus meeting the requirement of Regulation 39(2).

Table 8-13: PFW and Ballast Water Adaptive Management Framework

Monitoring strategy	Trigger criteria	Contingency actions
OIW		
The PFW OIWs are monitored continuously via an inline OIW analyser and two daily manual laboratory analysis.	OIW concentration exceeds the 'Unacceptable 24-hour Limit' for the PFW flow rate regime in operation, as per Table 5-57.	PFW is diverted inboard to Shaft 4 where it is diluted with ballast water.
	If the manual laboratory analysis significantly deviates from the inline OIW analyser instantaneous reading as per POM Procedure WNB-012-502	The inline OIW analyser will be cleaned (if not done so already) and an additional laboratory sample will be taken. If it still deviates, 4 hourly samples will be collected until inline OIW analyser is calibrated or repaired to within the required limits.
The ballast water OIWs are monitored continuously via an inline OIW analyser and two daily manual laboratory analysis.	OIW concentration exceeds the 'Unacceptable 24-hour Limit' for the PFW flow rate regime in operation	Ballast water is diverted inboard until sufficient time has passed to lower the OIW to acceptable levels.
	If the manual laboratory analysis significantly deviates from the inline OIW analyser instantaneous reading as per POM Procedure WNB-012-502	The inline OIW analyser will be cleaned (if not done so already) and an additional laboratory sample will be taken. If it still deviates, 4 hourly samples will be collected until inline OIW analyser is calibrated or repaired to within the required limits.
An end-of-pipe PFW sample is taken on a monthly basis and analysed in a NATA accredited laboratory including hydrocarbons;	NATA laboratory results (combined average of TPH totals) significantly exceed the manual laboratory results.	The HACH manual analyser will be calibrated at the earliest convenience. Any issues with the HACH manual analyser however would most likely be identified from the daily samples against the inline OIW analyser.
PFW flow rate		
Flow is measured continuously via inline flow meter.	Flow rate discharge trending towards exceeding 'Maximum PFW 24-hour Limit' for the PFW flow rate regime in operation, as per Table 5-57.	PFW flow rate is tracked on production averages. If flow rate trending towards exceeding the 'Maximum PFW 24-hour Limit', production is trimmed back.

Monitoring strategy	Trigger criteria	Contingency actions
PFW chemistry and toxicity		

An end-of-pipe PFW sample is taken on an annual basis and analysed in a NATA accredited laboratory.
Parameters tested include:
• Metals:
  ○ Dissolved and total metals: Arsenic, Barium, Cadmium, Copper, Iron, Lead, Manganese, Nickel, Selenium, Strontium and Zinc.
  ○ Mercury, Total Chromium, Chromium Trivalent and Chromium Hexavalent.
• Inorganics:
  ○ Chloride, Sulphide, Sulphite, pH, Total Organic Carbon, Total Dissolved Solids, Total Nitrogen, Total Suspended Solids and Turbidity.
• Radionuclides:
  ○ Potassium-40, Radium-226, Radium-228 and Thorium-228.
• Hydrocarbons:
  ○ O&G, Total TRH, NEPM TPH, PAH and BTEX.
• Alkylphenols.
	Metals
	Metal concentrations will be assessed against the ANZG guideline PC99 and PC95 levels (where available). If no guideline values exist, concentrations will be assessed against background and historical levels.
	
	Inorganics
	Inorganic concentrations will be assessed for anomalies or outliers, however no specific trigger levels will apply.
	
	Radionuclides
	As no Australian guideline values exist, radionuclide concentrations will be assessed against background and historical levels.
	
	Alkylphenols
	Phenol concentrations will be assessed against the ANZG guideline PC99 and PC95 levels (where available). If no guideline values exist, concentrations will be assessed against background and historical levels.
	
	Hydrocarbons
	Hydrocarbon concentrations will be assessed against the ANZG guideline PC99 and PC95 levels (where available). If no guideline values exist, concentrations will be assessed against background levels.
	
	Production chemicals
	As no Australian guideline values exist, quaternary amine compound concentrations will be assessed against their specific toxicity values.
		If the assessment of the chemical analytes combined with toxicity test results identify a potential increase in PFW toxicity, a further screening test will be undertaken.
		If the potential for increased toxicity of the PFW stream remains, a DTA on the remaining species (not tested within the screening test) will be undertaken. A revised mixing zone will then be calculated for assessment against the Wandoo Facility EP defined mixing zone.
		If the new mixing zone is greater than the Wandoo Facility EP defined mixing zone, the requirement for further laboratory testing (i.e. TIE assessment) will be determined through an ALARP and acceptability assessment (as per Section 5.8.7 and 5.8.8).

Monitoring strategy	Trigger criteria	Contingency actions

• Production chemicals:
  ○ Quaternary Amine Compounds.
• Ecotoxicity:
  ○ Screening test against the taxonomic groups: fish, mollusc and algae.
	Ecotoxicity
	Toxicity concentration/s (species % effects data) will be assessed against species background levels.	

An end-of-pipe PFW sample is taken on a monthly basis and analysed in a NATA accredited laboratory including the ammonia constituents: N, NH4 and NH3.	Total ammonia Given historical measurements, total ammonia is likely to exceed the ANZG guideline PC99 and PC95 levels. Therefore, further contingency actions will only be undertaken for a threshold level >50mg/L for total ammonia as N.	
Proposed production changes will be assessed for the following: New production chemical proposed to be used in the PWTP. Target dosage concentrations of chemicals.	Production changes New production chemical proposed to be used in the PWTP will be reviewed in accordance with the chemical assessment process outlined in Section 8.11. Contingency actions will be undertaken following any changes to the production process that could increase PFW toxicity, or introducing a new chemical that is more toxic than the chemical it is replacing Increase in the target dosage concentrations of chemicals approved for use in the production process that could increase PFW toxicity.	Initial assessment of potential for increased toxicity of the PFW is undertaken as per the impact assessment criteria for production chemicals in Section 5.8.3.6. If potential for increased toxicity is identified, then a screening test will be undertaken once the changes have been implemented (trialled via field change approval). If the screening test identifies potential increased toxicity of the PFW stream, the decision to implement the production change may be rejected. Alternatively, a DTA on the remaining species (not tested within the screening test) will be undertaken if the decision is to proceed. A revised mixing zone will then be calculated for assessment against the Wandoo Facility EP defined mixing zone

Monitoring strategy	Trigger criteria	Contingency actions
		If the new mixing zone is greater than the Wandoo Facility EP defined mixing zone, the requirement for further laboratory testing (i.e. TIE assessment) will be determined through an ALARP and acceptability assessment (as per Section 5.8.7 and 5.8.8).
The toxicity of an end-of-pipe PFW sample is assessed on a two yearly basis.	Ecotoxicity A mixing zone will be calculated based on DTA results to determine if it remains within the Wandoo Field EP defined mixing zone.	If the new mixing zone is greater than the Wandoo Facility EP defined mixing zone, the requirement for further laboratory testing (i.e. TIE assessment) will be determined through an ALARP and acceptability assessment (as per Section 5.8.7 and 5.8.8).

8.13 Biofouling Risk Assessment Process

The biofouling risk assessment process is undertaken as part of the process for engaging a new Contractor for activities involving vessel, MODU and/or immersible equipment, or for the mobilisation of a previously contracted vessel known to have an increased risk profile since last use (e.g. extended period in Port).

The process excludes ballast water management (managed under the *Biosecurity Act 2015*, Australian Ballast Water Management Requirements (DAWR, 2017) consistent with the International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Management Convention).

The following steps outline the VOGA Biofouling Risk Assessment Process:

Step 1: Conduct Review of Relevant Contractor Procedures and Documentation:

- Biofouling Management Plan consistent with IMO guidelines
- Biofouling Record Book
- Antifouling Coating Certificate
- Immersible equipment management procedures.

Step 2: Conduct Biosecurity Risk Assessment (vessel, MODU and/or immersible equipment) *

- Gather relevant information (where available)
- Recent inspection(s) – date/location and any corrective actions taken
- Dry dock / cleaning information – date/location
- Operational History (e.g., operating out of areas with known IMS)
- Anti-fouling coatings (AFC) – valid, age, coverage, appropriate for vessel activity profile
- Maintenance and inspection records and biocide dosing information for Marine Growth Prevention Systems (MGPS)
- Vessel operating profile – including any details of vessel operating outside normal profile, extended inactive periods
- Vessel previously located in high risk area (vessel sharing with other high or uncertain risk conveyance / platform, ports with established IMS.)
- Immersible equipment activity profile and history
- Immersible equipment cleaning, drying, maintenance and storage practices
- planned activity profile for vessel/MODU immersible equipment – how long alongside, proximity to facilities
- The Western Australian Department of Primary Industries and Regional Development ‘Vessel Check’ may be used to validate the low risk status of commercial vessels frequenting Western Australian waters

- Assess risk using the VOGA Risk Management Manual [VOG-2000-MN-0001] based on biofouling risk indicators from The Western Australian Department of Primary Industries and Regional Development 'Vessel Check'. Risk indicators will include the following:
  - History of the vessel/facility, including time spent in ports of call since last dry dock, cleaning regime or marine pest inspection results
  - Time between a biofouling inspection and mobilisation to an offshore activity to inform exposure risk following the last inspection and justify the relevance of biofouling inspection findings
  - Presence of an appropriate biofouling management plan and effective implementation of the plan
  - Level of existing biofouling and the presence of species of concern (in particular the presence of marine pests) within biofouling communities on the vessel/ infrastructure/ facility associated with the activity (informed by biofouling record books, maintenance records, cleaning results or inspection programs)
  - Operational profile relevant to biosecurity risk such as operating speed, time alongside a facility and the need for ballast exchanges while engaged in an offshore activity.

Step 3: Further Risk Mitigation Actions

If a low risk is not identified, an IMS expert will be engaged to review risk assessment and recommend mitigation measures to implement for the vessel risk to be acceptable. Further information must be obtained, and action undertaken to reduce risks to an acceptable level (i.e. low risk or further risk mitigation actions implemented) prior to proceeding with engagement of vessel or equipment. Mitigation measures include:

- Engage independent IMS expert to conduct visual inspection
- Cleaning of biofouling on submerged surfaces to reduce the risk of marine pest transfer
- Additional marine growth prevention measures (e.g. dosing of internal seawater system with biocides, application or re-application of anti-foul coatings)
- Using alternative vessels or other mobile components or equipment that have a demonstrated low biosecurity risk profile.

8.14 Monitoring and Review

8.14.1 Auditing

The VOGA audit procedure is outlined in the Performance Assurance Manual [VOG-1100-YG-1201.02] The audit process comprises:

- Audit scheduling
- Preparation and planning
- The audit

- Reporting
- Follow up and action item close-out.

To support compliance monitoring, the audit plan is set out each year as part of the VOGA Audit Schedule [VOG-2000-RY-0031]. An Environmental Advisor and/or HSE Advisor will undertake environmental audits to ensure compliance with environmental performance outcomes and environmental performance standards. These audits will be scheduled to occur at least once a year. The audit findings will be outlined in an audit report submitted to the Operations Manager.

A summary of the environmental audit findings will be included in the annual compliance report submitted to NOPSEMA.

Following receipt of the audit report, the Operations Manager should undertake a review and develop an action plan. The action plan should finalise:

- Action items
- Action parties
- Timeframe for completing action items
- Approver.

The appropriate actions need to be taken by the designated action parties within the agreed timeframe. The process for responding to corrective actions will be detailed in the Corrective Action Management Procedure [VOG-1100-YG-1201.03].

8.14.2 Environmental Monitoring Strategy

8.14.2.1 Overview

VOGA has developed an environmental monitoring strategy based on a review of risk and impact levels identified in Section 5 of the EP.

The strategy takes into consideration the following:

- Identification of the area of interest (the EMBA for each hazard)
- Identification of environmental values within this area of interest, and their current condition
- Identification of the potential environmental impact (the pressure potentially causing an environmental impact)
- The management response.

The strategy also guides management response by:

- Identifying whether baseline conditions have been adequately defined and quantified
- Identifying whether additional data is required to assess whether operation of the Facility is having a measurable impact on the offshore environment

- Identifying which mitigation or management measures may be required if monitoring identifies a measurable impact.

There are a number of ecologically sensitive receptors such as island nature reserves in the general area of where WNA and WNB operate, but these are some distance away (the nearest, Dampier Archipelago, is 40 km away) and are unlikely to be directly affected by VOGA operations at Wandoo unless there is a significant hydrocarbon release.

Given the ecological importance of areas potentially affected by hydrocarbon release (or from an alternate activity that may have been assessed to have the potential to impact the offshore environment), it is important that baseline information regarding the physio-chemical and ecological condition of the marine environment and any sensitive receptors that reside within the EMBA is readily available. An appropriate level of baseline survey data is also required to ensure that significant impacts on ecological values can be measured and recovery of these values can be monitored and remediated.

In this context, monitoring requirements in consideration of a significant hydrocarbon release are considered in detail within the Wandoo Field OSCP [WAN-2000-RD-0001]. Monitoring requirements in relation to standard operational activities are considered further in this section.

8.14.2.2 Routine Environmental Monitoring

Table 8-14 and Table 8-15 provides a summary of routine emission and discharge monitoring carried out on Wandoo.

Table 8-14: Atmospheric emission monitoring

Source	Parameter	Monitoring Equipment	Records
Fuel Gas	Volume consumed	Inline Gas flow meter	Transcribed to daily report Emissions data based on NOPTA reports
Diesel usage on the platform	Volume consumed	Crane Pedestal Diesel Flow meter Bunkering invoice Manual Inventory measurements	Data stored in spreadsheet reconciled against invoices Transcribed to daily report
Flaring	Volume of gas sent to flare	Inline Gas flow meter Engineering calculations	Data stored in production data management and reporting system Transcribed to daily report Emissions data based on NOPTA reports

Table 8-15: Surface water discharge monitoring

Source	Parameter	Monitoring Equipment	Records
Produced Formation Water	Daily Discharge volume	Inline Flow meter	Data stored in production data management and reporting system Daily discharge volumes transcribed to Daily report
	24 hour average OIW concentrations	Inline OIW analyser Manual Sample Hach laboratory analyser	Data stored in production data management and reporting system Transcribed to Daily report Laboratory records Summary of deviations at the end of the month
	Ammonia concentrations	NATA accredited laboratory	Laboratory report
	Full chemical suite(refer to Table 8-13)	Annual NATA accredited laboratory	Laboratory report
	Ecotoxicology	Two yearly laboratory testing	Laboratory report
	Process Chemical concentration	P2 Explorer calculation (WNB-7000-YC-0001)	Data stored in P2 Explorer Monthly trend report
Ballast Water	Daily Discharge volume	Inline Flow meter	Data stored in production data management and reporting system Transcribed to Daily report

Source	Parameter	Monitoring Equipment	Records
	24 hour average OIW concentrations	Inline OIW analyser Manual Sample Hach laboratory analyser	Data stored in production data management and reporting system. Transcribed to Daily report
	Ammonia concentrations	NATA accredited laboratory	Laboratory report
Hazardous Drain Tank	Instantaneous OIW concentrations	Manual Sample Hach laboratory analyser	Laboratory records Transcribed to Daily report
Non-hazardous Drains	Instantaneous OIW concentrations	Manual Sample Hach laboratory analyser	Laboratory records Transcribed to Daily report

8.14.2.3 Field Environmental Monitoring

In terms of volume and total contaminant loads, the combined ballast and PFW discharge from WNB represents the most significant discharge into the offshore environment from the Wandoo facilities. Discharges of other types of wastewater from the Wandoo Facility are considered minor and are unlikely to be discernible from the overall potential impact of the PFW discharge. Hence, field environmental monitoring is undertaken to primarily assess whether the ballast and PFW discharge has caused any accumulation of contaminants.

The most recent field environmental monitoring campaign was undertaken in 2024 which supported the assumptions for the impact assessment for PFW and validated the dilutions modelling (refer to Section 5.8.4.2 for details).

In addition, an IMS inspection of project infrastructure utilising third party specialists to validate the absence of invasive marine pests will be undertaken within 20xx.

8.14.2.4 Future Field Environmental Monitoring

Key Sensitivities

Key sensitivities and species are described and considered in Section 3 of this EP. It is confirmed that key environmental assets at risk are species and habitats that primarily occur outside the Operational Area that could be impacted by a significant hydrocarbon release. These are present in both coastal and offshore locations throughout the NWS.

Sensitivities that are closest to the Wandoo facilities are the Dampier Archipelago and the Montebello Islands, located 50 km southeast and 40 km west of the WNB Platform, respectively. These sensitivities are well beyond the direct influence of the Wandoo operations. The EP also provides a summary of conservational significant marine species that may potentially occur near the Platform.

The risks associated with operation of the Facility on these species are considered very low as these species are likely to be present infrequently and are not resident. The potential exposure to operational discharges is also considered low. Their low relative abundance and mobility also precludes them from being suitable biological indicators for environmental monitoring of operational discharges such as PFW.

Monitoring Indicators and Studies

Indicators that are suitable for environmental monitoring should be:

- Measurable
- Relevant with respect to the actual and predicted impact
- Able to give significant results
- Have a measurable response within a reasonable time
- Cost effective.

Selecting monitoring variables that are difficult to measure, irrelevant, uncertain or extremely costly, are not useful and will not add to knowledge or understanding of impacts associated with operational discharges. Details of proposed monitoring indicators for Wandoo Field are provided in Table 8-16.

Table 8-16: Potential monitoring indicators for use at Wandoo

Indicator	Comments
Sediment	Relatively easy to measure using standard methods, e.g. grab. Relevant as particulate hydrocarbons and other contaminants are likely to settle out within 1 km of the discharge. Have internal baseline data for comparison. Provide a good basis for determination of cumulative long-term impacts. Relatively rapid testing (weather dependent) and reporting of results (usually within four weeks of testing).
Water	Relatively easy to measure at surface or depth using standard methods, e.g. Van Dorn or equivalent. Have internal and external baseline data for comparison. Provide a poor basis for determination of cumulative long-term impacts. Useful to obtain information to validate the presence of particular contaminants in the water column that could be directly related to the discharge, however the assessment of the PFW discharge itself (as per Section 5.8.4) is considered more effective and plume identification can be difficult. Relatively rapid testing (weather dependent) and reporting of results (usually within four weeks of testing).
Benthic (infauna)	Relatively easy to measure using standard methods, e.g. Van Veen grab or equivalent. Relevant as represents the habitat most vulnerable to cumulative long-term impacts based on its presence adjacent to WNB. Have internal baseline data for comparison. Relatively rapid testing (weather dependent) however reporting of results is comparatively slow (due to laboratory testing). Significant spatial and temporal variability common. Small scale variability can often confound interpretation of subtle impacts. Is likely to detect a significant impact, if present.
Other benthic habitat (seagrass, corals)	None present and therefore not considered further.
Plankton	Relatively easy to measure using standard methods, e.g. plankton tow nets. Relevant as represents species and habitat most vulnerable to direct impacts from discharge from WNB. Would be reliant on external data for comparison. Massive spatial and temporal variability in abundance and diversity of species related to tide, depth, season and time of day. Interpretation of impact likely to be confounded.
Fish	Comparatively difficult to measure, although a range of methods available e.g. non-destructive BRUVS.

Indicator	Comments
	Less relevant to impact detection as species are highly mobile and typically non-resident. Would be reliant on external data for comparison although some data is available from previous biochemical studies. Significant spatial and temporal variability in abundance and diversity of species Interpretation of impact likely to be confounded.
Megafauna (reptiles and marine mammals)	Comparatively difficult to measure as species are relatively uncommon and unlikely to occur in sufficient numbers for statistical assessment. Less relevant to impact detection as species are highly mobile and typically non-resident. Would be reliant on external data for comparison although some data is available from anecdotal observation. Significant spatial and temporal variability in abundance and diversity of species Interpretation of impact likely to be confounded.

On the basis of the advantages and disadvantages discussed above, the indicators most useful in determining impacts related to operational discharges and long-term cumulative impacts are related to assessment of benthic parameters, primarily sediment quality and possibly infauna. In addition to this, water quality sampling is proposed to be undertaken to verify that key parameters are not exceeded outside of the defined mixing zone boundary.

Monthly and annual PFW composition analysis is undertaken to collect PFW composition and toxicity data and compare with thresholds, baseline and historical data to assess changes (Refer to PFW monitoring and management framework detailed in Section 5.8.4).

Indicative details of proposed field monitoring studies are provided in Table 8-17.

Table 8-17: Indicative details of future field marine monitoring

Survey	Objective	Parameters
Sediment quality	Collect sediment quality data and compare with ANZG guideline values and historical sediment quality data at the boundary of the mixing zone to assess the mixing zone extent and any long-term changes.	ANZG Sediment Quality Guidelines (2018) low trigger values*: • Heavy metals (ie Al, As, Ba, Cd, Cr, Co, Cu, Fe, Hg, Ni, Pb, Zn) • NH_3 • TRH • PAH • TOC • Particle Size Distribution.
Benthic infauna and epifauna	Collect infauna data and compare with historical data to assess any long-term changes.	• Abundance • Species richness • Diversity.
Water quality	Collect water quality data and compare with ANZG guideline values and historical sediment quality data at the boundary of the	ANZG Water Quality Guidelines (2018) 99% species protection values*:

Survey	Objective	Parameters
	mixing zone to assess the mixing zone extent and any long-term changes.	• Heavy metals (ie Al, As, Ba, Cd, Cr, Co, Cu, Fe, Hg, Ni, Pb, Zn) • Ammonia • TRH • PAH • TOC • Particle Size Distribution.

**where no guideline is specified for a contaminant of concern, derive a value based on the natural background (reference) concentration multiplied by an appropriate factor as described by ANZG guidelines.*

8.14.3 Review of the Environment Plan and Oil Spill Contingency Plan

A formal review and revision of the Wandoo Facility EP will be undertaken every five years (Regulation 41), after a significant modification or new stage of an activity, or any new or increased environmental impact or risk has been identified under Regulations 38 or 39.

The review will include an assessment of:

- The compliance with the Commitments Register (containing environmental performance outcomes and standards)
- Any changes to the Wandoo Well Operations Management Plan [VOG-1000-YG-0006] which may impact on well integrity
- The continued relevance of environmental performance outcomes and standards
- Effectiveness of the implementation strategy within the Wandoo Field EP
- The adequacy of auditing and monitoring.

The review schedule and triggers for the OSCP are outlined in the Wandoo Field OSCP [WAN-2000-RD-0001].

8.14.4 Annual Performance Review

VOGA undertakes an annual performance review in accordance with Assurance Procedure #03303vai. The scope includes the following:

- Compliance auditing results
- Operational results summary
- Reportable and Recordable incidents
- Oil spill response assurance activities
- Stakeholder consultation activities
- EP and OPEP reviews undertaken.

8.15 Management of Asset and Decommissioning

8.15.1 Maintenance of Property

This section addresses the EP content requirements for Section 572(2) of the OPGGS Act.

In accordance with Section 572(2), VOGA manages and maintains the property within the Wandoo Field to economic EOFL through AIMS and maintenance management processes. These mechanisms ensure asset(s) are-maintained and monitored to economic end of field life, this also ensures assets will be suitably maintained for decommissioning.

The AIMS, through the AIMS Manuals, ensures that the assets are maintained thus meeting requirements of Section 572(2). The AIMS framework is governed by the following objectives:

- Maintaining the risk to personnel and the environment to ALARP
- Providing every employee and contractor with a safe and healthy workplace
- Minimising adverse environmental effects associated with VOGA's operations
- Verifying and checking the effectiveness of hazard control measures.

The AIMS is comprised of the following asset components:

- Pressure (includes risers and flowlines)
- Structural (includes CALM Buoy mooring and platform super-structures)
- Well
- Fire and safety systems
- Electrical
- Communications
- Rotating equipment.

The inspection, maintenance and repair tasks and frequencies are managed using maintenance procedures within SAP. The individual inspection, testing and maintenance procedures describe specific guidelines and the reporting criteria for the related tasks. After completion of each inspection, testing or maintenance task, a record of the actions carried out and the outcomes are recorded in the integrity database which links to SAP. This is then used to verify and measure the integrity of plant equipment and critical items (through comparison with acceptance criteria and key performance indicators).

A review of historical data related to the integrity management has been undertaken as part of five-yearly revision of the Wandoo Safety Case [WNB-1000-YH-0001]; as well as during the VOGA response to NOPSEMA Planned Inspection 1899. Data was collected from the following sources:

- Incident and event database, including all recorded incident events and investigations, and near misses, but excluding Hazard Observations: This information was utilised to identify:

  - significant incidents
  - repeated corrective actions
  - trends in failure analysis and/or root causes.

- Deviation Risk Assessments and Operational Directives: DRAs and Operational Directive are utilised to identify system shortfalls which required Operations to implement short term changes to improve or manage safety outcomes
- Actions arising from audits and NOPSEMA Planned Inspections: All action items from all historical NOPSEMA Planned Inspections. This information was utilised to identify and trend areas of improvement for critical elements (CEs) or AIMS discipline
- MoCs and Field Change Approvals (FCAs): FCAs data was reviewed to identify where VOGA have made system improvements as well as identifying trends in short term corrective changes required to maintain integrity/performance of CEs.

Assets will be managed in accordance with AIMS up until CoP. Separate maintenance requirements will be put in place to manage the assets between CoP and decommissioning.

8.15.1.1 Life Extension

VOGA intends to operate and maintain the Wandoo Field to EOFL. The scope for Life Extension revisits the design load and resistance criteria using updated loading knowledge and appropriate modern standards, together with information about the condition of the equipment and structures based on inspection records. Independent verification of platform systems supports the life extension process. Wandoo Facilities Life Extension Philosophy Document [VOG-1100-FG-0001] defines VOGA's approach to Life Extension.

The life extension scope ensures key infrastructure is technically suitable within life extension scope for service to the projected life and includes following items:

- WNB topsides structures, WNB substructure, marine systems, WNA topsides and substructure
- subsea systems and WNB safety systems
- Wandoo wells
- WNB process pressure plant and other topsides.

WNB started its operations in March 1997, with initial design life of the WNB facility of 20 years. All Wandoo process and export systems have undergone design verification and design life extension until 2037. WNB substructure and superstructure have interim verification life extension pending close out of substructure and superstructure activities with the Independent Verification Body (Lloyds register) due for completion in 2026.

The WNA facility was installed in 1993, and originally had 15 years design life, which was reached in October 2008. WNA life extension verification for topsides process systems has been life extended through to 2037, with substructure and superstructure items being worked with the Independent Verification Body expected for completion by end 2026.

Section 9 Reporting

9.1 Routine Reports

9.1.1 Routine Internal Reporting

Routine internal reports will be prepared during operations. These include:

- Daily reports
- Annual reporting
- Routine reporting and review of performance standards.

9.1.2 Routine External Reporting

VOGA reports information on environmental performance to regulators as outlined in Table 9-1.

Table 9-1: External routine reporting requirements

Report	Recipient	Frequency	Content
Annual EP Compliance Report	NOPSEMA	Annual (calendar year), by 28 February each year.	Review of compliance with Environmental performance standards in the previous calendar year.
Monthly Recordable Incident Reports	NOPSEMA	Monthly, by 15th of each month.	Details of recordable incidents that have occurred during drilling activities (if applicable).
NPI Report	Department of Environment Regulation	Annual, by 30 September each year.	Summary of the emissions to land, air and water for operational activities for inclusion in the Commonwealth NPI database. Reporting period from 1 July to 30 June.
NGERS Report	Australian Government Clean Energy Regulator	Annual, by 31 October each year.	Summary of the emissions to land, air and water for operational activities. Reporting period from 1 July to 30 June.
Change of titleholder details	NOPSEMA	When change occurs.	Change of titleholder, titleholder's nominated liaison person or a change in the contact details for either the titleholder or the liaison person.

9.2 Internal Incident Reporting

The Wandoo Event Management Manual [VOG-2000-MN-0003] outlines the reporting requirements:

- Incidents: All incidents that result in a loss must be reported using an approved Incident Investigation Report Form (e.g. injuries, damage to assets, spills and releases, corporate reputation and near misses)
- Non-compliance incidents: VOGA's Incident Report Form must be completed and submitted, whenever a non-compliance event is reported to a regulator
- Regulatory audits and inspections: The results of all regulatory audits and inspections are to be reported by site supervisors
- Hazard alert/near-miss reports: It is expected that all near-misses are reported, and all high-potential hazards are investigated and reported, using the Incident Report Form
- Hazard observations: To encourage the reporting of near-misses, VOGA uses a simplified reporting form. It is expected that all high-potential hazard alerts and close calls will be investigated, and reported, using VOGA's Unsafe act/condition Report Form
- Public concerns and complaints: Incidents involving the public in the communities near VOGA operations should be treated as serious and reported using the Incident Report Form.

All near-misses, hazard identifications, incidents, regulatory compliance inspections, and associated action items, must be entered into VOGA's event tracking system within 72 hours of the occurrence. All incident investigation reports must be complete within five working days of the event.

In accordance with the Wandoo Event Management Manual [VOG-2000-MN-0003], all incidents should be immediately recorded within the Event Management Database.

9.3 External Incident Reporting

9.3.1 Reportable Incidents

The OPGGS(E)R defines a reportable incident "as an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage."

Reportable incidents are identified through the risk assessment process for a reported event and comprise any event with a potential consequence to an ecosystem or environmental asset of 3 (moderate) or greater, i.e. 4 (major) and 5 (catastrophic), regardless of the overall risk level assigned. The consequence ratings are based on VOGA Risk Management Manual [VOG-2000-MN-0001] corporate risk matrix using the ecosystem/environmental asset impact criteria.

For Wandoo Facility EP, these include:

- Liquid hydrocarbon release from wells
- Liquid hydrocarbon release from export equipment, submarine hose, floating hose or export flow lines
- Liquid hydrocarbon release from CGS

- Vessel collision resulting in diesel spill to sea
- Introduction of invasive marine species
- Any incident that results in, or has the potential to result in, death, injury, or distress to protected marine fauna is a reportable incident.

NOPSEMA, NOPTA and the Department of the responsible State Minister are to be notified of all reportable incidents in accordance with the following requirements of the OPGGS(E)R:

- Notify NOPSEMA orally of a reportable environmental incident as soon as practicable but not later than two (2) hours after the first occurrence of the incident or after the time that the titleholder becomes aware of the incident.
- Provide a written record of the notification to NOPSEMA, the Titles Administrator and the Department of the responsible State or Northern Territory Minister as soon as practicable after the oral notification.
- Provide NOPSEMA a written report of a reportable incident as soon as practicable but not later than three (3) days after the first occurrence of the incident.
- Provide a copy of the written report to both the Titles Administrator and the Department of the responsible State Minister within seven (7) days of giving the written report to NOPSEMA.

The written report must contain the following information:

- all material facts and circumstances concerning the reportable incident that the titleholder knows or is able, by reasonable search or enquiry, to find out
- any action taken to avoid or mitigate any adverse environment impacts of the reportable incident
- the corrective action that has been taken, or is proposed to be taken, to stop, control or remedy the reportable incident.

9.3.2 Recordable Incidents

The OPGGS(E)R defines a recordable incident as "*a breach of an environmental performance outcome for the activity or an environmental performance standard relating to the activity, that is not a reportable incident*". Recordable incidents are reported to NOPSEMA on a monthly basis.

Written reports of all recordable incidents will be reported to NOPSEMA in compliance with Regulation 50 of the OPGGS(E)R and will:

- Relate to a calendar month
- Be given as soon as practical after the end of the calendar month to which the report relates, and not later than 15 days after the end of the calendar month
- Include all the information as required under Regulation 50 of the OPGGS(E)R.

9.3.3 Reporting Requirements for Harm to Protected Marine Fauna

EPBC Act – Commonwealth Environmental Law Obligations

If the fauna is listed as threatened, migratory, or marine under the EPBC Act, the incident may also trigger:

- Notification to DCCEEW.

For most offshore petroleum operations, NOPSEMA acts as the single point of contact, but the EPBC obligations still apply.

Additional Notifications (Depending on Circumstances)

These may include:

- AMSA (if vessel collision or navigational incident contributed)
- Wildlife rescue organisations (for live-response support)
- Traditional Owner groups (if required under consultation commitments).

9.3.4 Management of Non-conformances

Non-conformances include near-misses, incidents or other events or information which indicates a lack of conformance with specified objectives or compliance requirements.

VOGA utilises the Vermilion global event recording and action tracking system. This system is used for capturing and following up on near-misses and incidents including their associated corrective and preventive actions, ensuring that any lessons are learned in the interests of continual improvement.

In addition, and on behalf of the VOGA Managing Director, the VOGA Administration Assistant maintains logs of outstanding actions arising from audits or other actions that do not require entry in event recording and action tracking system, but which nevertheless require some form of follow-up action and confirmation of closure.

Section 10 Stakeholder Consultation

10.1 Overview

The relevant person consultation process enables VOGA to provide sufficient information and a reasonable period of time to allow each relevant person to make an informed assessment of the possible consequences of the proposed activity on their functions, interests, or activities.

Consultation also ensures the activity is undertaken in a manner consistent with the Environment Regulations to ensure the environmental impacts and risks are As Low As Reasonably Practicable (ALARP) and are acceptable.

Consultation with relevant persons began in October and November 2024 in accordance with Regulation 25 of the OPGGS(E)R. It builds on previous consultation undertaken with relevant persons to support the ongoing activities of VOGA's operations. VOGA's consultation record is at Appendix F.

10.2 Consultation Approach

VOGA's core values of excellence, trust, respect, and responsibility have underpinned the consultation process. In developing its approach to consultation and throughout the process, VOGA has also ensured it responds to:

- Regulation 25 of the OPGGS(E)R
- NOPSEMA guidance, specifically NOPSEMA's latest EP Consultation Guidelines (20 May 2024)
- Government and industry guidance, as described in Section 10.2.1
- Applicable case law (Santos v *Tipakalippa*), as described in Section 10.2.4.

VOGA's approach is also consistent with the principles of the Ecologically Sustainable Development (ESD) outlined in Section 3A of the EPBC Act [(a) – (e)].

10.2.1 OPGGS(E)R Consultation Requirements

VOGA has considered the OPGGS(E)R for its consultation program as appropriate.

Regulation 25 of the OPGGS(E)R describes a titleholder's obligations when preparing a new EP or revising an existing plan. The regulations require titleholders to engage with 'relevant persons' including Commonwealth, State, or Territory agencies or authorities; the Department of the responsible State Minister; people or organisations which have functions, interests or activities which may be affected by the titleholder's activities carried out under the EP; and any other people or organisations the titleholder considers relevant.

Regulation 25 requires each relevant person be given sufficient information and a reasonable period for consultation to make an informed assessment of the consequences of the titleholder's activities on their functions, interests or activities. Additionally, the titleholder must inform each consulted relevant person that they can request certain information to remain private, and such requested information will not be published.

10.2.2 NOPSEMA Consultation Guideline

VOGA's consultation approach, process, and activities have been developed in accordance with relevant regulations, NOPSEMA guidelines, and guidance notes as well as other government and industry guidance as listed below:

- *Consultation in the course of preparing an environment plan* – GL2086 A900179 – 20/5/2024
- *Responding to Public Comment* – GN1847 A662607 – 10/1/2024
- *Consultation with Commonwealth agencies with responsibilities in the marine area* – GL1887 A705589 – 21/11/2024
- *Environment Plan decision making* – GL1721 A524696 – 10/1/2024
- *Environment Plan Content Requirement* – GN1344 A339814 10/1/2024
- *Petroleum activities and Australian Marine Parks* – GN1785 A620236 – 10/1/2024.

10.2.3 Government and Industry Guidance

Consultation approach, process, and activities have also been developed in accordance with other government and industry guidance, including:

- Australian Fisheries Management Authority – Petroleum industry consultation with the commercial fishing industry
- Australian Heritage Commission – Ask First – A guide to respecting Indigenous heritage places and values
- International Association for Public Participation – Principles for Engagement with Communities and stakeholders
- DCCEEW: Sea Countries of the North-West; Literature review on Indigenous connection to and uses of the North-West Marine Region
- DCCEEW: Draft Guidelines for working in the near and offshore environment to protect Underwater Cultural Heritage – 2023
- WA Department of Transport – Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements – July 2020
- WA Department of Transport – WA Incident Management Plan – Marine Oil Pollution, September 2023
- Western Australian Fishing Industry Council – Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector, July 2023

- Western Australian Fishing Industry Council – Consultation Approach for Unplanned Events
- International Standards Organisation – ISO14001:2015 Environmental Management Systems Environmental management systems – requirements with guidance for use,
- International Finance Corporation Performance Standard 7 – 2012.

10.2.4 Applicable Case Law and Guidance

In shaping its approach and process to consultation, VOGA carefully considered judgments handed down in both the Federal Court and the Full Court of the Federal Court, with respect to environmental plans, which underscored the importance of conducting genuine consultations. These judgements reinforced that communication with relevant stakeholders must be open and effective, the process must be transparent, and further anchored in principles of collaboration, inclusiveness, and integrity.

The Full Court's decision in *Santos* v *Tipakalippa*[4] (*Tipakalippa*) has set a clear precedent for titleholders, establishing standards that have since been incorporated into NOPSEMA's current guidelines. *Tipakalippa* affirms that there is no 'one-size-fits-all' approach to consultation. Instead, consultation strategies must be tailored to reflect the specific interests of each relevant party and must go beyond superficial or tokenistic engagement. The judgement also placed particular emphasis on the need for meaningful consultation with First Nations groups, affirming that the right to be consulted is substantive and must be respected as such (Ashurst, 2023).[5]

VOGA has been conscious of these requirements in establishing and implementing its consultation process.

10.3 Consultation Summary

VOGA undertook a comprehensive approach to identify relevant persons and implemented a robust consultation process in keeping with the NOPSEMA's guidance which focuses on the instructive reasons outlined in *Tipakalippa*.

The guideline deals with matters that should be considered when designing and implementing consultation processes and provides interpretations contained in Regulation 25 of the OPGGS(E)R. Further, it provides a summary of the Full Court of the Federal Court's interpretation of 'functions', 'activities' and 'interests' to assist titleholders identify relevant persons.

Throughout the preparation of this EP, VOGA has undertaken consultation in compliance with Regulation 25 of the OPGGS(E)R by:

- Consulting with each of the following relevant persons while preparing this EP:

[4] *Santos NA Barossa Pty Ltd v Tipakalippa* [2022] FCAFC 193

[5] https://www.ashurst.com/en/insights/full-court-tipakalippa-decision-stakeholder-consultation-grows-teeth/

- each Commonwealth, State or Northern Territory agency or authority to which the activities to be carried out under the environment plan may be relevant
- if the plan relates to activities in the offshore area of a State—the Department of the responsible State Minister
- if the plan relates to activities in the Principal Northern Territory offshore area—the Department of the responsible Northern Territory Minister
- a person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the EP
- any other person or organisation that the titleholder considers relevant (Regulation 25(1) of the OPGGS(E)R)

- Giving each relevant person sufficient information to allow the relevant person to make an informed assessment of the possible consequences of the activity on their functions, interests or activities (Regulation 25(2) of the OPGGS(E)R)
- Allowing the relevant person a reasonable period for the consultation (Regulation 25(3) of the OPGGS(E)R
- Telling each relevant person that the titleholder consults with, that the relevant person may request that particular information it provides in the consultation note be published and any information subject to such a request is not to be published (Regulation 25(4) of the OPGGS(E)R).

10.4 VOGA's Consultation Methodology and Process

10.4.1 Overview

VOGA has undertaken extensive research to inform its methodology, process and approach, referencing various guidelines, standards, and relevant information on planned activities. VOGA applies guiding principles to its methodology for discharging its obligations under Regulation 25 of the OPGGS(E)R and has developed a consultation methodology for its process (Table 10-1 and Figure 10-1).

Table 10-1: Guiding Principles for Consultation

Guiding principle	Key concept
Consultation processes must be designed in the context of the objects of the Environment Regulations[6].	Consistent with the principles of ecologically sustainable development set out in Section 3A of the EPBC Act. Intended to reduce the environmental impacts and risks from the activity to ALARP and at an acceptable level.
Collaborative and provides opportunities for relevant persons to engage and provide feedback on the EP,	Consistent with general principles for effective consultation and literature, and guidelines or guidance issued by relevant persons.

[6] NOPSEMA. 2023. Guideline: Consultation in the course of preparing an environment plan, May 2023

Guiding principle	Key concept
through formal and ongoing consultation processes.	Consultation should be undertaken in good faith between titleholders and relevant persons, with a free and open exchange of information to inform appropriate environmental impact assessment[7].
A person required to be consulted under Section 25 needs to be more than a member of the public who is generally concerned with or interested in the activity[8].	Consultation on offshore petroleum activities is a two-way process where information is shared between titleholders and relevant persons[9].
Section 25 requires consultation with relevant persons; however, it does not require consent for an activity to be given by any relevant person[10].	Titleholders are not required by law to obtain agreement or consent from relevant persons for their offshore petroleum activities to proceed; however, they are required to demonstrate in their environment plan how the concerns, objections or claims raised by relevant persons were considered and demonstrate that their response to that information was appropriate[11].
The nature of the person or organisation being consulted, and the function, interest or activity that may be affected, will inform the appropriate manner of consultation with each relevant person[12].	What constitutes sufficient information, and a reasonable period of time depends on several factors including the nature of a relevant person's functions, interests and activities[13].
What is a reasonable period for consultation will need to be considered on a case-by-case basis[14].	The nature, scale, and complexity of an activity, as well as the extent of potential impacts and risks on a relevant person's functions, interests, or activities, may inform what makes a reasonable period for consultation[15].

[7] Replacement Explanatory Statement, Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulation 2023, 06 November 2023

[8] Replacement Explanatory Statement, Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulation 2023, 06 November 2023

[9] NOPSEMA. 2023. Consultation on Offshore Environment Plans – Information for the Community, May 2023

[10] Replacement Explanatory Statement, Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulation 2023, 06 November 2023

[11] NOPSEMA. 2023. Consultation on Offshore Environment Plans – Information for the Community, May 2023

[12] Replacement Explanatory Statement, Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulation 2023, 06 November 2023

[13] NOPSEMA. 2023. Consultation on Offshore Environment Plans – Information for the Community, May 2023

[14] Replacement Explanatory Statement, Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulation 2023, 06 November 2023

[15] Replacement Explanatory Statement, Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulation 2023, 06 November 2023

Guiding principle	Key concept
Section 25 places obligations on titleholders but does not place any obligations on relevant persons[16].	If a relevant person does not respond to consultation, the titleholder is not required to wait indefinitely for a response[17]. Titleholders must make reasonable efforts to consult with relevant persons, but the regulations do not require them to get a response to their requests. As long as the titleholder can demonstrate that it has provided sufficient information and a reasonable period for consultation in accordance with subsections 25(2) and (3), the titleholder will have met the consultation requirements.
The consultation process must be practical and reasonable to implement.	There is no requirement in the law for titleholders to pay the costs incurred by relevant persons to be consulted, however they may choose to provide assistance to relevant persons to ensure consultation is carried out efficiently and is robust. This is a matter between the titleholder and relevant persons[18]. Relevant persons should be aware that while they are free to respond on any matter and raise any concern, this may not be able to be considered if it is outside the scope or purpose of the environment plan and approval process[19].

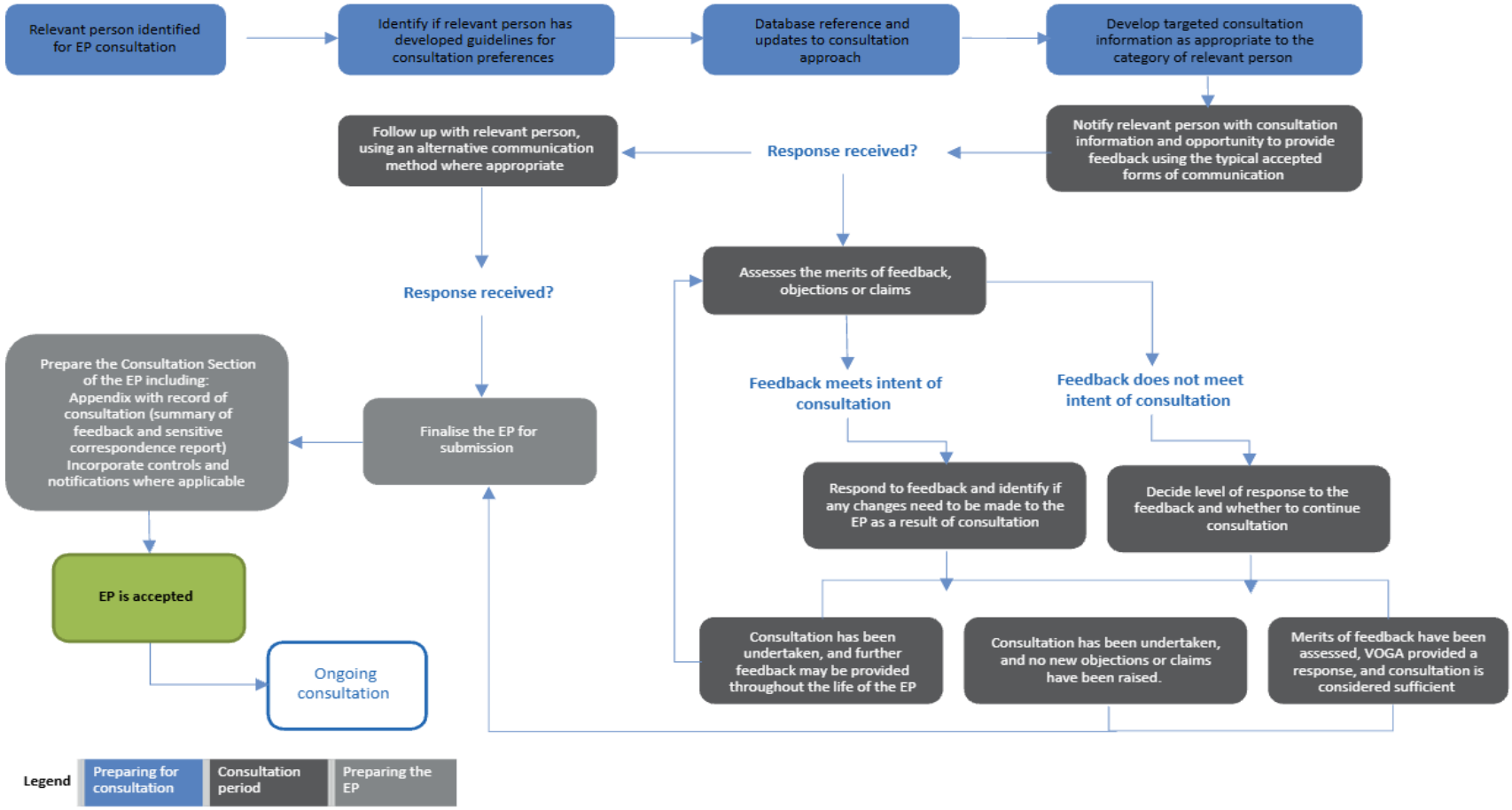
[16] Replacement Explanatory Statement, Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulation 2023, 06 November 2023

[17] Replacement Explanatory Statement, Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulation 2023, 06 November 2023

[18] NOPSEMA. 2023. Consultation on Offshore Environment Plans – Information for the Community, May 2023

[19] NOPSEMA. 2023. Consultation on Offshore Environment Plans – Information for the Community, May 2023

Figure 10-1: VOGA's consultation methodology and process



10.4.2 Identifying Relevant Persons

VOGA acknowledges the importance of consultation and undertook a comprehensive assessment to determine who qualified as relevant persons for the purposes of this EP. VOGA recognises that consultation provides an opportunity for relevant persons to be heard and to provide feedback in keeping with best practice principles as outlined in the International Association for Public Participation – *Quality Assurance Standard for Community and Stakeholder* Engagement,[20] recognising that for each relevant person consultation may differ.

Table 10-2 illustrates how VOGA identified relevant persons for this EP.

Table 10-2: VOGA's process to identify relevant persons and undertake consultation

Process	Activities and considerations
Identifying potentially relevant person categories	Relevant person category identification methodology: • Consider nature and scale of the activity • Describe the petroleum activity • Spatial extent of the EMBA • Environmental impacts • Spatial mapping datasets and analysis of physical receptors • Undertake actions to identify relevant persons categories • Review of relevant person database • Review of public databases • Research activities
Identifying relevant persons for consultation	Undertake actions to identify relevant persons: • Review of relevant persons databases • Review of identified relevant persons in publicly available EPs submitted by other titleholders that may be relevant to this proposed activity • Desktop research of publicly available information, studies and key word search • Review of information previously provided during engagement and consultation activities • Review of fishing catch and effort data and fisheries in the EMBA/Operational Area • Review of EMBA overlap (and adjacent) with Native Title registered or determined claims, ILUAs, sacred sites, IPAs and management, to identify First Nations groups • Review National Native Title Tribunal website • Review public cultural heritage databases relevant to the EMBA • Review marine park management plans relevant to the EMBA • Review of EMBA overlap with: o Local Government areas

[20] https://iap2.org.au/resources/quality-assurance-standard/

Process	Activities and considerations
	○ Petroleum, greenhouse gas and any other NOPTA issued titles ○ Area of recreational fishing and areas of interest to charter and tourism operators ○ Research institutes, infrastructure operators, historical heritage groups or organisations and local environment or conservation groups with potential activity or presence in the area. • Throughout the consultation process, relevant persons may provide advice or suggestions about other relevant persons. VOGA will assess those identified persons to determine if they are relevant for consultation on the Environment Plan.
Opportunities for relevant persons to identify themselves if they wish to be consulted through advertising and/or third parties	Undertake actions to identify relevant persons: • Targeted print media advertising campaign to raise awareness of the activity and promote relevant persons to identify themselves and come forward. • Geo-targeted social media campaign to raise awareness of the activity, promote self-identification, and direct digital traffic to the consultation website. • Distribution of flyers to be displayed at relevant community centres, promoting the activity, self-identification, and listing contact details for VOGA.
Consultation planning and consultation activities	Undertake actions to consult with relevant persons: • Print media advertisement campaigns to seek feedback from relevant persons and detail avenues for providing feedback. • Development of consultation materials (information sheets, presentations etc.). • Draft consultation outreach materials (emails, letters). • Development of a consultation webpage on VOGA's website to host relevant information on the activity, provide contact details, and resources such as a frequently asked questions document. • Geo-targeted social media campaign to raise awareness of the activity, promote self-identification, and direct digital traffic to further information hosted on the consultation website.
Consulting relevant persons	Undertake consultation outreach with relevant persons: • Consultation outreach with relevant persons to notify them and receive feedback • Follow ups with relevant persons • Two-way correspondence with relevant persons • Face-to-face meetings (in person and virtually), as required.

10.4.3 Public Awareness Campaign and Self-identification Opportunities

VOGA has undertaken several promotional activities for organisations and individuals to self-identify as potentially relevant persons if they believe their functions, interests, or activities may be affected by the activity. These included print media, community flyers,

and social media advertisements with links to a webpage containing information about the proposed activities.

Further details of the public awareness campaign and self-identification opportunities including efforts to ensure self-identification opportunities for First Nations organisations and individuals are described in Appendix F, Section 1.3. A schedule of advertising for both social media and print media is included in Appendix F, Section 1.3.2.

An information flyer was displayed at community centres within and adjacent to the EMBA, outlining the activity and promoting self-identification for consultation purposes. VOGA's consultation webpage provided fact sheets and other publicly available materials. Further details concerning the community flyer and webpage are included in Appendix F, Section 1.3.3.

These activities and information provided a more than reasonable opportunity to raise public awareness of consultation and for organisations and individuals to self-identify for the purpose of OPGGS(E)R Regulation 25 consultation.

VOGA's process provides a reasonable timeframe for the self-identification of relevant persons, for relevant persons to consider and access consultation information, and for relevant persons to provide feedback for VOGA to consider.

10.4.4 Identification and Consultation with First Nations People and Organisations

VOGA's consultation with First Nations groups was reinforced and in keeping with the Australian Heritage Commission – *Ask First – A guide to respecting Indigenous Heritage places and values*.[21] VOGA recognises the necessity to maintain heritage values and place, that are a vital part of First Nations groups 'sense of place', cultural identity and well-being. Indigenous heritage is unique and part of Australia's national cultural heritage, requiring recognition and protection for future generations of all Australians.

The DCCEEW – *Sea Countries of the North-West – literature review on Indigenous connection to and uses of the North-West Marine Region*[22] was considered when consulting First Nations groups in Commonwealth waters. This literature outlines the strong connection and direct interest First Nations groups have in planning and managing the North West Marine Region.

DCCEEW is responsible for administering the *Underwater Cultural Heritage Act 2018*, which provides protection from disturbance or adverse impact to archaeological remains located in Australia's near and offshore environment. The department provides guidelines with direction for proponents who undertake activities in Australian waters.[23]

[21] https://culturalheritage.org.au/resource/ask-first-a-guide-to-respecting-indigenous-heritage-places-and-values/

[22] https://www.dcceew.gov.au/sites/default/files/documents/nw-sea-countries.pdf

[23] https://storage.googleapis.com/files-au-climate/climate-au/p/prj25bb7bb33727bafff177d/public_assets/Guidelines%20for%20working%20in%20the%20near%20and%20offshore%20environment%20to%20protect%20Underwater%20Cultural%20Heritage.docx

When approaching identification and consultation with relevant First Nations groups, VOGA undertook a broad and tailored approach.

1. Initial Identification

- Developed a list of all Native Title registered claims and determinations along the coastline of WA.
- Reviewed the EMBA and overlap or adjacency to Native Title registered claims and determinations to establish a list of potentially affected First Nations groups.
- Identified First Nations groups as potentially relevant persons, comprising:
- Native Title Representative Bodies (NTRB)
- Registered Native Title Bodies Corporate (RNTBCs – the formal name given to a group once Native Title has been determined)
- Prescribed Bodies Corporate (PBCs – the legal entity formed by a group of Native Title Claimants during the determination process, but used interchangeably with RNTBC)
- Aboriginal Corporations – Aboriginal run or managed businesses, often operating on behalf of, or under a RNTBC
- Land and Sea Management Groups – primarily Ranger Groups, many of whom operate under a RNTBC.

2. Tiered Contact Methodology

Utilising extensive spill modelling, VOGA has conservatively assessed that planned impacts to First Nations relevant persons functions, interests, and activities (including cultural values or features) are unlikely to extend beyond 200 km from the Wandoo Operational Area for this EP. VOGA maintains open to feedback from First Nations relevant persons to inform its understanding of functions, interests or activities.

This was considered a reasonable basis for including a tiered methodology to focus consultation efforts on those relevant persons closest to the planned activities outlined in this EP and those who could provide inputs into cultural features closest to the planned activities.

However, regardless of which tier a group was categorised in, VOGA's overarching approach remained consistent in principle.

Table 10-3 below identifies the relevant First Nations people, groups and organisations categorised into Tier 1 and Tier 2. For the Tier 3 category, Table 10-4 below identifies the First Nations people and organisations determined to be not relevant but the members are at the periphery of the Planning Area or are Indigenous people or organisations that can self-identify.

Table 10-3: Approach to consultation with relevant First Nations people and organisations

Contact Methodology	Overview of Relevant Person	Relevant Persons	Consultation Efforts
Tier 1	Closest to planned activities - located within 200 km of the operational area on the Australian mainland: • Determined Native Title Holders (including relevant registered native title body corporate (RNTBC) or prescribed body corporate (PBC)). • Aboriginal corporation providing environmental management functions.	Representative Aboriginal Corporations Prescribed Bodies Corporates (PBCs): • Ngarluma People – Ngarluma Aboriginal Corporation RNTBC • Kariyarra People – Kariyarra Aboriginal Corporation RNTBC • Ngarluma/Yindjibarndi – Yindjibarndi Aboriginal Corporation • Yaburara & Mardudhunera People - Wirrawandi Aboriginal Corporation RNTBC • Ngarla and Ngarla #2 (Determination Area A) – Wanparta Aboriginal Corporation RNTBC Other: • Murujuga Aboriginal Corporation.	Precedence was placed on consultation with **Tier 1** relevant persons through focused efforts, including attempts to contact them via multiple forms of communication—such as phone calls, text messages, and emails—where such details were available. Where long-standing relationships were not already in place or being actively maintained by the relevant group, efforts were made to initiate and foster enduring connections, consistent with principles of respectful engagement. These efforts were undertaken not only to disseminate information about the EP and the Wandoo Facility, but also to foster meaningful, two-way engagement with appropriate representatives—such as the Board or Chief Executive Officer—in accordance with Regulation 25 OPGGS(E)R and NOPSEMA's *Community Engagement and Consultation Guidance Note (GN1746)*. This engagement sought to gather input on cultural features, values, and potential impacts, and to determine whether additional consultation information or engagement were required to satisfy our consultation obligations, beyond the provision of information, online material and through advertising.

Contact Methodology	Overview of Relevant Person	Relevant Persons	Consultation Efforts
			As Tier 1 Relevant Persons, VOGA may adopt a broader approach to consultation with these stakeholders, during which information about the Wandoo Facility—as well as other Environmental Plans—may be discussed to provide appropriate context and support deeper understanding. This approach reflects VOGA's commitment to transparent communication, mutual respect, and early identification of concerns that may influence the ongoing development or revision of the EP. This approach was also the preference of these stakeholders.
Tier 2	• Determined Native Title Holders (including relevant representative bodies) (excluding Tier 1 and Tier 3) • Aboriginal corporations providing environmental management functions, who are coastally adjacent to the planning area (excluding Tier 1 and Tier 3)	Representative Aboriginal Corporations Prescribed Bodies Corporates (PBCs): • Thalanyji People – Buurabalayji Thalanyji Aboriginal Corporation RNTBC • Gnulli, Gnulli #2 and Gnulli #3 – Yinggarda, Baiyungu and Thalanyji People – Nganhurra Thanardi Garrbu Aboriginal, Yinggarda Aboriginal Corporation	**Tier 2** relevant persons were identified as stakeholders whose functions, activities or interests may be affected by the proposed activities, but to a lesser extent than Tier 1 stakeholders. While VOGA's systematic approach prioritised initial contact with Tier 1 persons, engagement with Tier 2 stakeholders commenced at the same time. A concerted effort was made to contact Tier 2 stakeholders through multiple available communication methods, including phone calls, text messages, and emails. The aim was to gather input on cultural values, features, and any other matters relevant to the preparation of the EP. Where possible, VOGA sought to establish genuine two-way dialogue

Contact Methodology	Overview of Relevant Person	Relevant Persons	Consultation Efforts
			with appropriate representatives, such as Boards or Chief Executive Officers, and responded to any requests to enter into consultation agreements regarding the EP.

Table 10-4: Approach to consultation with not relevant First Nations people and organisations

Contact Methodology	Overview of Identified First Nations People and Organisations	Identified and Assessed as Not Relevant	Consultation Efforts
Tier 3	Determined Native Title Holders (including relevant representative bodies) whose members are at the periphery of the Planning Area (excluding Tier 1 and Tier 2): • Aboriginal Corporations – Aboriginal run or managed businesses, often operating on behalf of, or under a RNTBC. • Land and Sea Management Groups – primarily Ranger Groups, many of whom operate under a RNTBC.	Representative Aboriginal Corporations Prescribed Body Corporates (PBCs): • Rubibi Community – Yawuru Native Title Holders Aboriginal Corporation RNTBC • Karajarri People – Karajarri Traditional Lands Association (Aboriginal Corporation) RNTBC • Nyangumarta People (Part A) – Nyangumarta Warraran Aboriginal Corporation RNTBC • Nyangumarta-Karajarri Overlap Proceeding (Yawinya) – Nyangumarta Karajarri Aboriginal Corporation RNTBC • Malgana Part A – Malgana Aboriginal Corporation RNTBC • Nanda People Part B, Malgana 2 and Malgana 3 – Malgana Aboriginal Corporation RNTBC & Nanda Aboriginal Corporation RNTBC	**Tier 3** stakeholders were identified during the stakeholder mapping process but were assessed as not meeting the definition of Relevant Persons under Regulation 25 of the OPGGS(E)R . Groups that had previously engaged with VOGA on prior EP consultation were contacted at VOGA 's discretion to advise of the proposed activities and that they were not identified as relevant for the consultation. Groups with no previous engagement on VOGA EPs were not directly contacted. However, to ensure transparency and provide a reasonable opportunity for self-identification, a public awareness campaign was implemented. This included clear pathways for interested parties to contact VOGA should they wish to participate in the consultation process.

Contact Methodology	Overview of Identified First Nations People and Organisations	Identified and Assessed as Not Relevant	Consultation Efforts
		• Nanda People and Nanda #2 - Nanda Aboriginal Corporation RNTBC • Mayala People – Mayala Inninalang Aboriginal Corporation • Bardi and Jawi Bardi Jawi Niimindiman Aborigincal Corporation RNTBC • Warrwa Mawadjala Gadjidgar & Warrwa Combined Part A – Madanann Nada Aboriginal Corporation RNTBC • Bindunbur Nimanburr Aboriginal Corporation, Nyul Nyul PBC Aboriginal Corporation & Gogolanyngor Aboriginal Corporation • Jabirr Jabirr/Ngumbarl – Gogolanyngor Aboriginal Corporation • Yamatji Nation – Bundi Yamatji Aboriginal Corporation Native Title Representative Bodies: • Kimberly Land Council (KLC) – (NTRB) • Yamatji Marlpa Aboriginal Corporation (YMAC) – (NTRB)	No contact was received from these groups during the consultation period. However, in the event that a Tier 3 stakeholder makes contact or expresses an interest in the EP, VOGA will respond promptly using the communication method provided (e.g. phone call, text message, or email). Where appropriate, and if an email address is supplied, an EP Information Sheet will be made available to support informed engagement.

4. *Cultural awareness and understanding lore and protocols*

VOGA ensured that all staff involved in the consultation process had undertaken cultural awareness training to understand the significance of Indigenous heritage and protocols.

VOGA understands that First Nations people follow lore and customs with respect to land. Cultural protocol establishes who can and cannot 'speak for country'.[24]

Following research and consultation activities, it was understood that not all groups considered themselves responsible for cultural and spiritual care of land and sea to equal or similar degrees. For example:

- NTRBs, including Kimberley Land Council and Yamatji Marlpa Aboriginal Corporation, often provide administration services such as payroll, legal and human resource services to RNTBCs or PBCs who have chosen to use the NTRB as an umbrella organisation under which to function, in addition to their primary role of assisting with matters pertaining to Native Title claims and determinations
- VOGA engaged with NTRBs to receive advice on groups who could be relevant for consultation and to gather insights about preferred consultation approaches
- However, the NTRBs do not consider it appropriate to represent the views of the RNTBCs or other groups who use their services, although in some circumstances they operate as a conduit or formal contact point for RNTBCs.

5. *Culturally appropriate engagement*

When engaging with First Nations relevant persons, VOGA aimed to adopt a culturally appropriate and tailored approach.

- VOGA was aware that Traditional Lore time, typically from November to February, is when Indigenous communities engage in cultural activities and ceremonies. These periods are not fixed to specific dates but are instead aligned with natural cycles, seasons, and significant cultural events
- During Lore time, it is customary for First Nations groups to focus on cultural activities, ceremonies, and the passing down of traditions. As such, it may not be possible for meetings and other formal engagements to be scheduled during these times
- For this EP, VOGA provided an extended consultation period to First Nations relevant persons by starting the initial outreach in August 2025 with those groups it has ongoing engagement with on other EPs, advising of the upcoming consultation and seeking a consultation meeting if the group would like one.
    - Understanding that stakeholders may engage before or not until after the Lore time period. VOGA recognised that early engagement was important in some cases to allow time for meaningful consultation.

[24] https://www.noongarculture.org.au/noongar-lore/

- VOGA was prepared to be flexible and while it followed up to arrange engagements, was aware that it may take time for stakeholders to be available for meetings.[25]
- During the period of August 2025 to March 2026, VOGA made multiple attempts to engage with First Nations groups to progress consultation on this EP. Many attempts were made to contact First Nations groups once lore time was complete and before submission of the EP.
- In February 2026, VOGA sent written communication to First Nations groups advising of its intent to submit this EP and explained that consultation on this EP can continue as part of ongoing consultation. VOGA advised that any feedback would be assessed and if required the EP could be updated through the management of change process.
  - In some cases, VOGA has also provided First Nations groups a summary of the information included in the EP for review and advice.
- VOGA continued to engage with First Nations groups on this EP as part of ongoing consultation. In some cases, feedback may be after the submission of this EP as part of the ongoing consultation process. It will be reviewed and incorporated as outlined in 10.4.11 Ongoing Consultation.

At the initial outreach to First Nations groups, VOGA:

- Stated the importance of cultural heritage to the Native Title Holders and committed to ensuring that these values are respected and integrated into project planning
- Sought advice on preferred contact and engagement methods
- Recognised the potential need for formal agreements before consultation
- Wanted to make sure the engagement was tailored to the group's needs and offered a co-design approach, where the agenda for any meeting is mutually agreed and includes input from the group
- Outlined the purpose of the consultation was to give the group an opportunity to provide input to:
  - VOGA's understanding of the current environment and its cultural characteristics
  - how VOGA's activities might affect the existing environment, including cultural aspects
  - potential measures and controls to reduce the environmental impact of the proposed activities on the group's functions, interests, and activities.

Initial outreach emails can be found in Appendix F.

6. Decision making process

VOGA understands that chairpersons, workers and other representatives from the First Nations group or community often do not make immediate decisions. Information from an email/phone call, meeting or consultation may need to be taken to other members of the

[25] Practice Tips: Working with Indigenous Australians

community to discuss and decide, which can take time. As part of ongoing consultation, VOGA will continue to engage with First Nations groups on this EP.

7. Capacity to engage

VOGA may need to provide tailored and additional resources to First Nations groups to help them engage effectively in the consultation process. This could include funding for attendance at meetings or for independent advisors. For this EP, VOGA has provided both tailored and additional resources to facilitate and fund consultation meetings with First Nations groups.

8. Tailored communication methods

VOGA develops tailored communication materials for consultation outreach including a summary information sheet which is shorter with plain English language, more diagrams and images and less technical information (Appendix F, reference 1.3).

VOGA aims to use communication methods that are preferred by First Nations groups. This includes making phone calls, text messages and prioritising face-to-face meetings where possible, or meeting by Microsoft Teams as appropriate. VOGA accommodates preference to be engaged on-Country (or other locations).

When face-to-face or virtual meetings are held with RNTBCs and Aboriginal Corporations, VOGA:

- Researches the group and publicly available consultation material (from consultation with other titleholders) to understand what areas might be of interest to the group
- Brings printed out consultation material to meetings: enlarged maps with the group's Native Title determination or ILUA, consultation and summary information sheets, and copies of the presentation to the meeting to ensure information is readily accessible
- Tailors its presentation material and verbal delivery of information to what VOGA considers to be the primary ways the group's functions, interests or activities could be affected. VOGA includes specific information that is more detailed on potential areas of interest. VOGA also tailors the acknowledgement of country and includes a local photo on the slide
- Aims to conduct its consultation meetings with co-design feedback. During consultation, VOGA has received positive feedback from a NTRB about the level of information and imagery used in the presentation. Based on feedback received from the NTRB, VOGA sought to include more video content at its next meeting of the marine environment at and surrounding Wandoo from its marine monitoring surveys.

Information about the specific consultation activities with First Nations relevant persons can be found at Appendix F, Section 1.3.4.

10.4.5 Relevant Persons Consultation Process

Consultation allows for the free and open exchange of information between a titleholder and any relevant persons who may be impacted by a proposed activity:

- The process provides a genuine opportunity for relevant persons to be heard and provide feedback.
- The process includes mechanisms for titleholders to receive information from relevant persons that they might not have otherwise received.
- The process enables a titleholder to gain better understanding about the environment that may be affected and measures that may be necessary to mitigate the potential environmental impacts and risks associated with either a petroleum or greenhouse gas activity [26, 27].
- Consultation does not carry with it any obligation on the titleholder either to seek or reach agreement; nor requires consent on the activity subject to the consultation; however, the titleholder should be receptive to suggestions from a relevant person, where these may improve the overall environmental outcome[28,29].

The consultation process must be practical and reasonable to implement:

- Consulting with relevant persons and potential relevant persons is a real-world obligation that must be interpreted in a practical and pragmatic way that makes a process both reasonable and workable[30].
- Where communal interests are held, the process of consultation needs to reasonably reflect the characteristics of the communal interests affected and does not necessarily require communications with each and every person who is a member of the relevant community[31].
- The obligation to identify relevant persons for the purpose of consultation must be reasonably capable of discharged (i.e. relevant persons need to be ascertainable) within a reasonable time[32].

Consultation entails providing adequate information about a proposed activity to relevant individuals and allowing them a reasonable period to review and consider the information:

- Information provided to a relevant person should be sufficient to allow them to make an informed assessment of consequence of the proposed activity on their functions, interests or activities[32].
- The nature, scale, and complexity of a proposed activity, as well as the extent of potential impacts and risks on a relevant person's functions, interests, or activities, is considered when determining a reasonable period for consultation.

Participation in the consultation process by relevant individuals is voluntary:

[26] Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 (Appeal Decision), paragraphs [49], [54], [57], [89] and [141].

[27] Replacement Explanatory Statement, Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulation 2023, 06 November 2023.

[28] NOPSEMA. 2023. Consultation on Offshore Environment Plans – Information for the Community, May 2023.

[29] Appeal Decision, paragraphs at [89], [109], [136], [138] and [141].

[30] Appeal Decision paragraphs [48], [89], [104], [108], [109], [141] and [153].

[31] Appeal Decision paragraphs [136], [141] and [153].

[32] As relevant to the categories of persons defined in the 25(1) (OPGGS (E) Regulations.

- Relevant persons are not obligated to respond to a titleholder's request to participate in the consultation process[28,27].
- A titleholder is not required to wait indefinitely for a response where sufficient information and reasonable period of time has been afforded to the relevant person[27].

Figure 10-2 demonstrates VOGA's ongoing consultation process.

Table 10-5 provides a summary of the relevant persons or organisations by category identified by VOGA the actions taken to identify and consult with them, the consultation process and information provided, and VOGA's determination of what constitutes a reasonable period and sufficient information. This process conducted consistent with Regulation 25(1)(a)(b)(c) of the OPGGS(E)R.

10.4.6 Provision of Sufficient Information

10.4.6.1 Overview

VOGA provided sufficient information to all relevant person categories for the purpose of consultation to allow them to make an informed assessment of the possible consequences of the activity on their functions, interests or activities.

Information provided by VOGA to relevant persons was provided through a number of channels:

- EP Consultation Information Sheet
- Emails
- Letters
- Telephone calls
- Published notices in applicable traditional print media
- Undertook geotargeted advertising on social media platforms, linking to consultation information on the VOGA website
- Distribution of community flyers in regional community centres.

As part of the consultation process emails were sent to relevant persons which included an activity summary, directions for how to provide input into the EP development through consultation, advice regarding the consultation closing date and a link to VOGA's website with additional resources on EP consultation. VOGA considers provision of information for this EP to relevant persons as sufficient.

10.4.6.2 Consultation Information Sheet

VOGA produced a consultation information sheet for this EP and distributed to relevant persons and organisations. It is also available on VOGA's website. The Consultation Information sheet is designed to ensure that relevant persons receive sufficient information. It includes:

- An overview of the proposed activities; including activity type and description, location, timing, planned schedule and duration, vessels, infrastructure and methods involved
- Maps of the proposed activities; potential impacts, risks and management measures
- The presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the EMBA based on a review of publicly available information
- An outline of how identified risks and impacts will be managed or mitigated
- Engagement and feedback channels, including contact details for submitting questions or feedback and timeframe for providing input.

Table 10-5: Relevant Persons identified by VOGA, consultation actions and reasonable period and sufficient information

Identified Relevant Persons	Actions taken to identify relevant persons	Consultation process and information provided	Reasonable Period and Sufficient Information
Regulation 25(1)(a) of the OPGGS(E)R: Departments or agencies of the Commonwealth to which the activities to be carried out under the EP may be relevant			
Commonwealth Government Departments and Agencies	Undertook an audit of Commonwealth government websites and directories to ascertain roles and responsibilities.	VOGA emailed the Commonwealth government agency/authority and included an activity summary, directions for how to provide input into the EP development through consultation, the consultation timing and a link to VOGA's website with additional resources on EP consultation. Consultation information sheet including an overview of the proposed activities; potential impacts, risks and management measures.	A reasonable period of 30 business days (four weeks), subject to the nature and scale of the proposed activity, was provided for feedback. A consultation information sheet including an overview of the proposed activities; potential impacts, risks and management measures which we deem to be sufficient information for each stakeholder. Additional targeted content via email, where applicable.
Regulation 25(1)(a) and (b) of the OPGGS(E)R: Departments or agencies of Western Australia to which the activities to be carried out under the EP may be relevant			
State Government Departments and Agencies	Undertook an audit of state government websites and directories to ascertain roles and responsibilities.	VOGA emailed the State government agency/authority and included an activity summary, directions for how to provide input into the EP development through consultation, the consultation timing and a link to VOGA's website with additional resources on EP consultation. Consultation information sheet including an overview of the proposed	A reasonable period of 30 business days (four weeks), subject to the nature and scale of the proposed activity, was provided for feedback. A consultation information sheet including an overview of the proposed activities; potential impacts, risks and management measures which we deem to be sufficient information for each stakeholder.

Identified Relevant Persons	Actions taken to identify relevant persons	Consultation process and information provided	Reasonable Period and Sufficient Information
		activities; potential impacts, risks and management measures.	Additional targeted content via email, where applicable.
Regulation 25(1)(d) of the OPGGS(E)R: Persons or organisations whose functions, interests or activities may be affected by the activities to be carried out under the EP			
Commonwealth commercial fishing – representative bodies; and Commonwealth commercial fisheries	Assessed Commonwealth commercial fishing catch and effort data in the Operational Area. Assessed fisheries entitled to fish in the EMBA and searched applicable websites.	VOGA emailed to introduce its operations and upcoming activities. Sought representative bodies' input on preferred method of consultation. VOGA emailed and provided consultation information which included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and a link to VOGA's website with additional resources. Consultation information sheet including an overview of the proposed activities; potential impacts, risks and management measures. VOGA provided a commercial fisher information sheet, which included an overview of the proposed activities; key information for the commercial fishing sector about the activities; coordinates for operational areas; an activity summary; assessment of commercial	A reasonable period of 30 business days (four weeks), subject to the nature and scale of the proposed activity, was provided for feedback. A consultation information sheet including an overview of the proposed activities; potential impacts, risks and management measures A commercial fisher information sheet, which included an overview of the proposed activities; key information for the commercial fishing sector about the activities; coordinates for operational areas; an activity summary; assessment of commercial fishing, potential effects and impacts; and VOGA's impact assessment. which we deem to be sufficient information for each stakeholder. Additional targeted content via email, where applicable.

Identified Relevant Persons	Actions taken to identify relevant persons	Consultation process and information provided	Reasonable Period and Sufficient Information
		fishing, potential effects and impacts; and VOGA's impact assessment.	
State commercial fishing – representative bodies	Assessed the Western Australian Government commercial fishing catch and effort data in the Operational Area and EMBA.	VOGA emailed WAFIC and provided consultation information. The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and a link to VOGA's website with additional resources. Consultation information sheet including an overview of the proposed activities; potential impacts, risks and management measures VOGA provided a commercial fisher information sheet, which included an overview of the proposed activities; key information for the commercial fishing sector about the activities; coordinates for operational areas; an activity summary; assessment of commercial fishing, potential effects and impacts; and VOGA's impact assessment.	A reasonable period of 30 business days (four weeks), subject to the nature and scale of the proposed activity, was provided for feedback. A consultation information Sheet including an overview of the proposed activities; potential impacts, risks and management measures A commercial fisher information sheet, which included an overview of the proposed activities; key information for the commercial fishing sector about the activities; coordinates for operational areas; an activity summary; assessment of commercial fishing, potential effects and impacts; and VOGA's impact assessment. which we deem to be sufficient information for each stakeholder. Additional targeted content via email, where applicable.
State commercial fisheries	Assessed the Western Australian Government commercial fishing catch and effort data in the Operational Area and EMBA.	VOGA emailed WAFIC and provided consultation information to distribute to licence holders. The email included an activity summary, directions for how to provide input into the EP development through	A reasonable period of 30 business days (four weeks), subject to the nature and scale of the proposed activity, was provided for feedback. A consultation information sheet including an overview of the proposed

Identified Relevant Persons	Actions taken to identify relevant persons	Consultation process and information provided	Reasonable Period and Sufficient Information
	Assessed the fisheries entitled to fish in the operational area and EMBA and searched applicable websites. Entered a fee for service arrangement with the West Australian Fishing Industry Council (WAFIC) to liaise directly with State commercial fisheries. Followed WAFIC's guidance[33] for its preferred approach to consultation with state commercial fisheries.	consultation, the consultation closing date and a link to VOGA's website with additional resources. Consultation information sheet including an overview of the proposed activities; potential impacts, risks and management measures. VOGA provided a commercial fisher information sheet, which included an overview of the proposed activities; key information for the commercial fishing sector about the activities; coordinates for operational areas; an activity summary; assessment of commercial fishing, potential effects and impacts; and VOGA's impact assessment. WAFIC undertook consultation with licence holders on behalf of VOGA and advised of any feedback at the end of the consultation process.	activities; potential impacts, risks and management measures A commercial fisher information sheet, which included an overview of the proposed activities; key information for the commercial fishing sector about the activities; coordinates for operational areas; an activity summary; assessment of commercial fishing, potential effects and impacts; and VOGA's impact assessment. which we deem to be sufficient information for each stakeholder. Additional targeted content via email, where applicable.
Recreational fishers and marine users and peak representative bodies	Assessed potential Operational Area and EMBA overlap with the interest of recreational fishers, marine users, tourism operators and peak representative bodies and searched applicable websites.	VOGA emailed and sent postal letters providing consultation information. Emails and letters included an activity summary, directions for how to provide input into the EP development through consultation, the consultation date and	A reasonable period of 30 business days (four weeks), subject to the nature and scale of the proposed activity, was provided for feedback. A consultation information sheet including an overview of the proposed activities; potential impacts, risks and

[33] https://www.wafic.org.au/wp-content/uploads/2023/07/Oil-and-Gas-Consultation-Framework.pdf

Identified Relevant Persons	Actions taken to identify relevant persons	Consultation process and information provided	Reasonable Period and Sufficient Information
		a link to VOGA's website with additional resources on EP consultation Consultation information sheet including an overview of the proposed activities; potential impacts, risks and management measures.	management measures which we deem to be sufficient information for each stakeholder.
Energy industry titleholders and operators	Assessed the potential presence in the EMBA and searched applicable websites.	VOGA emailed and provided consultation information. The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation date and a link to VOGA's website with additional resources on EP consultation. Consultation information sheet including an overview of the proposed activities; potential impacts, risks and management measures.	A reasonable period of 30 business days (four weeks), subject to the nature and scale of the proposed activity, was provided for feedback. A consultation information Sheet including an overview of the proposed activities; potential impacts, risks and management measures which we deem to be sufficient information for each stakeholder.
Peak industry titleholders and operators	Assessed the potential presence in the EMBA and searched applicable websites.	VOGA emailed and included an activity summary, directions for how to provide input into the EP development through consultation, the consultation date and a link to VOGA's website with additional resources on EP consultation. Consultation information sheet including an overview of the proposed activities; potential impacts, risks and management measures.	A reasonable period of 30 business days (four weeks), subject to the nature and scale of the proposed activity, was provided for feedback. A consultation information sheet including an overview of the proposed activities; potential impacts, risks and management measures which we deem to be sufficient information for each stakeholder.

Identified Relevant Persons	Actions taken to identify relevant persons	Consultation process and information provided	Reasonable Period and Sufficient Information
Infrastructure operators	Assessed the potential presence in the Operational Area and EMBA and searched applicable websites.	VOGA emailed and included an activity summary, directions for how to provide input into the EP development through consultation, the consultation date and a link to VOGA's website with additional resources on EP consultation. Consultation information sheet including an overview of the proposed activities; potential impacts, risks and management measures.	A reasonable period of 30 business days (four weeks), subject to the nature and scale of the proposed activity, was provided for feedback. A consultation information Sheet including an overview of the proposed activities; potential impacts, risks and management measures which we deem to be sufficient information for each stakeholder.
Traditional Custodians and First Nations nominated representative corporations and Native Title Representative Bodies	Developed a list of all Native Title registered claims and determinations along the coastline of WA. Reviewed the EMBA and overlap or adjacency to Native Title registered claims and determinations to establish a list of potentially affected First Nations groups. Identified First Nations groups as potentially relevant persons, comprising: Native Title Representative Bodies (NTRB) Registered Native Title Bodies Corporate (RNTBCs – the formal name given to a group once Native Title has been determined) Prescribed Bodies Corporate (PBCs – the legal entity formed by a group of	VOGA emailed and telephone called to introduce its operations and seek engagement in a co-design consultation process VOGA emailed and included an activity summary, directions for how to provide input into the EP development through consultation, the consultation date and a link to VOGA's website with additional resources on EP consultation Summary consultation information sheet and links to a detailed consultation information sheet including an overview of the proposed activities; potential impacts, risks and management measures Virtual or in person meetings with supporting presentation materials and handouts	A reasonable period of 30 business days (four weeks), subject to the nature and scale of the proposed activity, was provided for feedback. A summary consultation information sheet and links to a detailed consultation information sheet including an overview of the proposed activities; potential impacts, risks and management measures Bespoke maps outlining the EMBA relevant to areas of interest, such as native title boundary. Virtual or in person meetings with supporting presentation materials and handouts which we deem to be sufficient information for each stakeholder.

Identified Relevant Persons	Actions taken to identify relevant persons	Consultation process and information provided	Reasonable Period and Sufficient Information
	Native Title Claimants during the determination process, but used interchangeably with RNTBC) Aboriginal Corporations – Aboriginal run or managed businesses, often operating on behalf of, or under a RNTBC Land and Sea Management Groups – primarily Ranger Groups, many of whom operate under a RNTBC.	Continued emails and telephone calls to groups	Additional targeted content and requests via email.
Historical heritage groups or organisations	Searched public cultural heritage databases relevant to the Operational Area and EMBA.	VOGA emailed and included an activity summary, directions for how to provide input into the EP development through consultation, the consultation date and a link to VOGA's website with additional resources on EP consultation. Consultation information sheet including an overview of the proposed activities; potential impacts, risks and management measures.	A reasonable period of 30 business days (four weeks), subject to the nature and scale of the proposed activity, was provided for feedback. A consultation information Sheet including an overview of the proposed activities; potential impacts, risks and management measures which we deem to be sufficient information for each stakeholder. Additional targeted content via email, where applicable.
Local government and recognised local business and community reference/liaison groups or organisations	Assessed the boundaries of local governments, local business and community reference/liaison groups organisations on EMBA and potential presence in the EMBA and searched applicable websites.	VOGA emailed and included an activity summary, directions for how to provide input into the EP development through consultation, the consultation date and a link to VOGA's website with additional resources on EP consultation.	A reasonable period of 30 business days (four weeks), subject to the nature and scale of the proposed activity, was provided for feedback. A consultation information Sheet including an overview of the proposed activities; potential impacts, risks and

Identified Relevant Persons	Actions taken to identify relevant persons	Consultation process and information provided	Reasonable Period and Sufficient Information
		Consultation information sheet including an overview of the proposed activities; potential impacts, risks and management measures.	management measures which we deem to be sufficient information for each stakeholder.
Research institutes	Searched research institutes websites and publicly available information.	VOGA emailed and included an activity summary, directions for how to provide input into the EP development through consultation, the consultation date and a link to VOGA's website with additional resources on EP consultation. Consultation information sheet including an overview of the proposed activities; potential impacts, risks and management measures.	A reasonable period of 30 business days (four weeks), subject to the nature and scale of the proposed activity, was provided for feedback. A consultation information Sheet including an overview of the proposed activities; potential impacts, risks and management measures which we deem to be sufficient information for each stakeholder.
Local environment and conservation groups or organisations	Searched environment and conservation groups websites and publicly available information Reviewed publicly available EP documents from other titleholders on the NOPSEMA website.	VOGA emailed and included an activity summary, directions for how to provide input into the EP development through consultation, the consultation date and a link to VOGA's website with additional resources on EP consultation. Consultation information sheet including an overview of the proposed activities; potential impacts, risks and management measures.	A reasonable period of 30 business days (four weeks), subject to the nature and scale of the proposed activity, was provided for feedback. A consultation information Sheet including an overview of the proposed activities; potential impacts, risks and management measures which we deem to be sufficient information for each stakeholder.

Additional targeted and tailored information for relevant persons

In addition to the consultation information sheet, VOGA develops and provides supplementary targeted content for individual stakeholders or stakeholder groups, based on their known or likely functions, interests, or activities. For this EP, additional information developed included:

- EP Summary Consultation Information Sheet
- EP Commercial Fisher Information Sheet
- Where requested, virtual or in person meetings with supporting presentation materials and handouts
- Additional targeted content to consultation emails
- Bespoke maps and figures.

10.4.7 Providing a Reasonable Period for Consultation

In accordance with prescribed regulations regarding a 'reasonable period', VOGA initiated consultation with certain categories of relevant persons in August 2025, providing additional time before commencing consultation on the EP for gathering input on preferred methods. VOGA commenced its broad consultation approach on 22 October 2025. To account for the December and January public holidays and ensure relevant persons had adequate time to provide feedback, the consultation period closed on the 13 February 2026. VOGA remains committed to ongoing engagement beyond this deadline to facilitate meaningful dialogue and address any further considerations or feedback on this EP.

The Consultation Period during the development of an EP is generally defined by VOGA as being 30 business days (four weeks), subject to the nature and scale of the proposed activity. Where dialogue with relevant persons is ongoing after this period, VOGA will continue to consult with these persons until VOGA believes that it has provided sufficient evidence/justification to close the consultation.

VOGA considers it has provided a reasonable period to relevant persons for consultation appropriate to the nature and scale of the proposed activity under this EP.

10.4.8 Approach to Consulting Relevant Persons

VOGA adopted a bespoke approach for all relevant person categories, and each group/person was individually considered to ensure they received sufficient material that was appropriate for the recipient and aligned with any guidance or specific requirements.

This included a planned and considered approach to engaging identified relevant persons and interested parties on VOGA's proposed activities. The company undertook a broad consultation process to raise public awareness, encourage feedback, and prompt respectful two-way consultation.

10.4.9 Consultation Opportunities/Channels

VOGA provided consultation opportunities through multiple mediums such as:

- Introductory telephone calls
- Response via email or mail
- Provision of a consultation phone number
- In-person or virtual meetings as appropriate and mutually agreed.

In the instances where no response was received following initial consultation outreach, attempts were made to follow up identified relevant persons via email, letter, telephone calls and text message as appropriate.

10.4.10 Unplanned Event

VOGA has established procedures should an unplanned event occur.

Within our OPEP, VOGA has procedures to ensure relevant persons are notified within 24 hours should a Level 2 oil spill occur. VOGA provides notifications to relevant persons as requested through its consultation process.

VOGA routinely reviews its EPs to ensure all existing environment information is up to date. A current list of commercial fisheries and aquaculture, government departments and First Nations groups that could potentially be impacted is included in this update.

VOGA has prepared and adopted an Oil Spill Monitoring Plan utilising the joint industry framework for operational and scientific monitoring. VOGA is also a member of the Oil Spill Response Limited joint industry arrangements for Oil Spill Management which provides capacity to implement the Oil Spill Monitoring Plan.

10.4.11 Ongoing Consultation

10.4.11.1 Overview

VOGA recognises there will be relevant persons unable to provide feedback within the timeframes set out in Regulation 25 of the OPGGS(E)R and the extended consultation period provided by VOGA for the preparation of this EP.

If consultation cannot take place before the EP submission, VOGA will notify the relevant person of the intent to submit the EP and advise that consultation can continue in ongoing consultation, where feedback can be received, assessed and responded to (as appropriate) throughout the life of an EP.

In this way, if a response is received, consultation can commence after the EP is submitted and feedback can be assessed and incorporated through the Management of Change and Review process (Section 8.8). In accordance with Regulation 22(15), ongoing consultation is part of VOGA's implementation strategy. Should consultation feedback be received following acceptance of this EP in which a measure or control which VOGA considers

requires implementation or updates to meet the intended outcome of consultation, VOGA will apply its Management of Change and Review process (Section 8.8).

An overview and summary of VOGA's Ongoing Consultation engagements are included in Appendix F – Ongoing Engagement Plan Summary Report and summarised in Figure 10-2 demonstrates VOGA's ongoing consultation process.

10.4.11.2 Ongoing Consultation with First Nation Groups

VOGA remains in ongoing consultation with First Nation groups. At the time of EP submission, there are no outstanding issues to resolve as a result of relevant person consultation.

VOGA will continue to seek the opportunity to continue to meet with First Nations groups already consulted, and Tier 1 First Nations groups it is yet to meet with (Appendix F). VOGA is developing an Ongoing Engagement Plan with First Nations Groups ("Ongoing Engagement Plan"), to demonstrate VOGA's commitment to ongoing engagement of First Nations. It is a living document, designed to evolve with ongoing consultation and feedback from First Nations for all its activities.

A summary of the ongoing engagement with relevant First Nations groups for this EP is included at Appendix F - Summary of Ongoing Engagement, reference 1.4.2.

The Ongoing Engagement Plan has been developed so that First Nations can, on an ongoing basis, provide VOGA with feedback relating to the possible consequences of an activity to be carried out under an EP on their functions, interests and activities as they relate to cultural values. This feedback will be evaluated in conjunction with First Nation groups and, where necessary, avoidance or mitigation strategies will be developed.

VOGA is committed to continue to receive feedback on cultural values for the life of an EP, the inclusion of new information and the development of avoidance or mitigation strategies in collaboration with First Nations. This information will be recorded and assessed and any potential impacts to the accepted EP evaluated via the MoC process (Section 8.8).

Figure 10-2: VOGA's ongoing consultation process

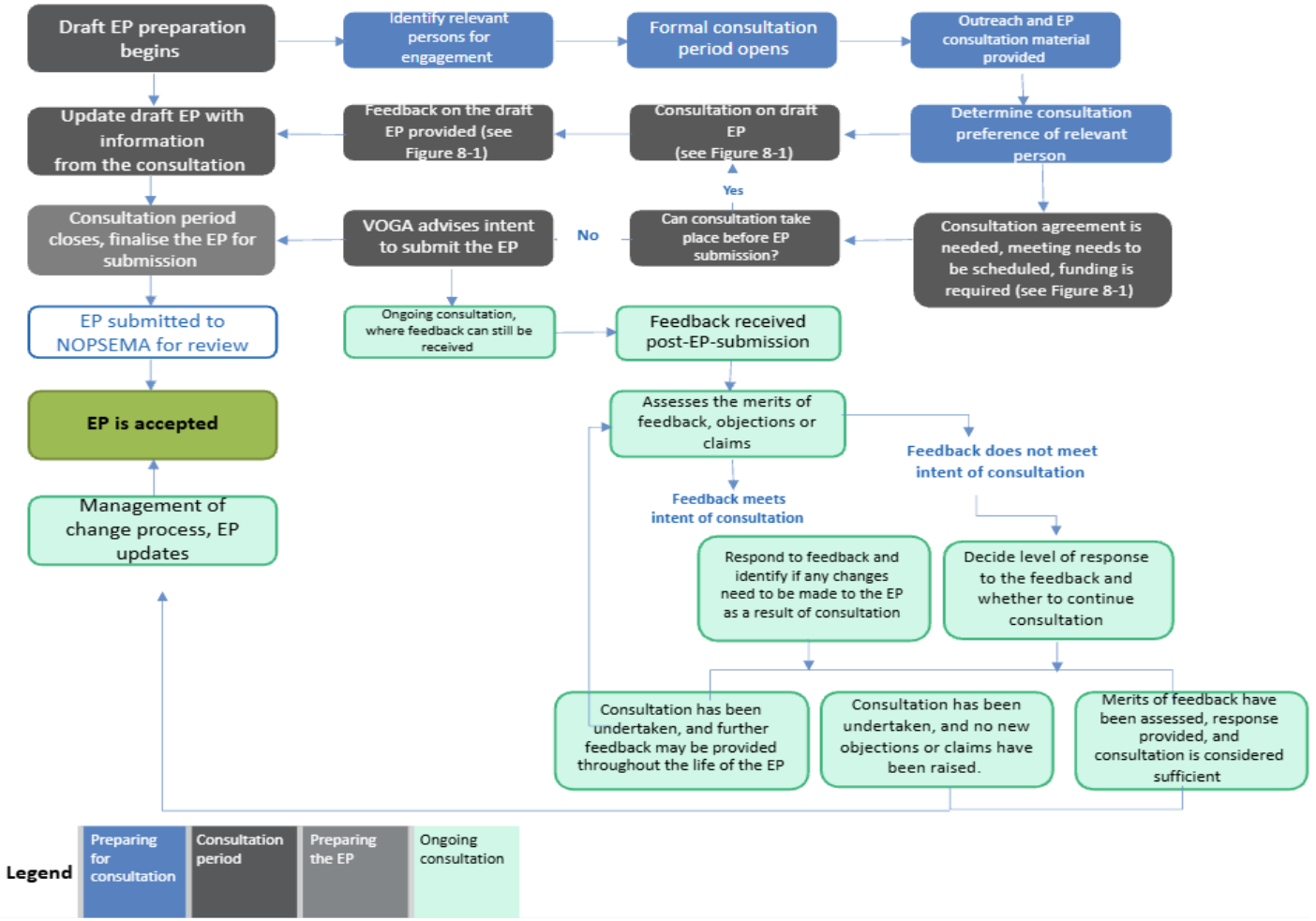


Table 10-6: Ongoing consultation engagements

Report	Recipient	Purpose	Frequency	Content
Emails/Meetings	Relevant First Nation Groups	Identification, assessment and consideration of cultural values relevant to the Operational Area and EMBA	Ongoing	Assessment of any relevant new information on cultural values will be assessed. VOGA will apply its MoC process, where appropriate (Section 8.5).
Notification (email)	AHO	As requested by AHO during consultation.	No less than 4 weeks prior to commencement.	Date of activity start. Addressed in Table 5-97.
Updates (email)			As required.	Changes to planned activities.
Notification (email)	AMSA – Marine Safety	As requested by AMSA during consultation.	No less than 4 weeks prior to commencement and at the end of activities.	Date of activity start. Addressed in Table 5-97.
			Contact AMSA's Rescue Centre (ARC) and Joint Rescue Coordination Centre (JRCC) at least 24–48 hours before operations commence.	
Notification (Australasian Underwater Cultural Heritage Database tool)	DCCEEW – Underwater Cultural Heritage	As requested by DCCEEW – Underwater Cultural Heritage during consultation.	Within 21 days of a discovery.	VOGA will notify the Minister of an Underwater Cultural Heritage discovery through the Australasian Underwater Cultural Heritage Database tool. Addressed in Table 5-97.

Report	Recipient	Purpose	Frequency	Content
Notification (email)	Director of National Parks (DNP)	As requested by DNP.	Within 24 hours of an unplanned oil spill event.	DNP requested Marine Compliance Duty Officer be notified of any spill or pollution.
Updates (email)			As required.	DNP requested an update should the operational area change.
Notification (email)	DBCA	As requested by DBCA.	As required.	VOGA to contact DBCA's Pilbara regional office in the event of a hydrocarbon release during the activity.
Notification (call and email)	DoT – Marine Pollution	As requested by DoT.	As soon as reasonably practical (within 2 hours).	In the risk of a spill impacting state waters to DoT Maritime Environmental Emergency Response (MEER) Duty Officer via the 24-hour reporting number (08) 9480 9924. The initial verbal notification must be followed up by an email containing a marine pollution report (POLREP), or similar, to marine.pollution@transport.wa.gov.au. As per Guidance Note from July 2020 titled Marine Oil Pollution: Response and Consultation Arrangements.
Notification (email)	Pilbara Ports Authority (PPA)	As requested by PPA.	As soon as practicable.	PPA to be notified if an unplanned event occurs.
Notification (email)	WAFIC	As requested by WAFIC.	No less than 10 days prior to commencement of activities.	Date of activity start. Addressed in Table 5-97.
			Within 24 hours of an unplanned Level 2 oil spill event.	WAFIC to be notified in the event of a Level 2 oil spill.
Ongoing engagement	Recfishwest	As requested by Recfishwest.	Ongoing.	Project progress update, including date of activity start.
Updates (email)	Shire of Ashburton	As requested by the Shire of Ashburton.	As required.	Project progress update, including date of activity start.

Report	Recipient	Purpose	Frequency	Content
Notification (email)	Other relevant persons	Notification of significant change.	As appropriate.	Notification of significant change.
Emails/Meetings	Persons or organisations who provide feedback to VOGA post EP submission.	Identification, assessment and consideration of feedback, claims and/or objections.	As appropriate.	Assessment of claims and/or objections. VOGA will apply its MoC process, where appropriate (Section 8.5).
Updates (email/phone call)	Ngarluma Aboriginal Corporation	As requested by Ngarluma Aboriginal Corporation	As soon as practicable.	Ngarluma Aboriginal Corporation to be notified in the event of an oil spill with potential to impact Country.
Updates (email/phone call)	Wanparta Aboriginal Corporation	As requested by Wanparta Aboriginal Corporation	As soon as practicable.	Wanparta Aboriginal Corporation to be notified in the event of an oil spill with potential to impact Country.
Updates (email/phone call)	Murujuga Aboriginal Corporation	As requested by Murujuga Aboriginal Corporation	As soon as practicable.	MAC to be immediately contacted for consultation on management of cultural values if an environmental incident may affect Murujuga World Heritage property/landscape/seascape within the impact zone.
Updates (email/phone call)	Buurabalayji Thalanyji Aboriginal Corporation	As requested by Buurabalayji Thalanyji Aboriginal Corporation	As required.	BTAC identified a culturally significant island and other important coastal sites. BTAC has requested to be contacted during an incident to support cultural heritage protection.

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Appendices

Appendix A VOGA Health, Safety and Environment (HSE) Policy

HEALTH, SAFETY AND ENVIRONMENT (HSE) POLICY

Vermilion is committed to conducting its activities in a manner that safeguards the health and safety of employees, contractors, and the public. Our HSE Vision is to consistently apply our Core Values of Excellence, Trust, Respect and Responsibility to foster a workplace where HSE is fully integrated into our organizational decision-making, reflecting our commitment to safe and reliable operations as a fundamental way of working – it is our way of life.

Vermilion will maintain health, safety and environmental practices and procedures that comply with or exceed regulatory requirements and industry standards.

Our commitments to achieving strong HSE performance include:

- Maintaining an HSE Management System (HSE MS) with clear objectives and expectations to identify hazards, manage risks, and reduce the likelihood and consequences of Serious Injury and Fatality (SIF) events, while promoting the health of employees and contractors
- Applying Human and Organizational Performance (HOP) principles to understand system and human interactions and enhance learning from all events and near-misses
- Demonstrating visible, active commitment from leaders at all levels to achieve HSE performance targets
- Providing a safe and healthy workplace for all employees and contractors, reinforced through control assurance for higher risk activities
- Fostering an ownership culture in which all employees and contractors take responsibility for HSE, feel empowered to speak up, and actively promote safe behaviors and environmental protection
- Continuously evaluating and improving our HSE MS, standards, operating practices, and procedures to strengthen safety, health, and operational reliability
- Making a positive contribution to environmental protection and seeking improvements in the efficient use of natural resources
- Ensuring open and timely communication with all stakeholders, and
- Ensuring the resources necessary to support this policy are provided

Hazard awareness, risk management, and environmental stewardship are integral to every job. Achieving these objectives requires the active participation and continuous support of everyone at Vermilion. The protection of health, safety and the environment must be a key part of the planning execution of every task. All individuals engaged in work for Vermilion are expected to perform their duties with consideration to these principles, and act in alignment with this policy to support safe and reliable operations.

HSE: Everyone. Everywhere. Everyday.

Dion Hatcher **President**	**Darcy Kerwin** **Vice President, International & HSE**	**Ryan Carty** **Managing Director,** **Australia Business Unit**

VERMILION ENERGY

Appendix B Oil Spill Modelling

VERMILION KULLINGAL OIL SPILL MODELLING

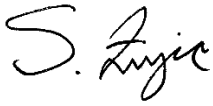
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TERMS AND ABBREVIATIONS

Term	Meaning
Actionable oil	Oil which is thick enough for the effective use of mitigation strategies.
AMSA	Australian Maritime Safety Authority
API	American Petroleum Institute gravity. A measure of how heavy or light a petroleum liquid is compared to water.
Bonn Agreement	An agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances, established 1983 includes: Governments of the Kingdom of Belgium, the Kingdom of Denmark, the French Republic, the Federal Republic of Germany, the Republic of Ireland, the Kingdom of the Netherlands, the Kingdom of Norway, the Kingdom of Sweden, the United Kingdom of Great Britain and Northern Ireland and the European Union.
BP	Boiling point. The temperature at which the vapor pressure of the liquid is equal to the pressure exerted on it by the surrounding atmosphere
BTEX	Benzene, toluene, ethylbenzene, and xylenes
Decay	The process where oil components are changed either chemically or biologically (biodegradation) to another compound. It includes breakdown to simpler organic carbon compounds by bacteria and other organisms, photo-oxidation by solar energy, and other chemical reactions.
Deterministic (single) Oil spill modelling	Oil spill modelling involving a computer simulation of a single hypothetical oil spill event subject to a single sequence of wind, current and other sea conditions over time. Single oil spill modelling, also referred to as “deterministic modelling” provides a simulation of one possible outcome of a given spill scenario, subject to the metocean conditions that are imposed. Single oil spill modelling is commonly used to consider the fate and effects of ‘worst-case’ oil spill scenarios that are carefully selected in consideration of the nature and scale of the offshore petroleum activity and the local environment (NOPSEMA, 2018). Because the outcomes of a single oil spill simulation can only represent the outcome of that scenario under one sequence of metocean conditions, worst-case conditions are often identified from stochastic modelling. It is impossible to calculate the likelihood of any outcome from a single oil spill simulation. Single oil spill modelling is generally used for response planning, preparedness planning and for supporting oil spill response operations in the event of an actual spill
Dynamic viscosity	The dynamic viscosity of a fluid expresses its resistance to shearing flows, where adjacent layers move parallel to each other with different speeds.
Floating oil exposure	Contact by floating oil on the sea surface at concentrations equal to or exceeding defined threshold concentrations. The consequence will vary depending on the threshold and the receptors
HYCOM	Hybrid Coordinate Ocean Model. A data-assimilative, three-dimensional ocean model
HYDROMAP	Advanced ocean/coastal tidal model used to predict tidal water levels, current speed and current direction.
MAHs	Monoaromatic hydrocarbons
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
PAH	Polynuclear aromatic hydrocarbons
Pour Point	The pour point of a liquid is the temperature below which the liquid loses its flow characteristics
Shoreline accumulation	Arrival of oil at or near shorelines at on-water concentrations equal to or exceeding defined threshold concentrations. Shoreline accumulation is judged for floating oil arriving within a 2 km buffer zone from any shoreline as a conservative measure.
SIMAP	Spill Impact Model Application Package. SIMAP is designed to simulate the fate and effects of spilled hydrocarbons for surface or subsea releases.
Stochastic (multiple) oil spill modelling	Stochastic oil spill modelling is created by overlaying and statistically analysing the outcomes of many single oil-spill simulations of a defined spill scenario, where each simulation was subject to a different sequence of metocean conditions, selected objectively (typically by random selection) from a long sequence of historic conditions for the study area. Analysis of this larger set of simulations provides a more accurate indication of the areas of potential exposure and indicates which locations are more likely to be exposed (as well as other statistics). Stochastic oil spill

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	modelling avoids biases that affect single oil spill modelling (due to the reliance on only one possible sequence of conditions). However, when interpreting stochastic modelling, which is based on a wide range of potential conditions that might happen to occur, it is essential to understand that calculations will encompass a much larger area than could be affected in any single spill event, where a more limited set of conditions will occur. Consequently, it is misleading to imply that the region derived from stochastic modelling indicate the outcomes expected from a single spill event (NOPSEMA, 2018) Stochastic modelling is generally used for risk assessment and preparedness planning by indicating locations that could be exposed and may require response or subsequent impact assessment.

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EXECUTIVE SUMMARY

Background

Vermilion Oil and Gas Australia Pty Ltd (VOGA) operates the Wandoo field, located approximately 70 km northwest of Dampier, Western Australia, in waters approximately 50 m deep.

To support the preparation of the Environment Plan (EP) and Oil Pollution Emergency Plan (OPEP) for the Kullingal well exploration drilling activity, a detailed oil spill modelling study was commissioned. This study assessed the following two hypothetical scenarios:

- **Scenario 1:** A 167,800 bbl (26,678 m^3) surface release of Wandoo crude over 35 days following a loss of well control (LOWC) at Kullingal; and
- **Scenario 2:** A 300 m^3 surface release of marine diesel oil (MDO) over 6 hours following a vessel collision at Kullingal.

The potential exposure of surrounding waters and shorelines was assessed and presented for the distinct seasons, summer (October to February), winter (April to July) and transitional (March, August and September). The modelling does not take into consideration any of the spill prevention, mitigation and response capabilities that would be implemented in response to the spill.

Methodology

The modelling study was carried out in stages. Firstly, a 10-year wind and current dataset (2010–2019) that includes the combined influence of large-scale ocean and tidal currents was prepared. Secondly, the currents, local winds and detailed hydrocarbon characteristics were used as inputs in the three-dimensional oil spill model (SIMAP) to simulate the drift, spread, weathering and fate of the spilled oil.

Modelling was conducted using a stochastic (or probabilistic) approach, which involved running 100 spill simulations per season and each simulation had the same spill information (spill volume, duration and composition of hydrocarbons) but randomly selected start times to ensure a range of wind and current conditions were assessed. Once all 100 simulations per season were run, the results were combined to determine the potential exposure to the surrounding waters, shorelines and sensitive receptors based on the thresholds outlined in the NOPSEMA Oil Spill Modelling Bulletin (NOPSEMA, 2019).

Oil Properties

Wandoo Crude (API 19.4) was used for this oil spill modelling study. The unweathered mixture has a density of 937.7 g/cm^3 (at 16°C), a dynamic viscosity of 161 cP and a pour point of -24°C, which ensures that this crude will remain in a liquid state over the annual temperature range observed.

Wandoo Crude is composed of approximately 1.7% (by mass) of volatile hydrocarbons that will evaporate within the first 12 hours. A further 10.2% of the oil is characterised as the semi-volatile compounds that will likely evaporate within the first 24 hours when on the surface and the additional 33.1% represent the low volatiles which typically evaporate over several weeks. A relatively high proportion (55%) of hydrocarbon compounds is persistent, which are unlikely to evaporate and will decay over time. It is categorised as a Group IV (or persistent) oil according to both oil classifications for AMSA (2023).

The MDO has a density of 890.0 kg/m^3 at 15ºC (API of 27.5) and a low pour point of -9.0°C. The low viscosity (14.0 cP at 25ºC) indicates that this oil will spread quickly when released and will form a thin to low thickness film on the sea surface, increasing the rate of evaporation. Generally, about 4% of the MDO mass should evaporate within the first 12 hours (Boiling point (BP) < 180°C); a further 32.0% should evaporate within the first 24 hours (180°C < BP < 265°C); and an additional 54.0% should evaporate over several days (265°C < BP < 380°C). Approximately 10% (by mass) of MDO will not evaporate, though will decay slowly over time. It is categorised as a Group II oil (light-persistent) according to the AMSA (2023) classifications.

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Summary of Modelling Results

A detailed summary of the results for all modelled scenarios is provided in the table below.

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Summary of key results

Scenario description		Scenario 1 – Surface LOWC	Scenario 2 - Vessel collision
Spill volume		167,800 bbl (26,678 m^3)	300 m^3
Oil type		Wandoo crude	MDO
Release depth		0 m (surface)	0 m (surface)
Release duration		35 days	6 hours
Simulation length		56 days	30 days
Floating Oil Exposure	Maximum distances from the release location to floating oil exposure thresholds	Floating oil concentrations ≥ 1 g/m^2 could extend up to 998 km from the release location. The maximum distances reduced to 473 km and 25 km as the threshold increases to ≥ 10 g/m^2 and ≥ 50 g/m^2, respectively.	Floating oil concentrations ≥ 1 g/m^2 could extend up to 31 km from the release location. The maximum distances reduced to 18 km and 6 km as the threshold increases to ≥ 10 g/m^2 and ≥ 50 g/m^2, respectively.
	Highest probability of floating oil exposure to a receptor at, or above, 1 g/m^2	Mermaid Reef AMP, 97% during winter conditions	NC
	Quickest time before exposure to a receptor at, or above, 1 g/m^2	Montebello AMP, 37 hours during transitional conditions	NC
Shoreline Oil Accumulation	Probability of oil accumulation on **any** shoreline at, or above, 10 g/m^2	100% during winter conditions	24% during winter conditions
	Absolute minimum time for oil to accumulate on shoreline cells at ,or above, 10 g/m^2	WA11.West (318) - Barrow Island and Montebello Islands (A), 69 hours during winter conditions	WA11.West (318) - Barrow Island and Montebello Islands (A), 91 hours during winter conditions
	Maximum volume of oil ashore from a single spill simulation at, or above, 10 g/m^2	4,550.0 m^3 during summer conditions	23.2 m^3 during winter conditions
	Highest probability of oil accumulation for a specific shoreline cell at, or above, 10 g/m^2	WA11.West (318) - Barrow Island and Montebello Islands (A), 92% during winter conditions	WA11.West (318) - Barrow Island and Montebello Islands (A), 15% during winter conditions
	Maximum volume of oil ashore from a single spill simulation for a specific shoreline cell at, or above, 10 g/m^2	2,570 m^3, WA11.West (318) - Barrow Island and Montebello Islands (A), during transitional conditions	23.2 m^3, WA11.West (318) - Barrow Island and Montebello Islands (A), during winter conditions

Dissolved Hydrocarbons	Maximum distances from the release location to dissolved hydrocarbon exposure thresholds	Concentrations ≥ 10 ppb threshold may extend up to 790 km from the release location. As the threshold increases to 50 ppb, the maximum distance decreases to 425 km. No exposure was predicted above 400 ppb.	Concentrations ≥ 10 ppb threshold may extend up to 169 km from the release location. As the threshold increases to 50 ppb, the maximum distance decreases to 58 km. No exposure was predicted above 400 ppb.
	Highest probability of dissolved hydrocarbon exposure to a receptor at, or above, 10 ppb	Montebello AMP, 89% during winter conditions	Montebello AMP, 7% during winter conditions
	Quickest time before exposure to a receptor at, or above, 10 ppb	Montebello AMP, 26 hours during summer conditions	Montebello AMP, 27 hours during transitional conditions
Entrained Hydrocarbons	Maximum distances from the release location to entrained hydrocarbons exposure thresholds	Concentrations ≥ 10 ppb threshold may extend up to 1,302 km from the release location. As the threshold increases to ≥ 100 ppb, the maximum distance decreases to 1,037 km.	Concentrations ≥ 10 ppb threshold may extend up to 494 km from the release location. As the threshold increases to ≥ 100 ppb, the maximum distance decreases to 237 km.
	Highest probability of entrained hydrocarbon exposure to a receptor at, or above, 10 ppb	Montebello AMP, 99% during winter conditions	Montebello AMP, 54% during winter conditions
	Quickest time before exposure to a receptor at, or above, 10 ppb	Montebello AMP, 21 hours during summer and winter conditions	Montebello AMP, 22 hours during winter conditions

NC: No contact to receptor predicted for specified threshold.

1 INTRODUCTION

1.1 Background

Vermilion Oil and Gas Australia Pty Ltd (VOGA) operates the Wandoo field, located approximately 70 km northwest of Dampier, Western Australia, in waters approximately 50 m deep.

To support the preparation of the Environment Plan (EP) and Oil Pollution Emergency Plan (OPEP) for the Kullingal well exploration drilling activity, a detailed oil spill modelling study was commissioned. This study assessed the following two hypothetical scenarios:

- **Scenario 1:** A 167,800 bbl (26,678 m^3) surface release of Wandoo crude over 35 days following a loss of well control (LOWC) at Kullingal; and
- **Scenario 2:** A 300 m^3 surface release of marine diesel oil (MDO) over 6 hours following a vessel collision at Kullingal.

The coordinates for the Kullingal well, which was used as the release location for the two scenarios are presented in Table 1.1 and is illustrated in Figure 1.1.

The potential exposure of surrounding waters and shorelines was assessed and presented for the distinct seasons, summer (October to February), winter (April to July) and transitional (March, August and September).

The spill modelling was performed using an advanced three-dimensional trajectory and fates model; Spill Impact Model Application Package (SIMAP). The SIMAP model calculates the transport, spreading, entrainment and evaporation of spilled hydrocarbons over time, based on the prevailing wind and current conditions and the physical and chemical properties. The modelling does not take into consideration any of the spill prevention, mitigation and response capabilities that would be implemented in response to the spill.

The hydrocarbon spill model, the method and analysis applied herein use modelling algorithms which have been peer reviewed and published in international journals. Further, RPS warrants that this work meets and exceeds the American Society for Testing and Materials (ASTM) Standard F2067-22 "*Standard Practice for Development and Use of Oil Spill Models*".

Table 1.1 Coordinates of the oil spill modelling release location.

Release site	Latitude*	Longitude*	Water Depth (m)
Kullingal	20° 10' 16.32" S	116° 24' 11.88" E	50

*Datum: WGS 1984

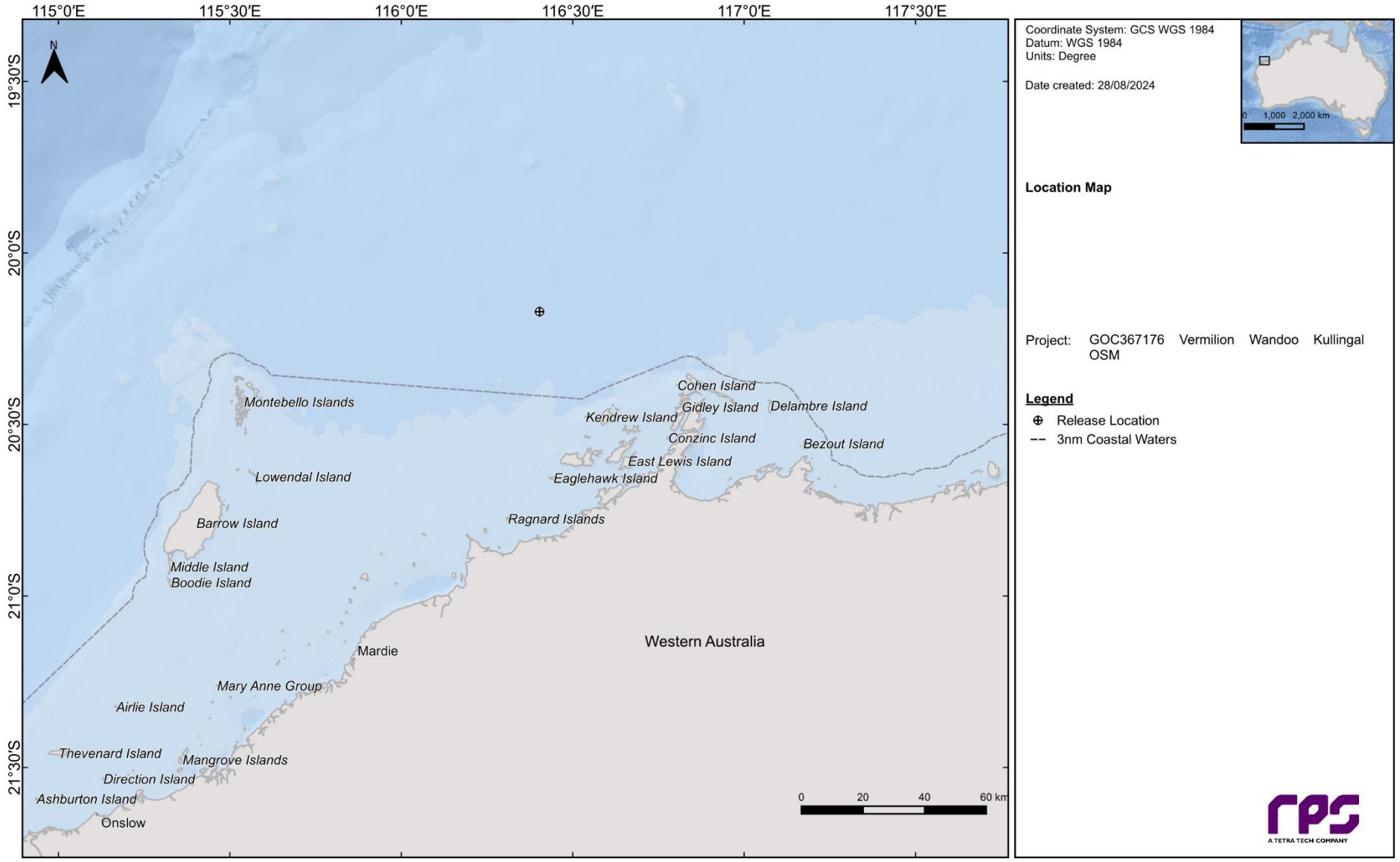


Figure 1.1 Map of the oil spill modelling release location.

What is Oil Spill Modelling?

Oil spill modelling is a valuable tool widely used for risk assessment, emergency response and contingency planning where it can be particularly helpful to proponents and decision makers. By modelling a series of the most likely oil spill scenarios, decisions concerning suitable response measures and strategic locations for deploying equipment and materials can be made, and the locations at most risk can be identified. The two types of oil spill modelling often used are stochastic and deterministic modelling.

1.1.1 Stochastic Modelling (Multiple Spill Simulations)

Stochastic oil spill modelling is created by overlaying a great number (often hundreds) of individual, computer-simulated hypothetical spills (NOPSEMA, 2018; Figure 1.2).

Stochastic modelling is a common means of assessing the potential risks from oil spills related to new projects and facilities. Stochastic modelling typically utilises hydrodynamic data for the location in combination with historic wind data. Typically, 100 simulations are run, which sufficiently samples the historic dataset that is most relevant to the season or timing of the project.

The outcomes are often presented as a probability of exposure and are primarily used for risk assessment purposes in view to understand the range of environments that may be affected or impacted by a spill. Elements of the stochastic modelling can also be used in oil spill preparedness and planning.

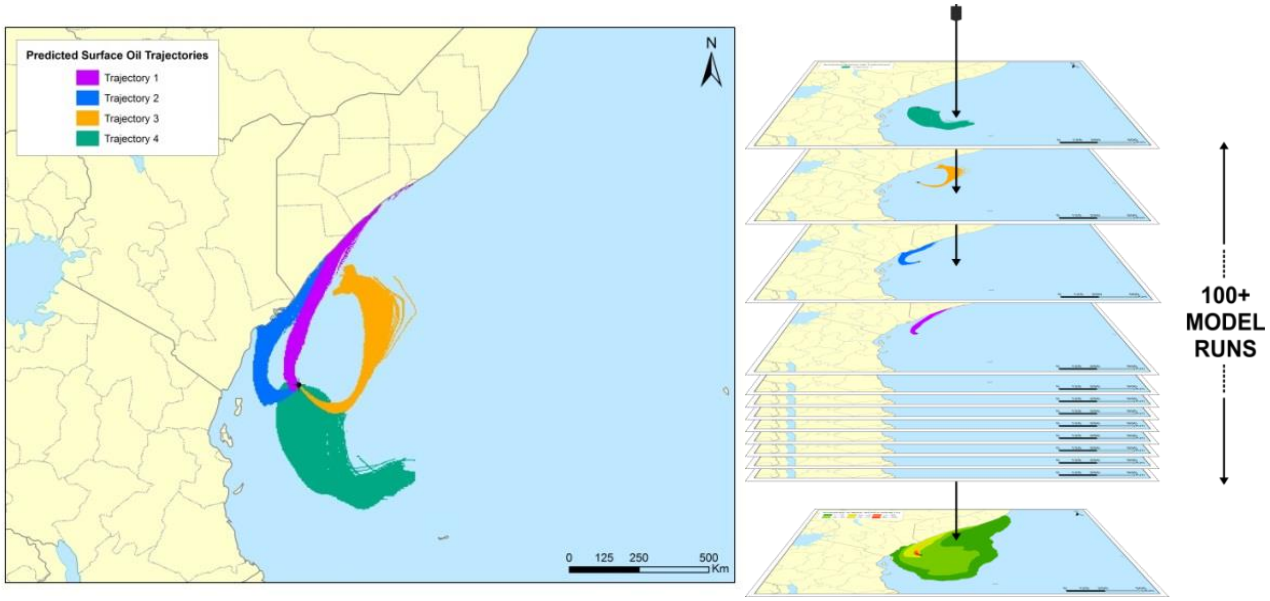


Figure 1.2 Examples of four individual spill trajectories (four replicate simulations) predicted by SIMAP for a spill scenario (left pane). The frequency of contact for given locations is used to calculate the probability of impacts during a spill. Essentially, all model runs are overlain (shown as the stacked runs on the right) and the number of times that trajectories contact a given location at a concentration is used to calculate the probability.

2 SCOPE OF WORK

The scope of work included the following components:

1. Generate 10 years (2010 to 2019 (inclusive)) of wind and current data. The three-dimensional current data includes the combined influence of ocean and tidal currents;
2. Include the wind data, current data and oil properties into the three-dimensional oil spill model; SIMAP, to model the movement, spreading, entrainment, weathering and potential shoreline accumulation over time;
3. Run 100 simulations per season (300 simulations in total) for each scenario, with each scenario specific simulation having the same spill information (location, volume, duration and crude properties) but randomly varying start times. This ensured that each spill simulation was exposed to unique wind and current conditions;
4. Combine the results from the 100 spill simulations per season for each scenario to determine the potential exposure to the surrounding waters, shorelines and sensitive receptors based on the thresholds outlined in the NOPSEMA Oil Spill Modelling Bulletin (NOPSEMA, 2019); and
5. To inform spill response and Operational and Scientific Monitoring (OSM) Bridging Implementation Plan (BIP) capability requirements, the following deterministic simulation for the LOWC scenario was identified and presented:
    a. Greatest number of receptors with floating oil exposure at or above 1 g/m^2 within the first 7 days.

3 REGIONAL CURRENTS

The area of interest for this study is typified by strong tidal flows over the shallower regions, particularly along the inshore region of the North West Shelf and among the island groups stretching from the Dampier Archipelago to the North West Cape. However, the offshore regions with water depths exceeding 100 m – 200 m experience significant large-scale drift currents. These drift currents can be relatively strong (1 knot – 2 knots) and complex, manifesting as a series of eddies, meandering currents, and connecting flows. These offshore drift currents also tend to persist longer (days to weeks) than tidal current flows (hours between reversals) and thus will have greater influence upon the net trajectory of slicks over time scales exceeding a few hours.

Wind shear on the water surface also generates local-scale currents that can persist for extended periods (hours to days) and result in long trajectories. Hence, the current-induced transport of oil can be variably affected by combinations of tidal, wind-induced, and density-induced drift currents. Depending on their local influence, it is critical to consider all these potential advective mechanisms to rigorously understand patterns of potential transport from a given spill location. A comprehensive description of the circulation patterns of the North West Shelf is provided in a review by Condie & Andrewartha (2008).

A schematic of the ocean currents along the North West Australian continental shelf is shown in Figure 3.1.

While the tidal currents are generally weaker in the deeper waters, their influence is greatest along the near shore, coastal passage regions and, in and around islands. Therefore, to accurately account for the movement of an oil spill, which can move between the nearshore and offshore region, ocean and tidal currents were combined as part of the study.

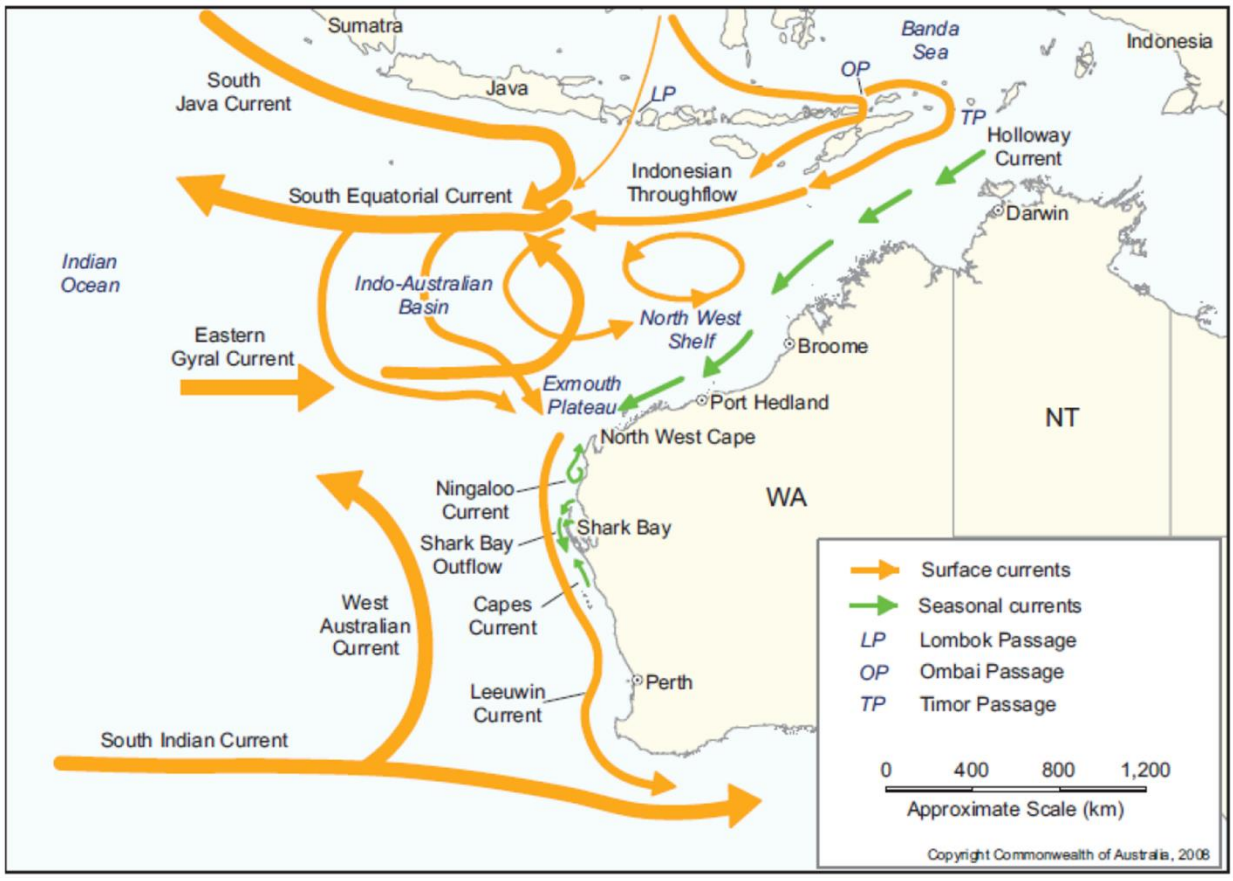


Figure 3.1 Schematic of ocean currents along the northwestern Australian continental shelf. Image adapted from DEWHA (2008).

3.1 Tidal Currents

The effects of tides were generated using RPS's advanced ocean/coastal model, HYDROMAP. The HYDROMAP model has been thoroughly tested and verified through field measurements throughout the world for over 35 years (Isaji and Spaulding, 1984; Isaji et al., 2001; Zigic et al., 2003; Makarynskyy et al., 2010), whilst being used for a wide variety of disciplines within marine environments (e.g. Zigic et al., 2003; Talouli et al., 2009; Zigic et al., 2009; King et al., 2010; Makarynskyy et al., 2010; 2015). In fact, HYDROMAP tidal current data have been used as input for the OILMAP hydrocarbon spill modelling system, which forms part of the Incident Management System (IMS) operated by Maritime New Zealand (MNZ), Australian Maritime Safety Authority (AMSA) and the United Kingdom Maritime and Coastguard Agency, as well as several major oil and gas companies.

HYDROMAP employs a sophisticated sub-gridding strategy, which supports up to six levels of spatial resolution, halving the grid cell size as each level of resolution is employed. The sub-gridding allows for higher resolution of currents within areas of greater bathymetric and coastline complexity, and/or of particular interest to a study.

The numerical solution methodology follows that of Davies (1977a and 1977b) with further developments for model efficiency by Owen (1980) and Gordon (1982). A more detailed presentation of the model can be found in Isaji and Spaulding (1984) and Isaji et al. (2001).

3.1.1 Grid Setup

The tidal model domain has been sub-gridded to a resolution of 500 m for shallow and coastal regions, starting from an offshore (or deep water) resolution of 8 km. The finer grids were allocated in a step-wise fashion to resolve flows more accurately along the coastline, around islands and over regions with more complex bathymetry. Figure 3.2 shows the tidal model grid resolutions.

A combination of datasets was used and merged to describe the shape of the seabed within the grid domain (Figure 3.3). These included spot depths and contours which were digitised from nautical charts released by the hydrographic offices as well as Geoscience Australia database, and depths extracted from the Shuttle Radar Topography Mission (SRTM30_PLUS) Plus dataset (see Becker et al., 2009).

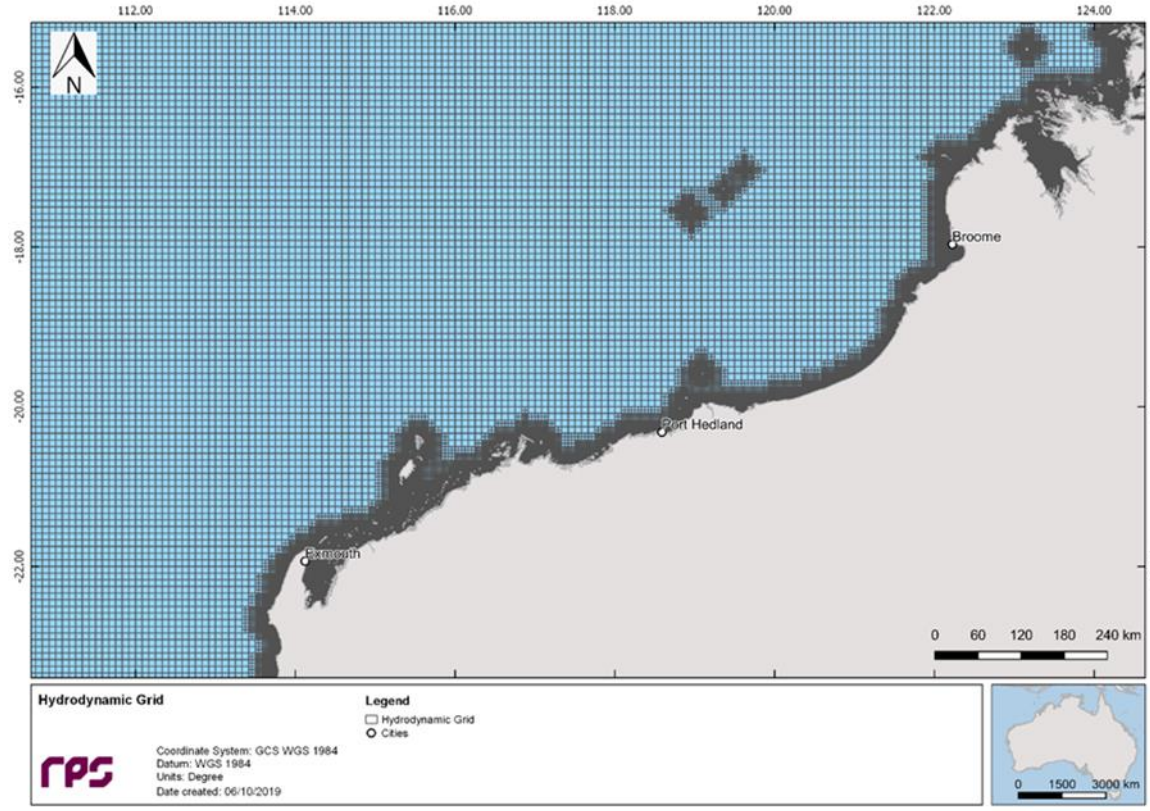


Figure 3.2 Zoomed in view of the model grid used to generate the tidal currents for the study region. Higher resolution areas are shown by the denser mesh.

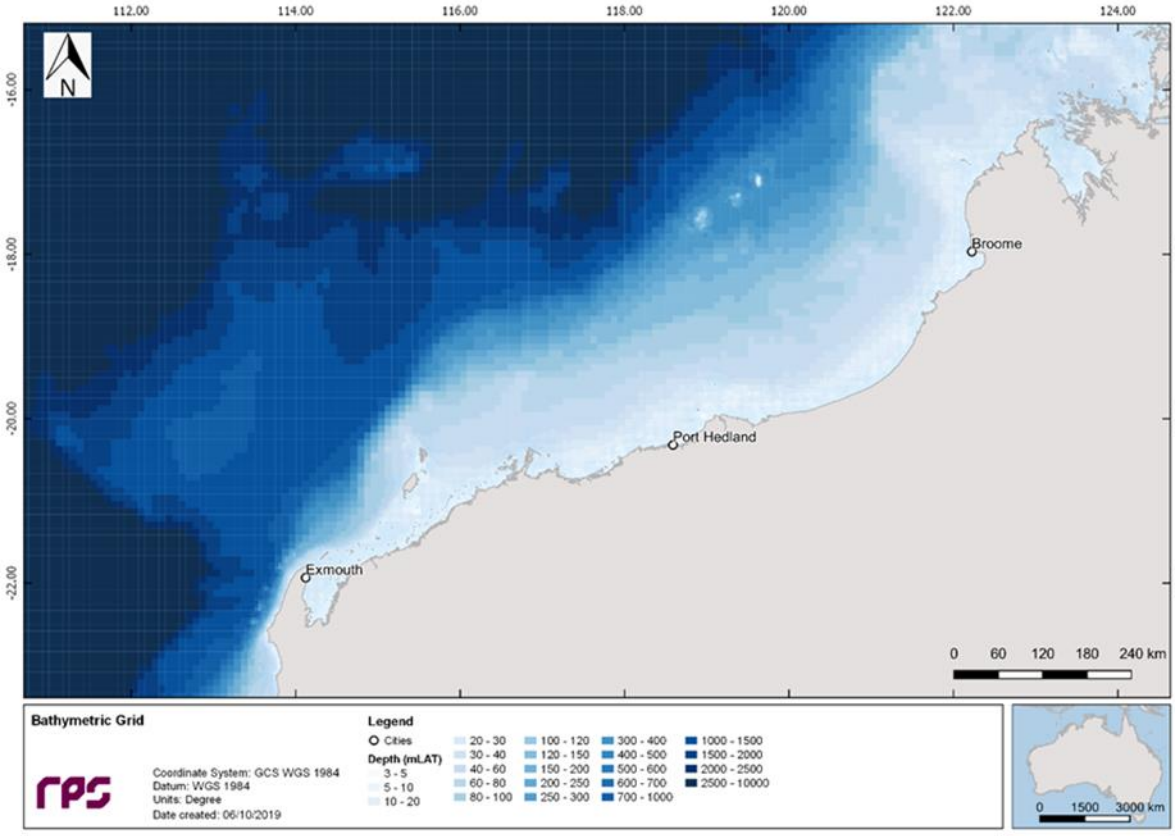


Figure 3.3 Bathymetry defined throughout the tidal model domain.

3.1.2 Tidal Conditions

The ocean boundary data for the regional model was obtained from satellite measured altimetry data (TOPEX/Poseidon 7.2) which provided estimates of the eight dominant tidal constituents at a horizontal scale of approximately 0.25 degrees. The eight major tidal constituents used were K_2, S_2, M_2, N_2, K_1, P_1, O_1 and Q_1. Using the tidal data, surface heights were firstly calculated along the open boundaries, at each time step in the model.

The TOPEX/Poseidon satellite data have a global resolution of 0.25 degrees and is produced and quality controlled by NASA (National Aeronautics and Space Administration). The satellites equipped with two highly accurate altimeters and capable of taking sea level measurements with an accuracy of ± 5 cm measured oceanic surface elevations (and the resultant tides) for over 13 years (1992–2005). In total, these satellites carried out 62,000 orbits of the planet.

The Topex-Poseidon tidal data have been extensively reported and utilised within the oceanographic community (e.g. Andersen, 1995; Ludicone et al., 1998; Matsumoto et al., 2000; Kostianoy et al., 2003; Yaremchuk and Tangdong, 2004; Qiu and Chen 2010; Amores et al., 2019; Sagnieres et al., 2020; Veng et al., 2021; Zeitlhöfler et al., 2023). As such the Topex/Poseidon tidal data is considered suitably accurate for this study.

3.2 Ocean Currents

Data describing the flow of ocean currents were obtained from HYCOM (Hybrid Coordinate Ocean Model, (Chassignet et al., 2007), which is operated by the HYCOM Consortium, sponsored by the National Ocean Partnership Program (NOPP), as part of the U.S. Global Ocean Data Assimilation Experiment (GODAE). HYCOM is a data-assimilative, three-dimensional ocean model that is run as a hindcast (for a past period), assimilating time-varying observations of sea surface height, sea surface temperature and in-situ temperature and salinity measurements (Chassignet et al., 2009). The HYCOM predictions for drift currents are produced at a horizontal spatial resolution of approximately 8.25 km (1/12th of a degree) over the region, at a frequency of every 3 hours. HYCOM uses isopycnal layers in the open, stratified ocean, but uses the layered continuity equation to make a dynamically smooth transition to a terrain following coordinate in shallow coastal regions, and to z-level coordinates in the mixed layer and/or unstratified seas.

For this study, the HYCOM hindcast currents were obtained for the years 2010 to 2019 (inclusive).

3.3 Surface Currents

Figure 3.4 and Figure 3.5 present the monthly and total current rose plots, respectively, for surface waters adjacent to the release location.

Note the convention for defining current direction throughout this report is the direction the current flows towards. Each branch of the current rose distribution represents the currents flowing to that direction, with north to the top of the diagram. The branches are divided into segments of different colour, which represent the current speed ranges for each direction. Speed intervals of 0.2 m/s are typically used in these current roses. The length of each coloured segment within a branch is proportional to the frequency of currents flowing within the corresponding speed and direction.

The average and maximum current speeds were 0.25 m/s and 2.07 m/s, respectively. Throughout the year, the dominant current directions were northwest and southeast, primarily driven by tidal currents rather than ocean currents, given the release location's proximity to shore and shallow waters.

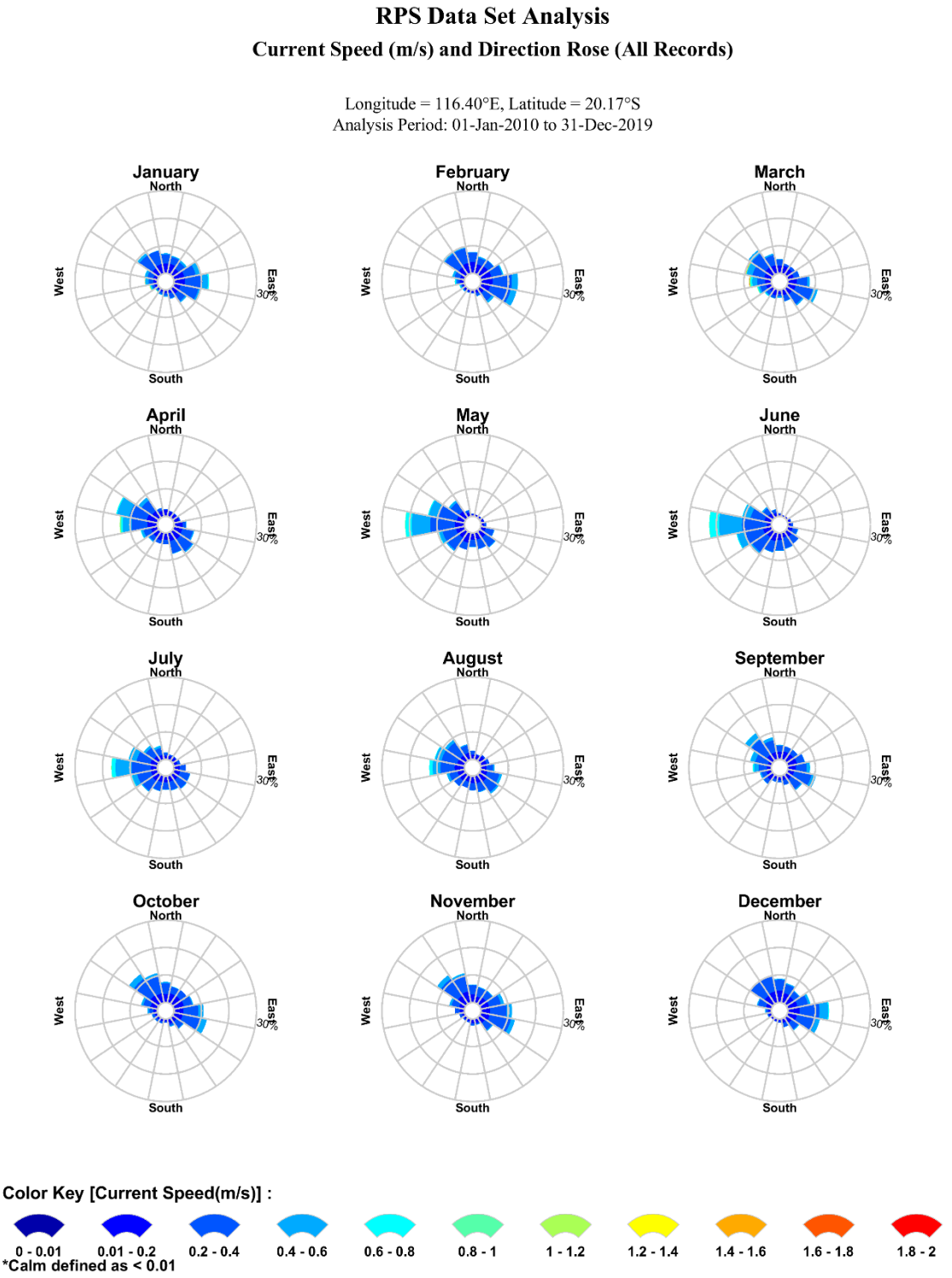


Figure 3.4 Monthly surface current rose plots adjacent to the release location, derived from the 2010 to 2019 modelled dataset.

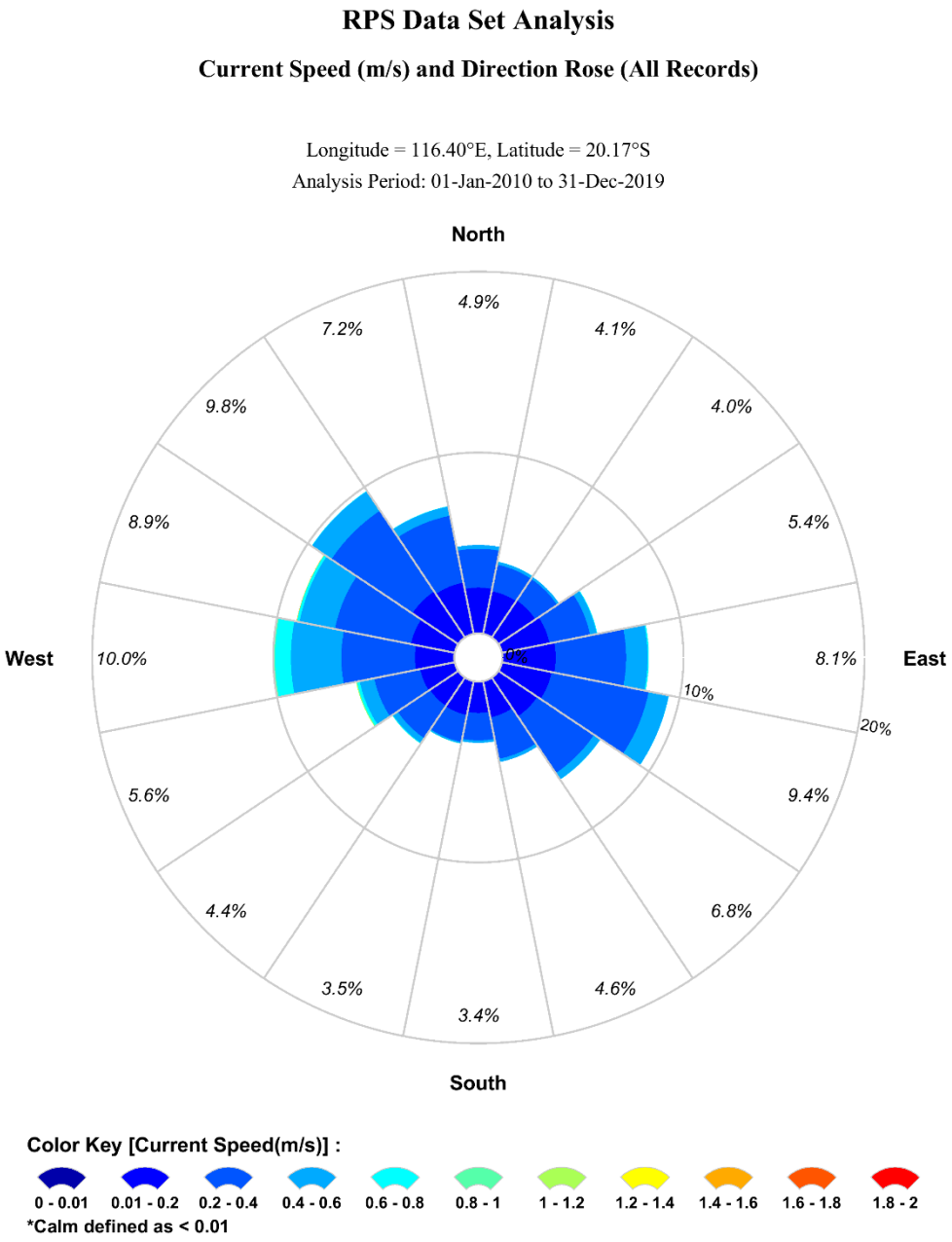


Figure 3.5 Total surface current rose plots adjacent to the release location, derived from the 2010 to 2019 modelled dataset.

4 WIND DATA

To account for the influence of the wind on the floating oil, wind data from 2010 to 2019 (inclusive) was sourced from the National Centre for Environmental Prediction (NCEP) Climate Forecast System Reanalysis (CFSR; see Saha et al., 2010). The CFSR wind model includes observations from many data sources; surface observations, upper-atmosphere air balloon observations, aircraft observations and satellite observations. The model is capable of accurately representing the interaction between the earth's oceans, land and atmosphere. The gridded wind data output is available at ¼ of a degree resolution (~33 km) and 1-hourly time intervals. Figure 4.1 shows the spatial resolution of the wind field used as input into the oil spill model.

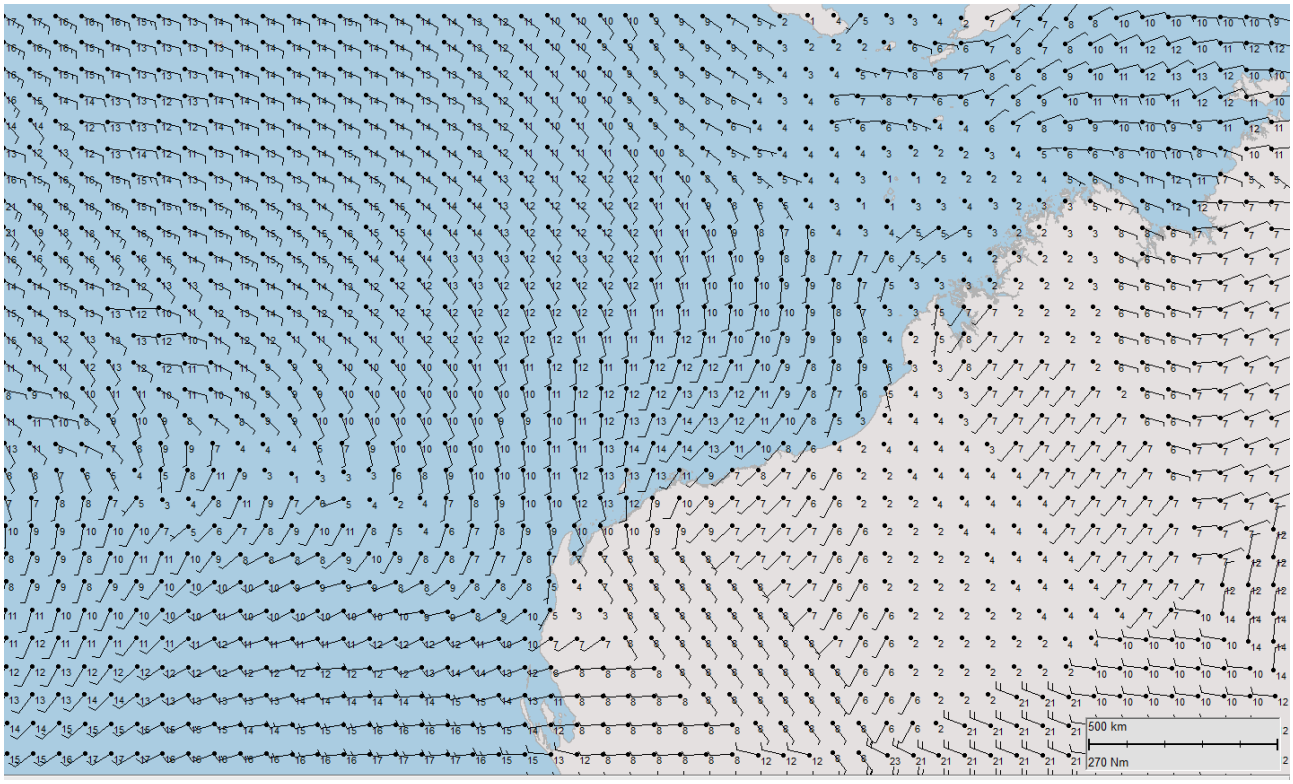


Figure 4.1 Spatial resolution of the CFSR modelled wind data used as input into the oil spill model. Note, for ease viewing only every second wind vector is displayed on the map.

Figure 4.2 and Figure 4.3 illustrate the monthly and total wind rose plots, respectively, adjacent to the release location.

Note that the atmospheric convention for defining wind direction, that is, the direction the wind blows from, is used to reference wind direction throughout this report. Each branch of the rose represents wind coming from that direction, with north to the top of the diagram. Sixteen directions are used. The branches are divided into segments of different colour, which represent wind speed ranges from that direction. Speed ranges of 5 knot intervals are typically used in these wind roses. The length of each segment within a branch is proportional to the frequency of winds blowing within the corresponding range of speeds from that direction.

The average and maximum wind speeds were 12.2 knots and 52.3 knots, respectively. Winds typically blow from the west-southwest during the summer months, while in winter, they predominantly come from the east.

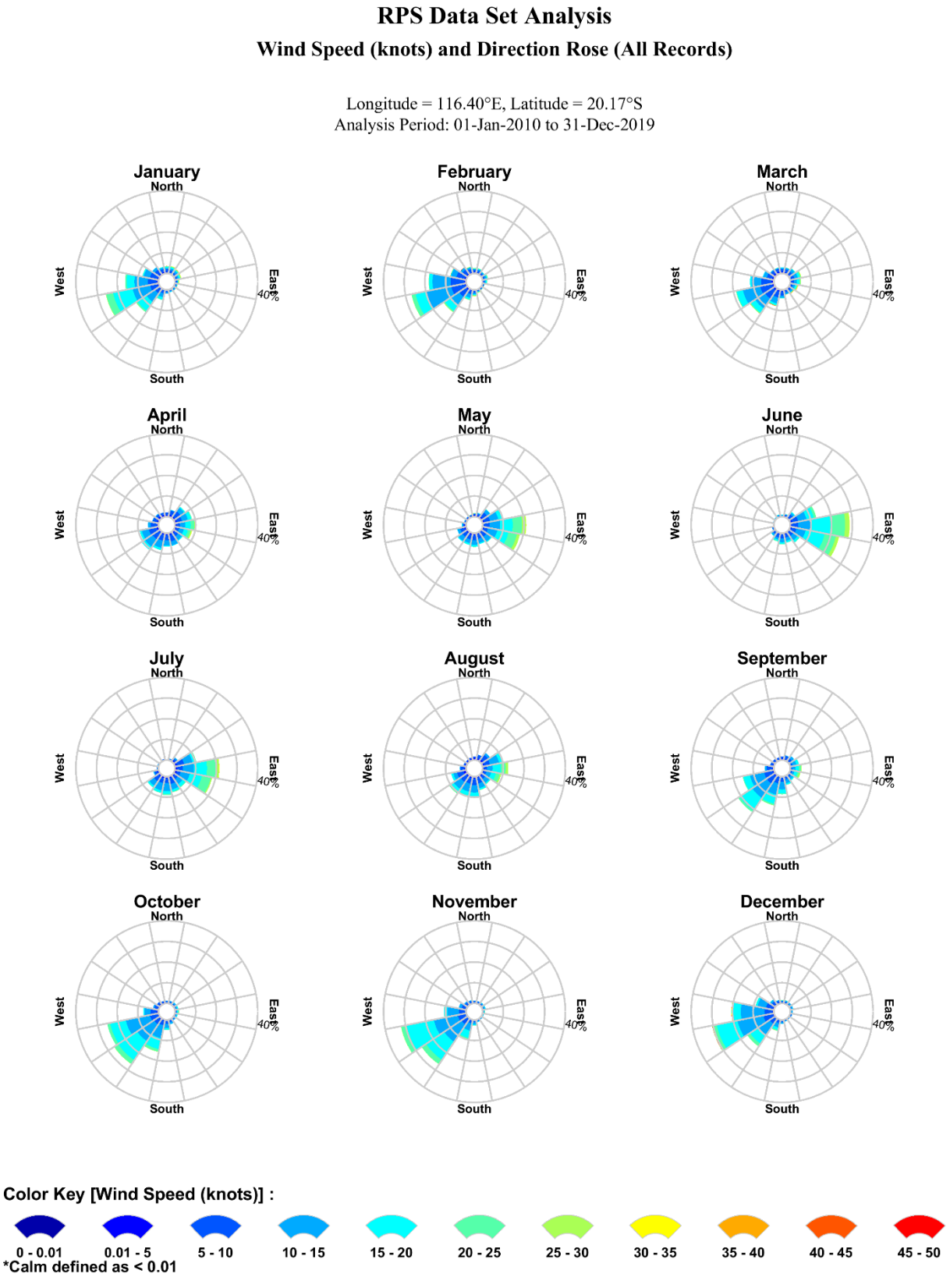


Figure 4.2 Monthly wind rose plots adjacent to the release location, derived from the 2010 to 2019 modelled dataset.

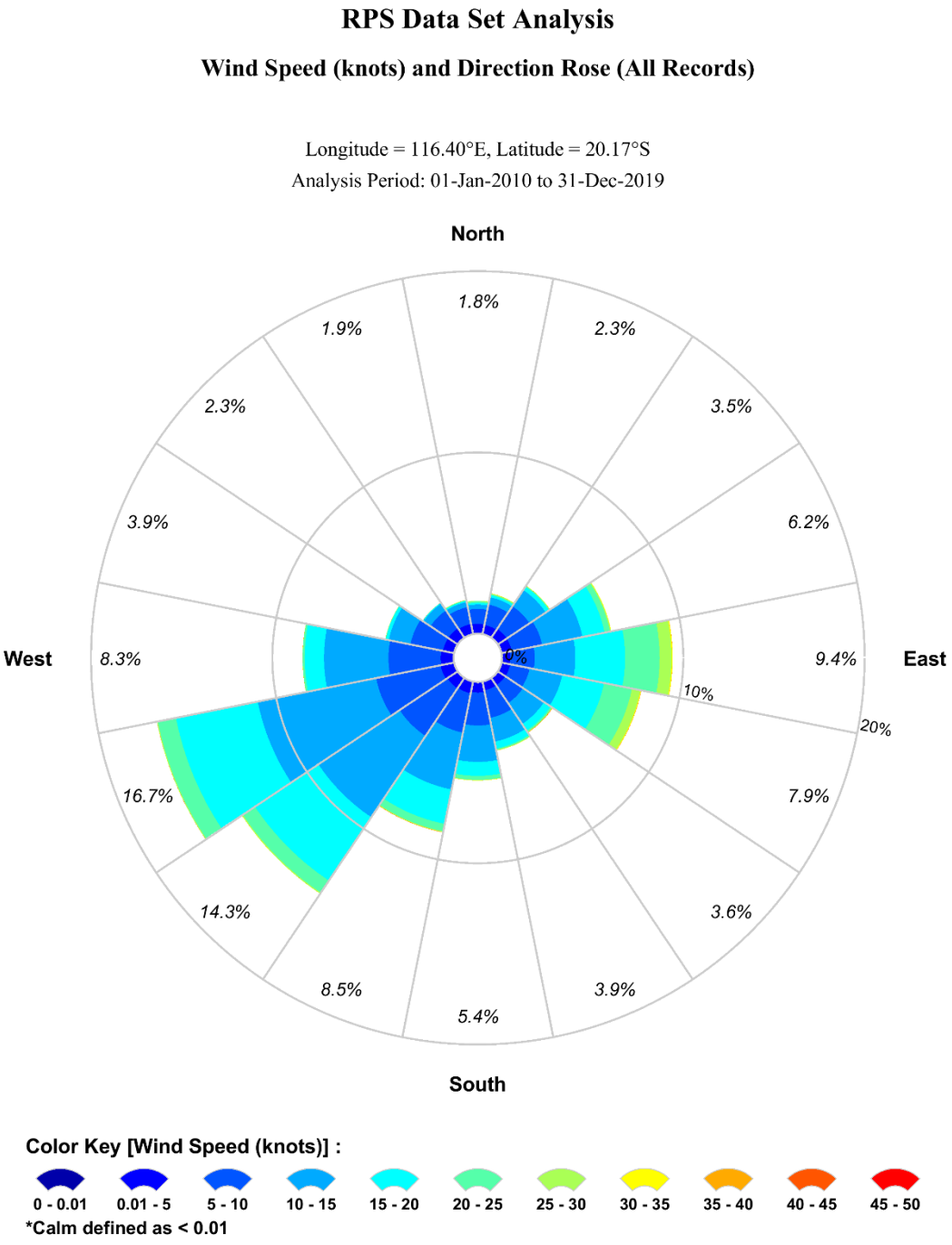


Figure 4.3 Total wind rose plot adjacent to the release location, derived from the 2010 to 2019 modelled dataset.

5 WATER TEMPERATURE AND SALINITY

The monthly depth-varying water temperature and salinity profiles for the closest point to the release location were obtained from the World Ocean Atlas 2018 database produced by the National Oceanographic Data Centre (National Oceanic and Atmospheric Administration) and its co-located World Data Center for Oceanography (Levitus et al., 2013). The data are used to inform the weathering, movement and evaporative loss of hydrocarbon spills in the surface and subsurface layers.

Table 5.1 shows that the monthly average sea surface (0-2 m depth layer) temperatures ranged from 24.0°C (September) to 29.6°C (March). Salinity remained consistent throughout the year ranging between 35.2 ppt and 35.4 ppt.

Figure 5.1 presents monthly temperature and salinity profiles throughout the water column in the vicinity of the release location.

Table 5.1 Monthly average sea surface (0-2 m depth layer) temperature and salinity in the vicinity of the release location.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Temperature (°C)	27.5	27.5	29.6	28.2	28.1	26.4	24.7	24.3	24.0	25.8	26.8	27.8
Salinity (psu)	35.3	35.3	35.2	35.2	35.4	35.4	35.2	35.2	35.2	35.2	35.3	35.2

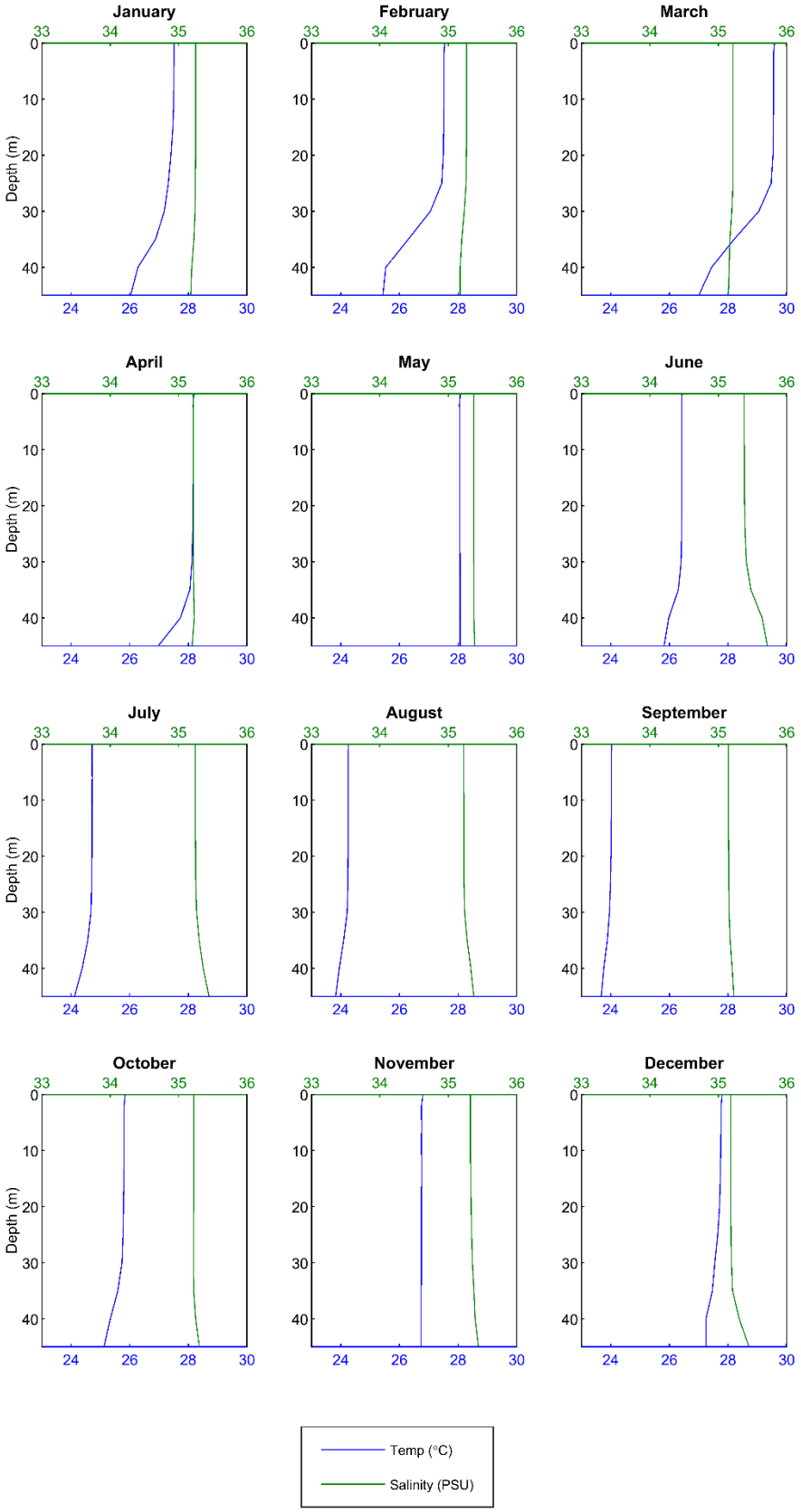


Figure 5.1 Monthly temperature and salinity profiles throughout the water column in the vicinity of the release location.

6 OIL SPILL MODEL SIMAP

The spill modelling was carried out using a purpose-developed oil spill trajectory and fates model, SIMAP (Spill Impact Model Application Package). This model is designed to simulate the transport and weathering processes that affect the outcomes of hydrocarbon spills to the sea, accounting for the specific oil type, spill scenario, and prevailing wind and current circulation patterns (French et al., 1999; French-McCay, 2003; 2004; French-McCay et al., 2004; 2021; 2022a; 2022b).

SIMAP is the evolution of the United States Environmental Protection Agency (US EPA) Natural Resource Damage Assessment model (French et al., 1999) and is designed to simulate the fate and effects of spilled oils and fuels for both the surface slick and the three-dimensional plume that is generated in the water column. SIMAP includes algorithms to account for both physical transport and weathering processes. The latter are important for accounting for the partitioning of the spilled mass over time between the water surface (surface slick), water column (entrained oil and dissolved compounds), atmosphere (evaporated compounds) and land (stranded oil). The model also accounts for the interaction between weathering and transport processes.

The physical algorithms calculate transport and spreading by physical forces, including surface tension, gravity as well as wind and current forces for both surface slicks and oil within the water column. The fates algorithms calculate all the weathering processes known to be important for oil spilled to marine waters. These include droplet and slick formation, entrainment by wave action, emulsification, dissolution of soluble components, sedimentation, evaporation, bacterial and photo-chemical decay and shoreline interactions. These algorithms account for the specific oil type being considered.

Entrainment is the physical process where globules of oil are transported from the sea surface into the water column by wind and wave-induced turbulence or be generated subsea by a pressurised discharge at depth. It has been observed that entrained oil is broken into droplets of varying sizes. Small droplets spread and diffuse into the water column, while larger ones rise rapidly back to the surface (Delvigne & Sweeney, 1988; Delvigne, 1991).

Dissolution is the process by which soluble hydrocarbons enter the water from a surface slick or from entrained droplets. The lower molecular weight hydrocarbons tend to be both more volatile and more soluble than those of higher molecular weight.

The formation of water-in-oil emulsions, or mousse, which is termed ‘emulsification’, depends on oil composition and sea state. Emulsified oil can contain as much as 80% water in the form of micrometre-sized droplets dispersed within a continuous phase of oil (Daling & Brandvik, 1991; Bobra, 1991; Daling et al., 1997; Fingas, 1995, Fingas & Fieldhouse, 2004).

Entrainment, dissolution and emulsification rates are correlated to wave energy, which is accounted for by estimating wave heights from the sustained wind speed, direction and fetch (i.e. distance downwind from land barriers) at different locations in the domain. Dissolution rates are dependent upon the proportion of soluble, short-chained hydrocarbon compounds, and the surface area at the oil/water interface of slicks. Dissolution rates are also strongly affected by the level of turbulence. For example, dissolution rates will be relatively high at the site of the release for a deep-sea discharge at high pressure.

Evaporation can result in the transfer of large proportions of spilled oil from the sea surface to the atmosphere, depending on the type of oil. Evaporation rates vary over space and time dependent on the prevailing sea temperatures, wind and current speeds, the surface area of the slick and entrained droplets that are exposed to the atmosphere as well as the state of weathering of the oil. Evaporation rates will decrease over time, depending on the calculated rate of loss of the more volatile compounds. By this process, the model can differentiate between the fates of different oil types.

Decay (degradation) of hydrocarbons may occur as the result of photolysis, which is a chemical process energised by ultraviolet light from the sun, and by biological breakdown, termed biodegradation. Many types of marine organisms ingest, metabolise and utilise oil as a carbon source, producing carbon dioxide and water as by-products.

The SIMAP weathering algorithms include terms to represent these dynamic processes. Technical descriptions of the algorithms used in SIMAP and validations against real spill events are provided in French et al., (1999) and French-McCay (2004).

Input specifications for oil types include density, viscosity, pour-point, distillation curve (volume of oil distilled off versus temperature) and the aromatic/aliphatic component ratios within given boiling point ranges. The model calculates a distribution of the oil by mass into the following components:

- Surface-bound or floating oil;
- Entrained oil (non-dissolved oil droplets that are physically entrained by wave action);
- Dissolved hydrocarbons (principally the aromatic and short-chained aliphatic compounds);
- Evaporated hydrocarbons;
- Sedimented hydrocarbons; and
- Decayed hydrocarbons.

7 THRESHOLDS

The SIMAP model will track oil concentrations to very low levels. Hence, it is useful to define meaningful threshold concentrations for the recording of contact by oil components and determining the probability of exposure at a location (calculated from the number of replicate simulations in which this contact occurred).

The judgement of meaningful levels is complicated and will depend upon the mode of action, sensitivity of the biota contacted, the duration of the contact and the toxicity of the compounds that are represented in the oil. The latter factor is further complicated by the change in the composition of an oil type over time due to weathering processes. Without specific testing of the oil types, at different states of weathering against a wide range of the potential local receptors, such considerations are beyond the scope of this investigation.

It is important to note that the thresholds herein are based on the thresholds outlined in the NOPSEMA Oil Spill Modelling Bulletin (NOPSEMA, 2019), which are summarised in Table 7.1. Their relationship to exposure for the sea surface, shoreline, and water column (entrained and dissolved hydrocarbons) are presented in Sections 7.1 to 7.3. Supporting justifications of the adopted thresholds applied during the study and additional context relating to the area of exposure are also provided.

Table 7.1 Summary of the thresholds applied in this study.

Floating Oil Concentration (g/m^2)	Shoreline Oil Accumulation (g/m^2)	Entrained Hydrocarbons Concentration (ppb)	Instantaneous Dissolved Hydrocarbons (ppb)
1	10	10	10
10	100	100	50
50	1,000		400

7.1 Floating Oil

Floating oil concentrations are relevant to describing the risks of oil coating emergent reefs, vegetation in the littoral zone and shoreline habitats, as well as the risk to wildlife found on the water surface, such as marine mammals, reptiles, and birds. Floating oil is also visible at relatively low concentrations (> ~0.05 g/m^2). Hence, the area affected by visible oil, which might trigger social or economic impacts, will be larger than the area where biological impacts might be expected.

The low threshold for floating oil exposure was set to 1 g/m^2, which equates approximately to an average thickness of 1 µm. It represents the practical limit of observing hydrocarbon sheens in the marine environment. This threshold is considered below levels which would cause environmental harm and is more indicative of the areas perceived to be affected due to its visibility on the sea-surface and potential to trigger temporary closures of areas (i.e., fishing grounds) as a precautionary measure.

Oil of this thickness is described as rainbow sheen in appearance, according to the Bonn Agreement Oil Appearance Code (Bonn Agreement, 2009; AMSA, 2014) (see Table 7.2). Figure 7.1 shows photographs highlighting the difference in appearance between a silvery sheen, rainbow sheen and metallic sheen.

Ecological impact has been estimated to occur at 10 g/m^2 (a film thickness of approximately 10 µm or 0.01 mm) (French et al.,1996; French-McCay 2009) as this level of fresh oiling has been observed to mortally impact some birds through adhesion of oil to their feathers, exposing them to secondary effects such as hypothermia. The appearance of oil at this average thickness has been described as a metallic sheen (Bonn Agreement, 2009). Concentrations above 10 g/m^2 are also considered the lower actionable threshold, where oil may be thick enough for containment and recovery as well as dispersant treatment (AMSA, 2023).

Oil concentrations on the sea surface of 25 g/m^2 (or greater) would be harmful for all birds that have landed in an oil film due to potential contamination of their feathers, with secondary effects such as loss of temperature regulation and ingestion of oil through preening (Scholten et al., 1996; Koops et al., 2004). The appearance of oil at this thickness is also described as metallic sheen (Bonn Agreement, 2009). For this study the high exposure threshold was set to 50 g/m^2 and above based on NOPSEMA (2019). This threshold can also be used to inform response planning. Table 7.3 is a summary of each threshold.

Table 7.2 The Bonn Agreement Oil Appearance Code.

Code	Description Appearance	Layer Thickness Interval (g/m^2 or µm)	Litres per km^2
1	Sheen (silvery/grey)	0.04 – 0.30	40 – 300
2	Rainbow	0.30 – 5.0	300 – 5,000
3	Metallic	5.0 – 50	5,000 – 50,000
4	Discontinuous True Oil Colour	50 – 200	50,000 – 200,000
5	Continuous True Oil Colour	≥ 200	≥ 200,000

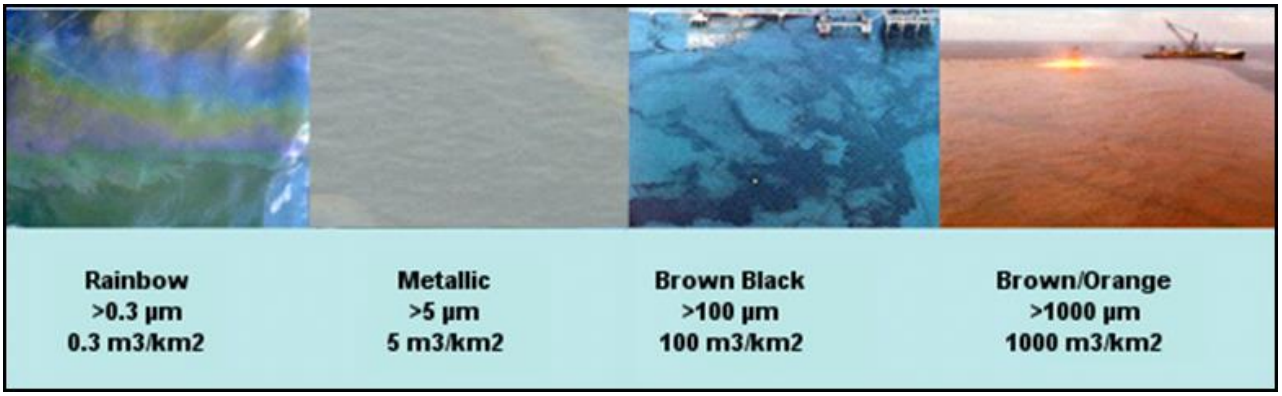


Figure 7.1 Photographs showing the difference between oil colour and thickness on the sea surface (source: adapted from Oil Spill Solutions, 2015).

Table 7.3 Floating oil exposure thresholds used in the oil spill modelling study (in alignment with NOPSEMA, 2019).

Threshold level	Floating oil (g/m^2)	Description
Low	1	Approximates range of socio-economic effects and establishes planning area for scientific monitoring
Moderate	10	Approximates lower limit for harmful exposures to birds and marine mammals
High	50*	Approximates surface oil slick and informs response planning

* 50 g/m^2 also used to define the threshold for actionable floating oil.

7.2 Shoreline Oil Accumulation

There are many different types of shorelines, ranging from cliffs, rocky beaches, sandy beaches, mud flats and mangroves, and each of these influences the volume of oil that can remain stranded ashore and its thickness before the shoreline saturation point occurs. For instance, a sandy beach may allow oil to percolate through the sand, thus increasing its ability to hold more oil ashore over tidal cycles and various wave actions than an equivalent area of water; hence oil can increase in thickness onshore over time. A sandy beach shoreline was assumed as the default shoreline type for the modelling in this study, as it allows for the highest carrying capacity of oil (of the available open/exposed shoreline types).

In, previous risk assessment studies, a threshold of 10 g/m^2 was used to assess the potential for shoreline accumulation (French-McCay et al.,2005a; 2005b). This is a conservative threshold used to define regions of socio-economic impact, such as triggering temporary closures of adjoining fisheries or the need for shore clean-up on beaches or man-made features/amenities (breakwaters, jetties, marinas, etc.). It would equate

to approximately 2 teaspoons of hydrocarbon per square meter of shoreline accumulation. The appearance is described as a stain/film. On that basis, the 10 g/m^2 has been selected to define the low threshold.

French et al. (1996) and French-McCay (2009) define a shoreline oil accumulation threshold of 100 g/m^2, or above, would potentially harm shorebirds and wildlife (fur-bearing aquatic mammals and marine reptiles on or along the shore) based on studies for sub-lethal and lethal impacts. This threshold has been used in previous environmental risk assessment studies (see French-McCay, 2003; French-McCay et al., 2004, French-McCay et al., 2011; 2012; NOAA, 2013). Additionally, this threshold is also recommended in AMSA's foreshore assessment guide as the acceptable minimum thickness that does not inhibit the potential for recovery and is best remediated by natural coastal processes alone (AMSA, 2023). This threshold equates to approximately ½ a cup of oil per square meter of shoreline accumulation and is described as a thin oil coat. The 100 g/m^2 has been selected to define the moderate threshold.

Observations by Lin & Mendelssohn (1996) demonstrated that loadings of more than 1,000 g/m^2 of hydrocarbon during the growing season would be required to impact marsh plants significantly. Similar thresholds have been found in studies assessing hydrocarbon impacts on mangroves (Grant et al., 1993; Suprayogi & Murray, 1999). This loading equates to approximately 1 litre of hydrocarbon per square meter of shoreline accumulation and the appearance is described as a hydrocarbon cover. A loading of 1,000 g/m^2 has been selected to define high threshold.

Table 7.4 is a summary of each threshold.

Table 7.4 Shoreline accumulation thresholds used in oil spill modelling study (in alignment with NOPSEMA, 2019).

Threshold level	Shoreline loading(g/m^2)	Description
Low	10	Predicts potential for some socio-economic impact
Moderate	100*	Loading predicts area likely to require clean-up effort
High	1,000	Loading predicts area likely to require intensive clean-up effort

* 100 g/m^2 also used to define the threshold for actionable shoreline oil.

7.3 In-water

Oil is a mixture of thousands of hydrocarbons of varying physical, chemical, and toxicological characteristics, and therefore, demonstrates varying fates and impacts on organisms. As such, for in-water exposure, the SIMAP model provides separate outputs for dissolved and entrained hydrocarbons from oil droplets. The consequences of exposure to dissolved and entrained components will differ because they have different modes and magnitudes of effect.

Entrained hydrocarbon concentrations were calculated based on oil droplets that are suspended in the water column, though not dissolved. The composition of this oil would vary with the state of weathering (oil age) and may contain soluble hydrocarbons when the oil is fresh. Calculations for dissolved hydrocarbons specifically calculates oil components which are dissolved in water, which are known to be the primary source of toxicity exerted by oil.

A complicating factor that should be considered when assessing the consequence of dissolved and entrained oil distributions is that there will be some areas where both physically entrained oil droplets and dissolved hydrocarbons co-exist. Higher concentrations of each will tend to occur close to the source where sea conditions can force mixing of relatively unweathered oil into the water column, resulting in more rapid dissolution of soluble compounds.

7.3.1 Dissolved Hydrocarbons

Laboratory studies have shown that dissolved hydrocarbons exert most of the toxic effects of oil on aquatic biota (Carls et al., 2008; Nordtug et al., 2011; Redman, 2015). The mode of action is a narcotic effect, which is positively related to the concentration of soluble hydrocarbons in the body tissues of organisms (French-McCay, 2002). Dissolved hydrocarbons are taken up by organisms directly from the water column by absorption through external surfaces and gills, as well as through the digestive tract. Thus, soluble hydrocarbons are termed “bioavailable”.

Hydrocarbon compounds vary in water-solubility and the toxicity exerted by individual compounds is inversely related to solubility, however bioavailability will be modified by the volatility of individual compounds (Nirmalakhandan & Speece, 1988; Blum & Speece, 1990; McCarty, 1986; McCarty et al., 1992a; 1992b; McCarty & Mackay, 1993; Verhaar et al., 1992; 1999; Swartz et al., 1995; French-McCay, 2002; McGrath & Di Toro, 2009). Of the soluble compounds, the greatest contributor to toxicity for water-column and benthic organisms are the lower-molecular-weight aromatic compounds, which are both volatile and soluble in water. Although they are not the most water-soluble hydrocarbons within most oil types, the polynuclear aromatic hydrocarbons (PAHs) containing 2 – 3 aromatic ring structures typically exert the largest narcotic effects because they are semi-soluble and not highly volatile, so they persist in the environment long enough for significant accumulation to occur (Anderson et al., 1974; 1987; Neff & Anderson, 1981; Malins & Hodgins, 1981; McAuliffe, 1987; NRC, 2003). The monoaromatic hydrocarbons (MAHs), including the BTEX compounds (benzene, toluene, ethylbenzene, and xylenes), and the soluble alkanes (straight chain hydrocarbons) also contribute to toxicity, but these compounds are highly volatile, so that their contribution will be low when oil is exposed to evaporation and higher when oil is discharged at depth where volatilisation does not occur (French-McCay, 2002).

French-McCay (2002) reviewed available toxicity data, where marine biota was exposed to dissolved hydrocarbons prepared from oil mixtures, finding that 95% of species and life stages exhibited 50% population mortality (LC_{50}) between 6 and 400 ppb (with an average of 50 ppb) total PAH concentration after 96 hrs exposure. Therefore, concentrations lower than 6 ppb total PAH value should be protective of 97.5% of species and life stages even with exposure periods of days (at least 96 hours). Early life-history stages of fish appear to be more sensitive than older fish stages and invertebrates.

Exceedances of 10, 50 or 400 ppb over a 1-hour timestep (see Table 7.5) were applied in this study to indicate the increasing potential for sub-lethal to lethal toxic effects (or low to high), based on NOPSEMA (2019).

7.3.2 Entrained Hydrocarbons

Entrained hydrocarbons consist of oil droplets that are suspended in the water column and insoluble. Insoluble compounds in oil cannot be absorbed from the water column by aquatic organisms, therefore they are not bioavailable through absorption of compounds from the water. Exposure to these compounds would require routes of uptake other than absorption of soluble compounds. The route of exposure of organisms to whole oil alone include direct contact with tissues of organisms and uptake of oil by direct consumption, with potential for biomagnification through the food chain (NRC, 2003).

Thresholds of 10 ppb and 100 ppb were applied over a 1-hour time exposure (Table 7.5) as per NOPSEMA (2019).

The 10-ppb threshold exposure zone is not considered to be of significant biological impact and is therefore outside the adverse exposure zone. This exposure zone represents the area contacted by the spill.

Table 7.5 Dissolved and entrained hydrocarbon exposure thresholds assessed over a 1-hour time step used in the oil spill modelling study (in alignment NOPSEMA, 2019).

	Exposure level	In-water threshold (ppb)	Description
Dissolved hydrocarbons	Low	10	Establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers
	Moderate	50	Approximates potential toxic effects, particularly sublethal effects to sensitive species
	High	400	Approximates toxic effects including lethal effects to sensitive species
Entrained hydrocarbons	Low	10	Establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers
	Moderate	100	As appropriate given oil characteristics for informing risk evaluation

7.4 Dispersion Coefficients and Mixed Layer Depth

A horizontal dispersion coefficient of 10 m^2/s was used to account for dispersive processes acting on the floating oil on the sea surface that are below the scale of resolution of the current data and is based on typical values for open waters (Okubo, 1971).

A vertical dispersion coefficient (*Dv)* of 91 cm^2/s was used to represent the turbulent mixing and diffusion processes in the wave-mixed layer in the upper water column. It is a site-specific value computed using the 50^{th} percentile wind speed of approximately 12 knots at the operational area derived from the 10-year dataset (at 10 m above the sea surface, W_{10}) based on French-McCay (2004).

The mixed layer depth corresponds to the top layer of the water column, where vertical mixing is strong enough to cause uniform temperature and salinity, and is influenced by factors such as wind, ocean currents and waves. The 50^{th} percentile value at the site was calculated using Copernicus' 10 years (2010 to 2019) monthly averaged mixed layer depth data and was found to be 20 m.

8 OIL PROPERTIES

Table 8.1 and Table 8.2 present the physical properties and boiling point ranges of Wandoo crude and MDO used for Scenario 1 and Scenario 2 modelling, respectively.

Wandoo crude has a density of 937.0 kg/m^3 at 16ºC (API of 19.4) and a low pour point of -24°C, which ensures that this crude will remain in a liquid state over the annual temperature range observed on the North West Shelf. It is also low in wax content, typical of a biodegraded oil.

Generally, <2% of the crude should evaporate within the first 12 hours (Boiling point (BP) < 180°C); a further 10.2% is expected to evaporate within the first 24 hours (180°C < BP < 265°C); and an additional 33.1% should evaporate over several weeks (265°C < BP < 380°C). Additionally, 55% (by mass) of the crude will not evaporate, decaying slowly over time. It is categorised as a Group IV (or persistent) oil according to oil classifications by AMSA (2023). The classification is based on the specific gravity of hydrocarbons in combination with relevant boiling point ranges.

The MDO has a density of 890.0 kg/m^3 at 15ºC (API of 27.5) and a low pour point of -9.0°C. The low viscosity (14.0 cP at 25ºC) indicates that this oil will spread quickly when released and will form a thin to low thickness film on the sea surface, increasing the rate of evaporation. Generally, about 4% of the MDO mass should evaporate within the first 12 hours (Boiling point (BP) < 180°C); a further 32.0% should evaporate within the first 24 hours (180°C < BP < 265°C); and an additional 54.0% should evaporate over several days (265°C < BP < 380°C). Approximately 10% (by mass) of MDO will not evaporate, though will decay slowly over time. It is categorised as a Group II oil (light-persistent) according to the AMSA (2023) classifications.

It's noteworthy that the heavier components of the Wandoo crude and MDO, specifically the low volatile and persistent (residual) portions (i.e., ~88% and 64%, respectively), will have a strong tendency to become entrained into the water column in the presence of winds speeds above 7 knots and in turn breaking waves, however, it can re-surface under calm conditions (less than 7 knots).

Table 8.1 Physical properties for Wandoo crude and MDO.

Properties	Wandoo Crude	MDO
Density (kg/m^3)	937 (at 16 °C)	890.0 (at 15 °C)
API	19.4	27.5
Dynamic viscosity (cP)	161 (at 25 °C)	14.0 (at 25 °C)
Pour point (°C)	-24	-9.0
Hydrocarbon property category	Group IV	Group II
Hydrocarbon property classification	Persistent	Light persistent

Table 8.2 Boiling point ranges for Wandoo crude and MDO.

Characteristic Oil Type	Volatiles (%)	Semi-volatiles (%)	Low Volatiles (%)	Residual (%)
Boiling point (°C)	< 180	180-265	265-380	> 380
	Non persistent			Persistent
Wandoo crude	1.7	10.2	33.1	55.0
MDO	4.0	32.0	54.0	10.0

8.1 Weathering Characteristics

8.1.1 Wandoo crude

A series of weathering tests were conducted to illustrate the potential behaviour following a 50 m^3 instantaneous surface release of Wandoo crude when exposed to:

- 5 knot (2.6 m/s) constant wind speed, 27°C water temperature and currents; and
- Variable wind speeds (1 – 12 m/s or 2 to 24 knots), 27°C water temperature and currents.

The first case is indicative of the potential weathering rates under calm conditions that would not generate entrainment, while the second case would be more representative of the moderate winds experienced over the region.

The mass balance forecast for the constant wind case (Figure 8.1) shows that 13.0% of the crude is predicted to evaporate within 24 hours. The remaining hydrocarbon on the water surface will weather at a slower rate and be subject to more gradual decay through biological and photochemical processes.

In the variable wind speeds test (Figure 8.2), characterised by stronger average winds and breaking waves, there is an increased entrainment of the crude into the water column. Approximately 24 hours into the spill, the forecast indicates that 3.2% of the crude will have evaporated, with additional 93.9% expected to have entrained. Hence, less than 1% of floating oil remains on the water surface 24 hours into the spill.

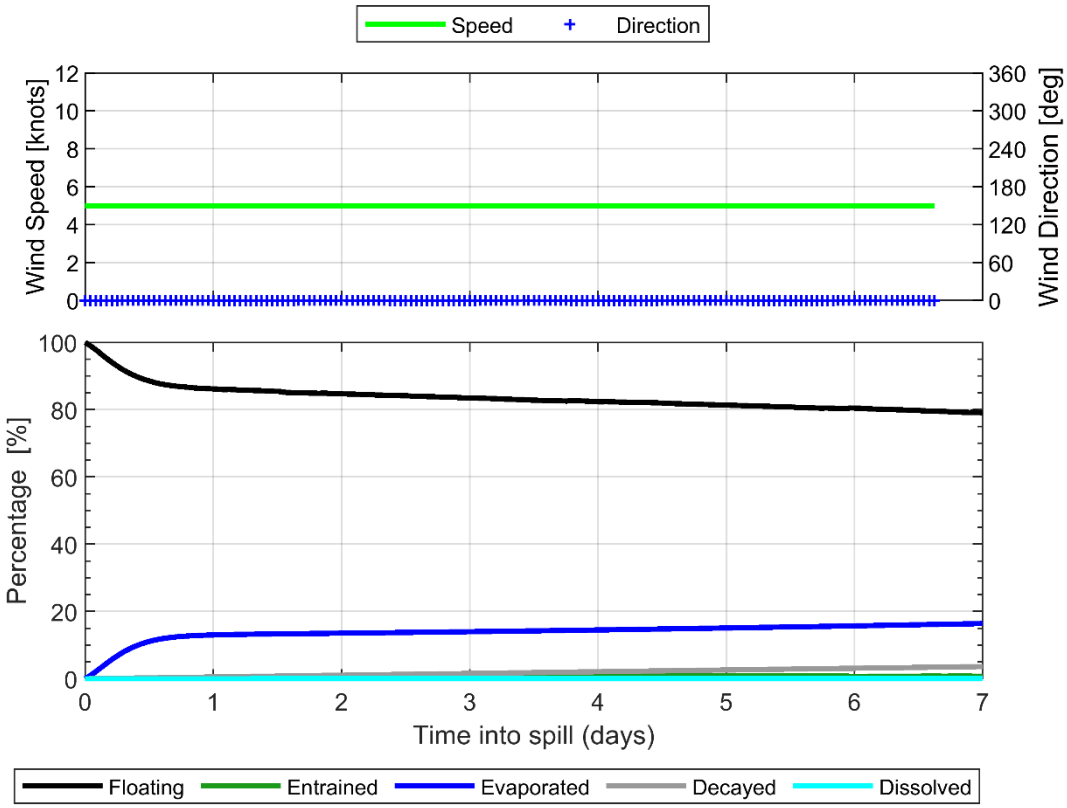


Figure 8.1 Mass balance plot for an instantaneous 50 m^3 surface release of Wandoo crude subjected to a constant 5 knot (2.6 m/s) wind, currents and 27°C water temperature.

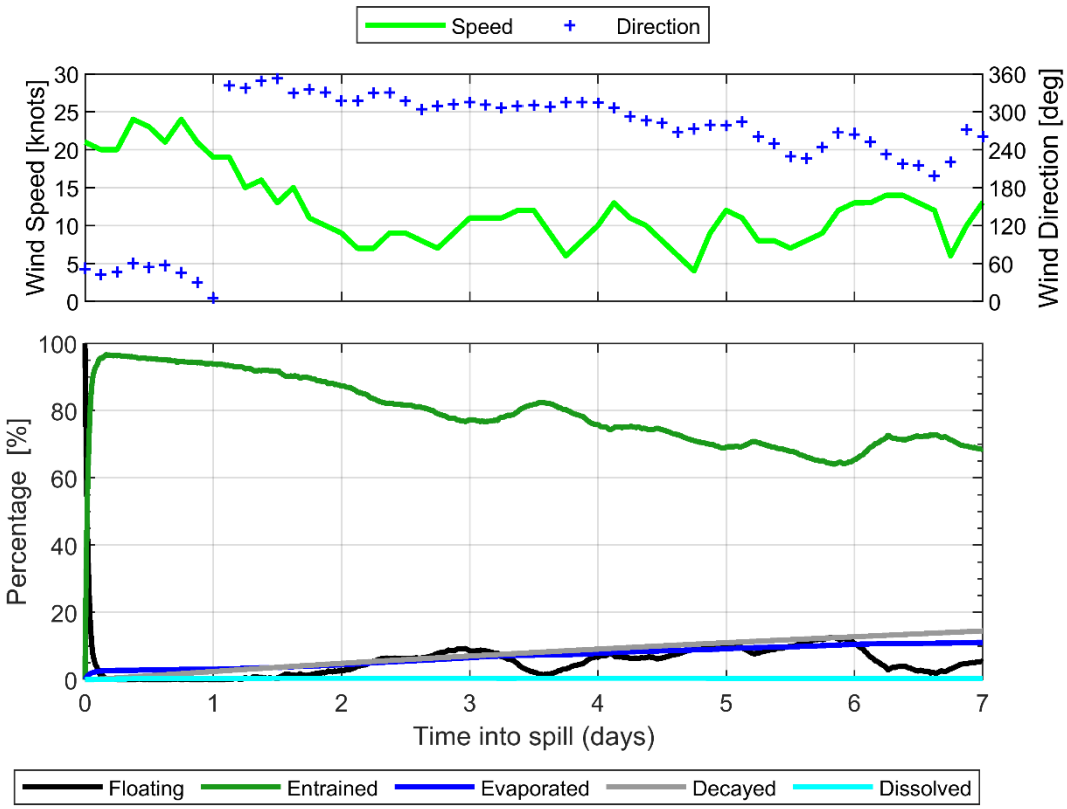


Figure 8.2 Mass balance plot for an instantaneous 50 m³ surface release of Wandoo crude subjected to variable wind speeds (1 – 12 m/s or 2 to 24 knots), currents and 27°C water temperature.

8.1.2 Marine Diesel Oil

A series of weathering tests were conducted to illustrate the potential behaviour following a 50 m³ instantaneous surface release of MDO when exposed to:

- 5 knot (2.6 m/s) constant wind speed, 27°C water temperature and currents; and
- Variable wind speeds (1 – 12 m/s or 2 to 23 knots), 27°C water temperature and currents.

The first case is indicative of the potential weathering rates under calm conditions that would not generate entrainment, while the second case would be more representative of the moderate winds experienced over the region.

The mass balance forecast for the constant wind case (Figure 8.1) shows that 36.1% of the MDO is predicted to evaporate within 24 hours. The remaining MDO on the water surface will weather at a slower rate and be subject to more gradual decay through biological and photochemical processes.

For the variable wind speed case (Figure 8.2), after 24 hours, 80.5% of the mass of MDO will have entrained, with an additional 15.0% expected to have evaporated. Hence, only a <1% of floating oil remains on the water surface. The low volatile and residual compounds are anticipated to entrain beneath the surface under conditions generating wind waves (winds approximately > 6 m/s). While the MDO is entrained, it is forecast to decay at a higher rate of 3% per day or 21% after 7 days, attributed to biological and photochemical degradation. This contrasts with a rate of 0.14% per day and a total of ~1% after 7 days for the constant-wind case. Given the proportion of entrained MDO and its tendency to remain mixed in the water column, the remaining hydrocarbons are expected to undergo decay over several weeks.

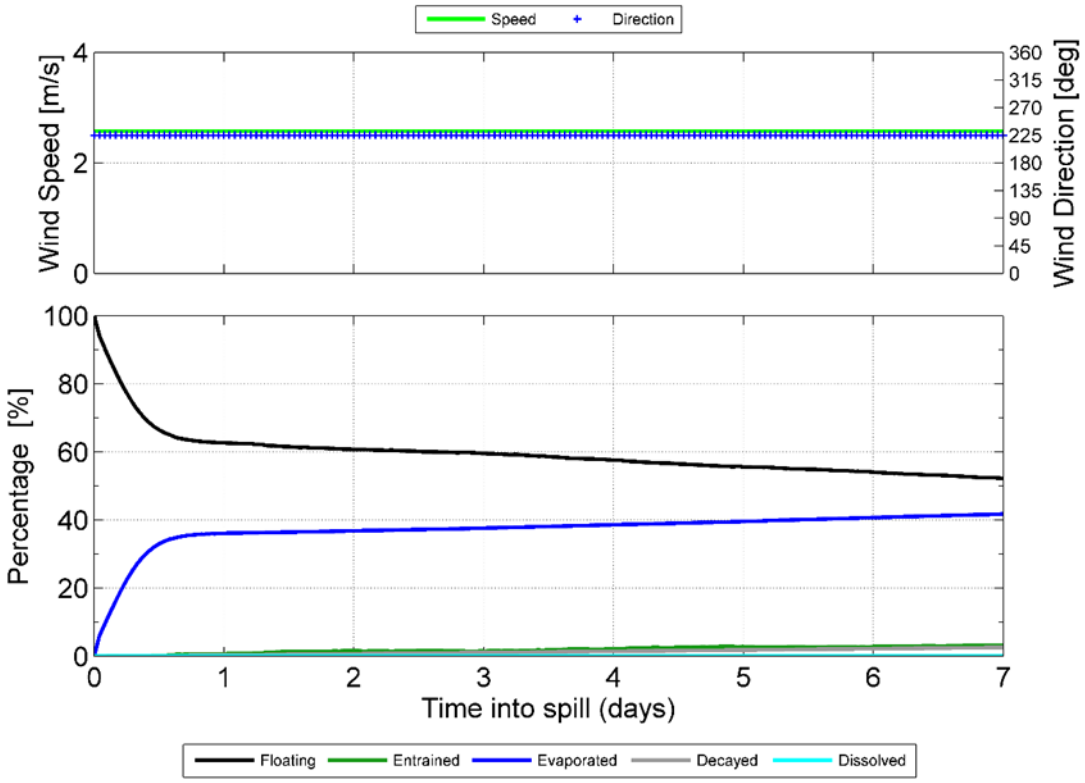


Figure 8.3 **Mass balance plot for an instantaneous 50 m^3 surface release of MDO subjected to a constant 5 knot (2.6 m/s) wind, currents and 27°C water temperature.**

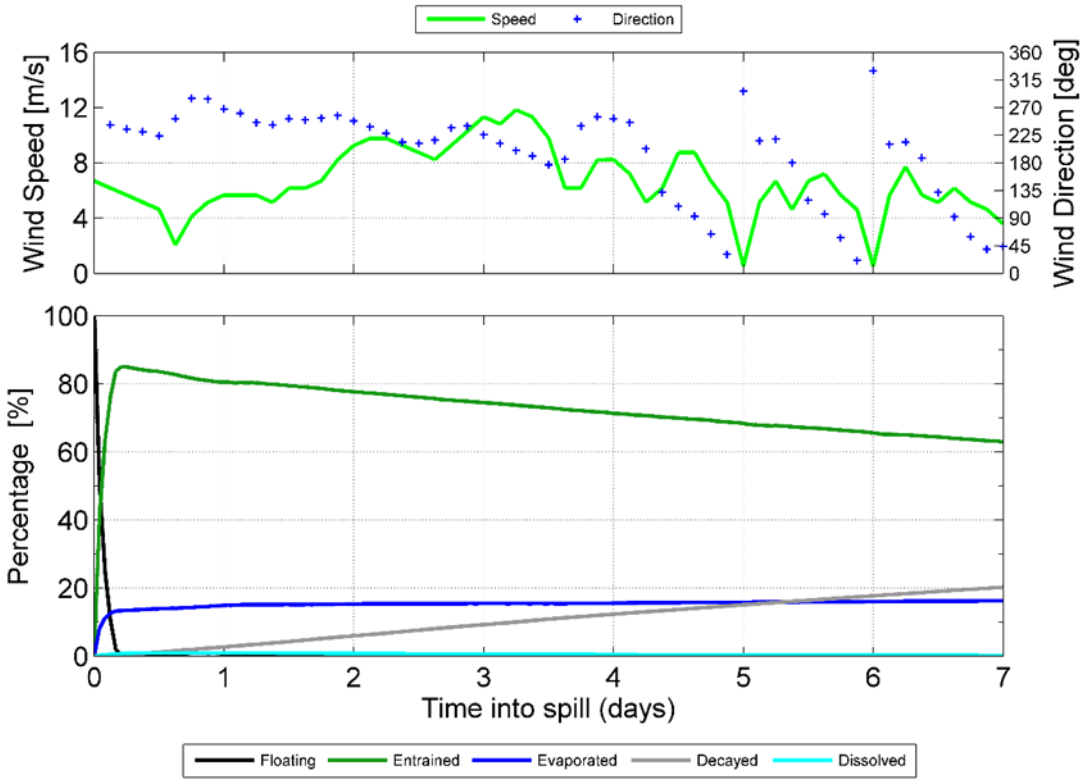


Figure 8.4 **Mass balance plot for an instantaneous 50 m^3 surface release of MDO subjected to variable wind speeds of 2 to 23 knots (1 – 12 m/s), currents and 27°C water temperature.**

9 RECEPTORS

A comprehensive receptor database was compiled from multiple sources to evaluate floating oil exposure, in-water column exposure (entrained and dissolved hydrocarbons), and shoreline oil accumulation. These sources include:

- Protected Matters Search Tool (PMST) from Department of Climate Change, Energy, the Environment and Water (https://pmst.awe.gov.au);
- Shoreline cells from the Western Australia Marine Oil Pollution Risk Assessment Protection Priorities (https://www.transport.wa.gov.au/imarine/preparedness-response-resources.asp); and
- Additional receptors, such as Habitat Critical to Turtles from Department of Climate Change, Energy, the Environment and Water (https://fed.dcceew.gov.au).

Table 9.1 summarises the receptors assessed for hydrocarbon exposure and presented in the report. Key receptor categories are presented in Figure 9.1 to Figure 9.19. Exposure risks were calculated separately for each receptor, and results are presented only for those receptors predicted to be exposed at, or above, the minimum thresholds. Additionally, exposure within Western Australian State Waters (WA State Waters) and Northern Territory Waters (NT Waters) was included as part of the study.

Table 9.1 Summary of receptors assessed for floating oil exposure, in-water column exposure (entrained and dissolved hydrocarbons), and shoreline oil accumulation. Results for these receptors have been presented.

Receptor Category	Acronym	Source	Hydrocarbon Exposure Assessment		
			Water Column	Floating oil	Shoreline
Australian Marine Park	AMP	https://pmst.awe.gov.au	✓	✓	×
Exclusive Economic Zone	EEZ	http://www.marineregions.org	✓	✓	×
Indigenous Protected Area	IPA	https://pmst.awe.gov.au	✓	✓	×
Key Ecological Feature	KEF	https://pmst.awe.gov.au	✓	✓	×
Management Agreement Area	MAA	https://pmst.awe.gov.au	✓	✓	×
Marine Park	MP	https://pmst.awe.gov.au	✓	✓	×
National Parks	NP	https://pmst.awe.gov.au	✓	✓	×
Nature Reserve	NR	https://pmst.awe.gov.au	✓	✓	×
Ramsar wetland	Ramsar	https://pmst.awe.gov.au	✓	✓	×
Reefs, Shoals and Banks	RSB	Digital nautical charts	✓	✓	×
State and Territory Waters	State and Territory Waters	https://www.ga.gov.au/scientific-topics/marine/jurisdiction	✓	✓	×
Western Australia Marine Oil Pollution Risk Assessment Protection Priorities (WAMOPRA)	Shoreline cells	http://www.transport.wa.gov.au	×	×	✓

Additionally, Table 9.2 lists other receptor categories that were assessed but not presented in the report for conciseness. However, these can be provided upon request if needed.

Table 9.2 Summary of receptors assessed for floating oil exposure, in-water column exposure (entrained and dissolved hydrocarbons), and shoreline oil accumulation. Results for these receptors have not been presented but can be provided upon request.

Receptor Category	Acronym	Source	Hydrocarbon Exposure Assessment		
			Water Column	Floating oil	Shoreline
5(1)(g) Reserve	S5G	https://pmst.awe.gov.au	✓	✓	×
5(1)(h) Reserve	S5H	https://pmst.awe.gov.au	✓	✓	×
Commonwealth Herritage Place Historic	CHPH	https://pmst.awe.gov.au	✓	✓	×
Commonwealth Herritage Place Natural	CHPN	https://pmst.awe.gov.au	✓	✓	×
Conservation Park	CP	https://pmst.awe.gov.au	✓	✓	×
Fish Habitat Protected Area	FHPA	https://pmst.awe.gov.au	✓	✓	×
Habitat Critical to Turtles	TUR	https://fed.dcceew.gov.au	✓	✓	×
Indigenous Cultural Heritage - WA	ICH	https://catalogue.data.wa.gov.au/dataset	✓	✓	×
Integrated Marine and Coastal Regionalisation of Australia (Meso-scale)	IMCRA	https://pmst.awe.gov.au	✓	✓	×
Nationally Important Wetlands	NIW	https://pmst.awe.gov.au	✓	✓	×
Shipwreck Protection Zones	SPZ	https://pmst.awe.gov.au	✓	✓	×
World Heritage Properties (Australia Only)	WHP	https://pmst.awe.gov.au	✓	✓	×

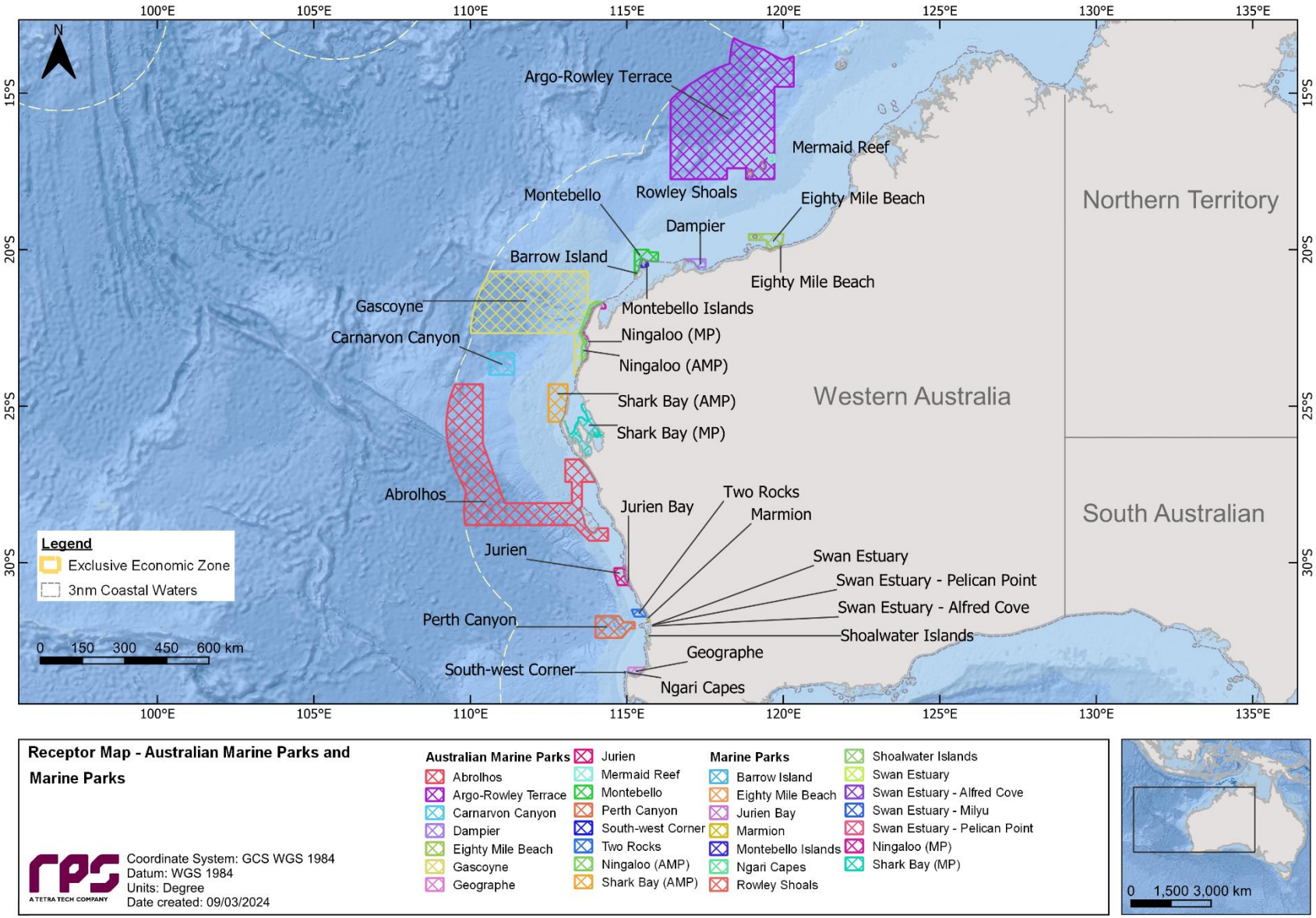


Figure 9.1 Receptor map for Australian Marine Parks and Marine Parks.

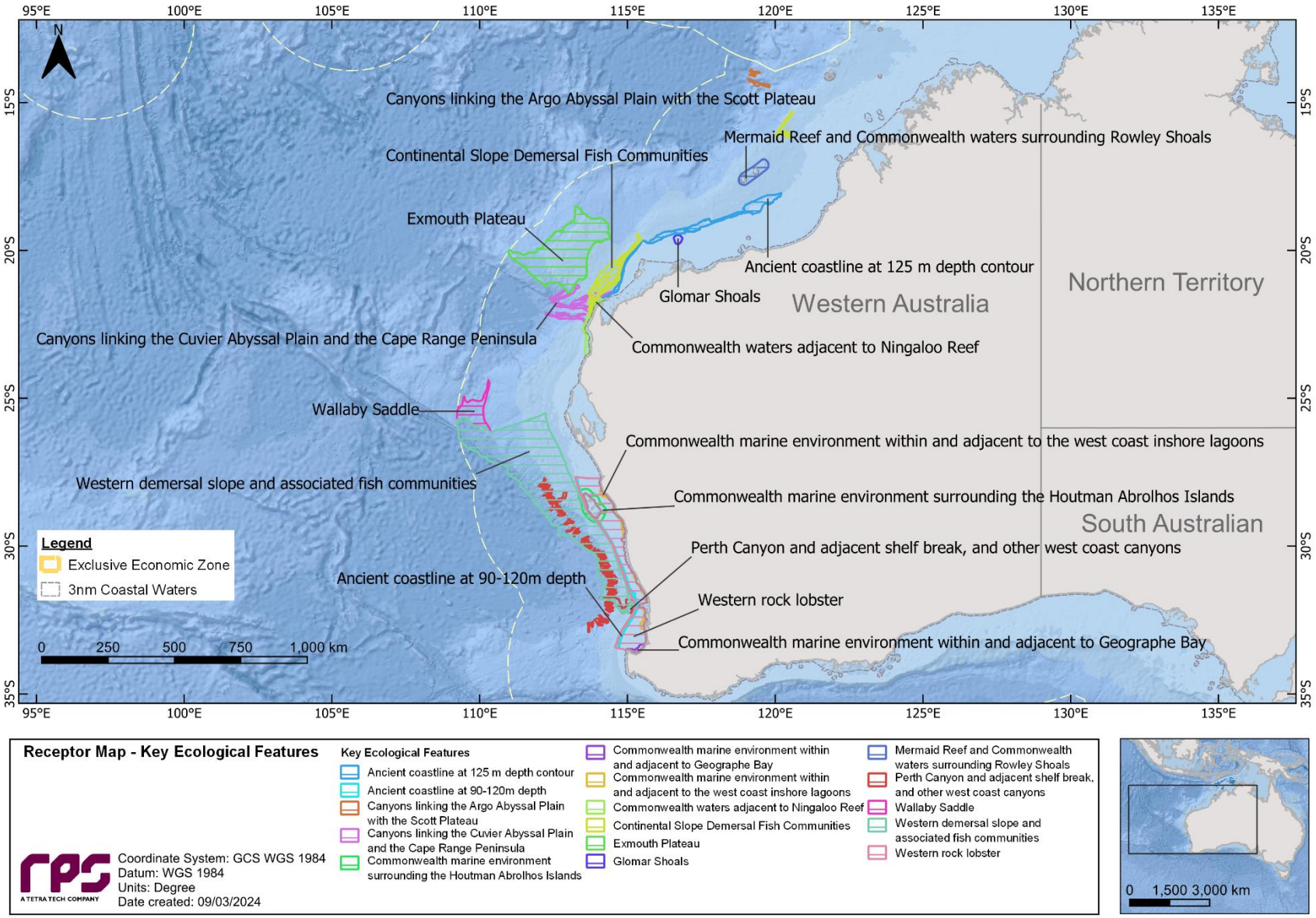


Figure 9.2 Receptor map of Key Ecological Features (KEF).

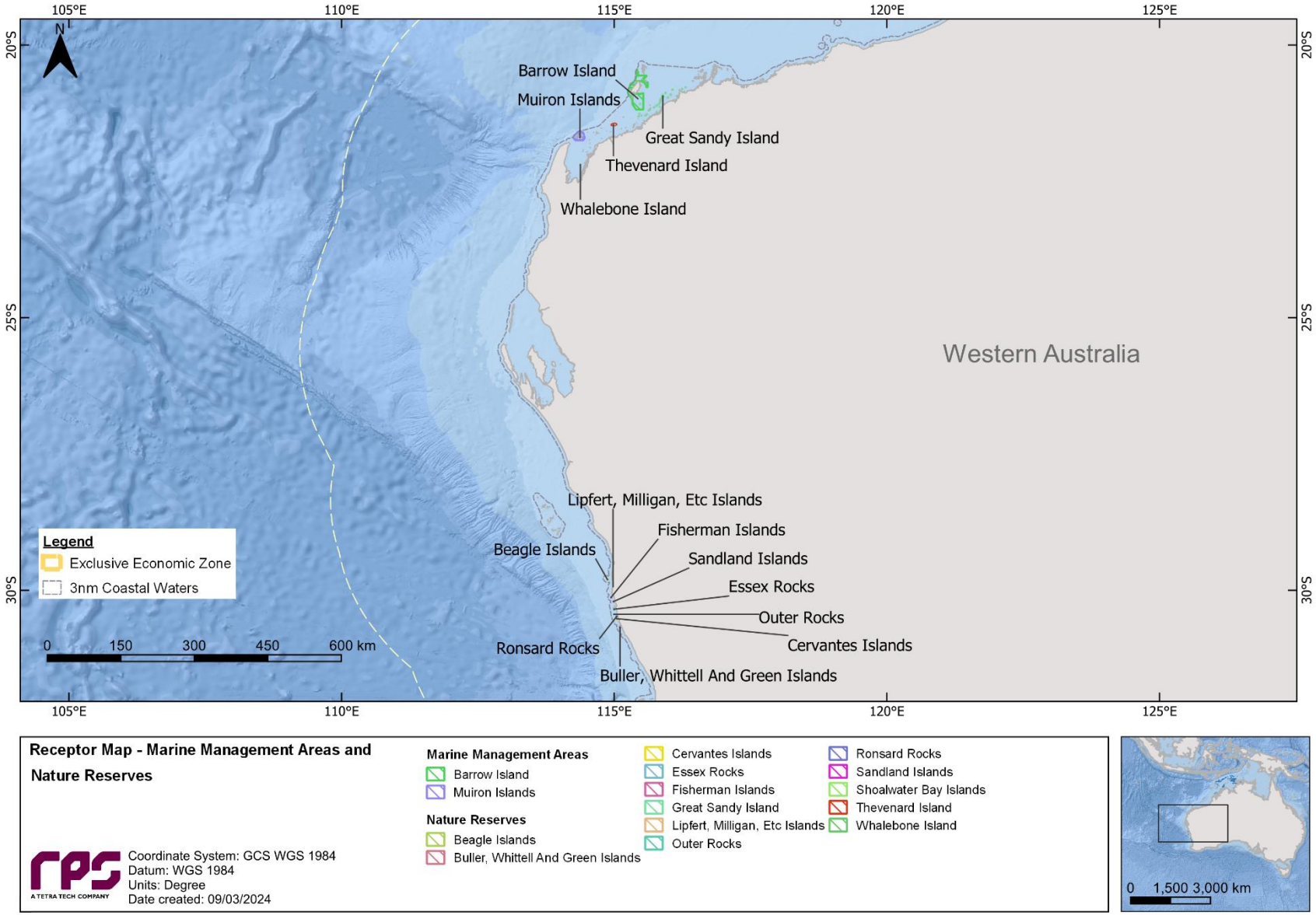


Figure 9.3 Receptor map of Marine Management Areas (MMA) and Nature Reserves (NR).

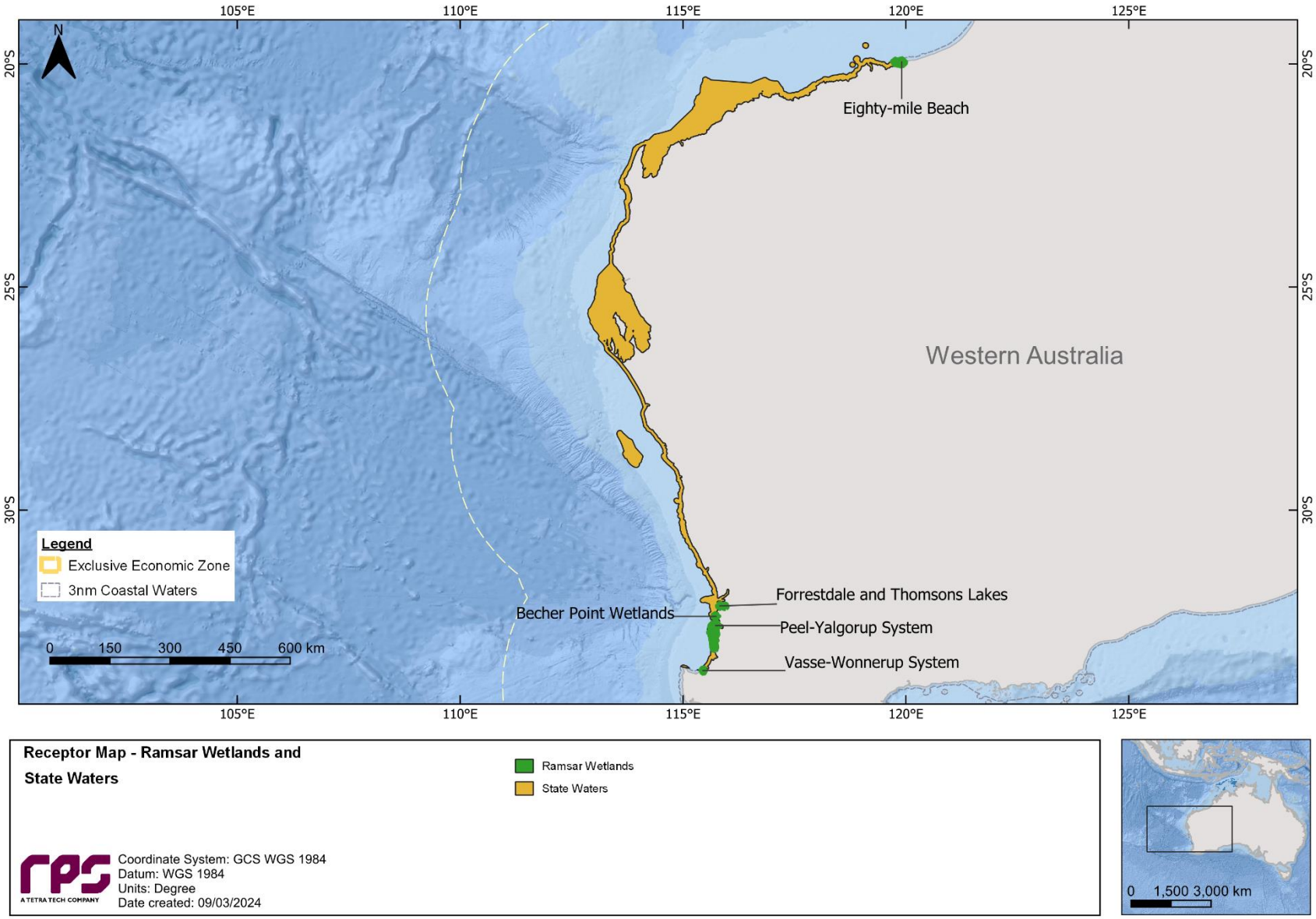


Figure 9.4 Receptor map for Ramsar wetlands and State and Territory Waters (1 of 2).

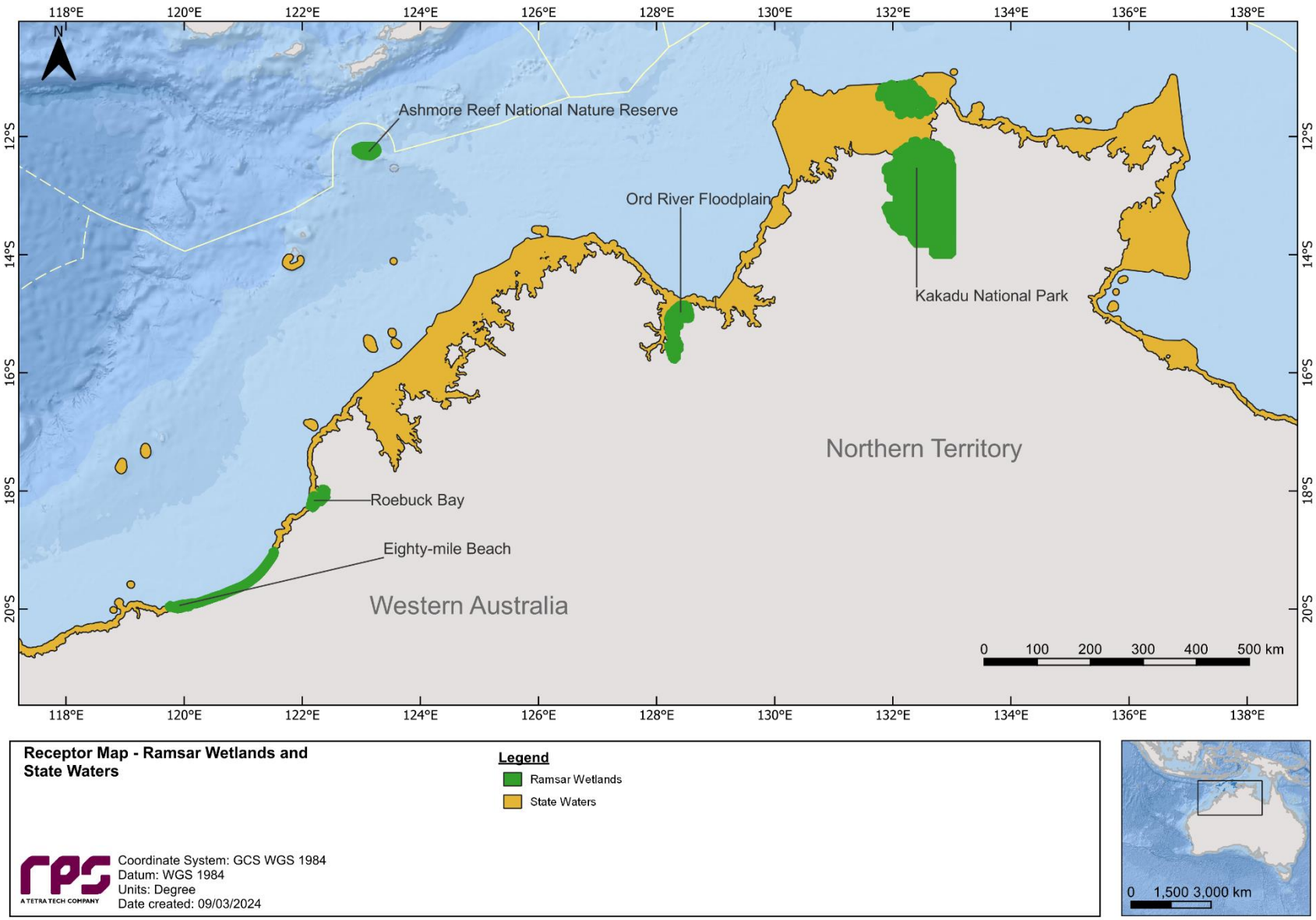


Figure 9.5 Receptor map for Ramsar wetlands and State and Territory Waters (2 of 2).

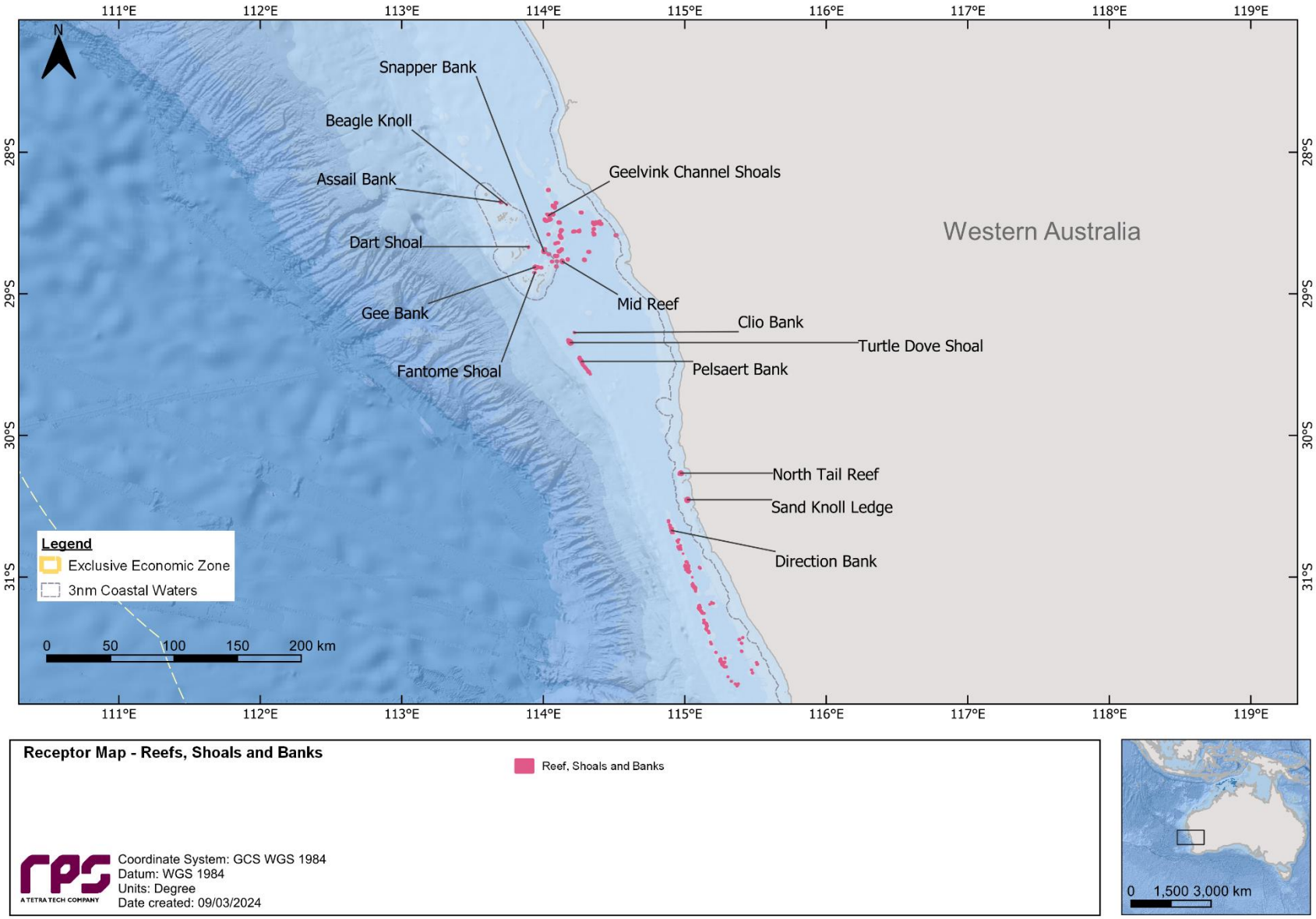


Figure 9.6 Receptor map for Reefs, Shoals and Banks (1 of 4)

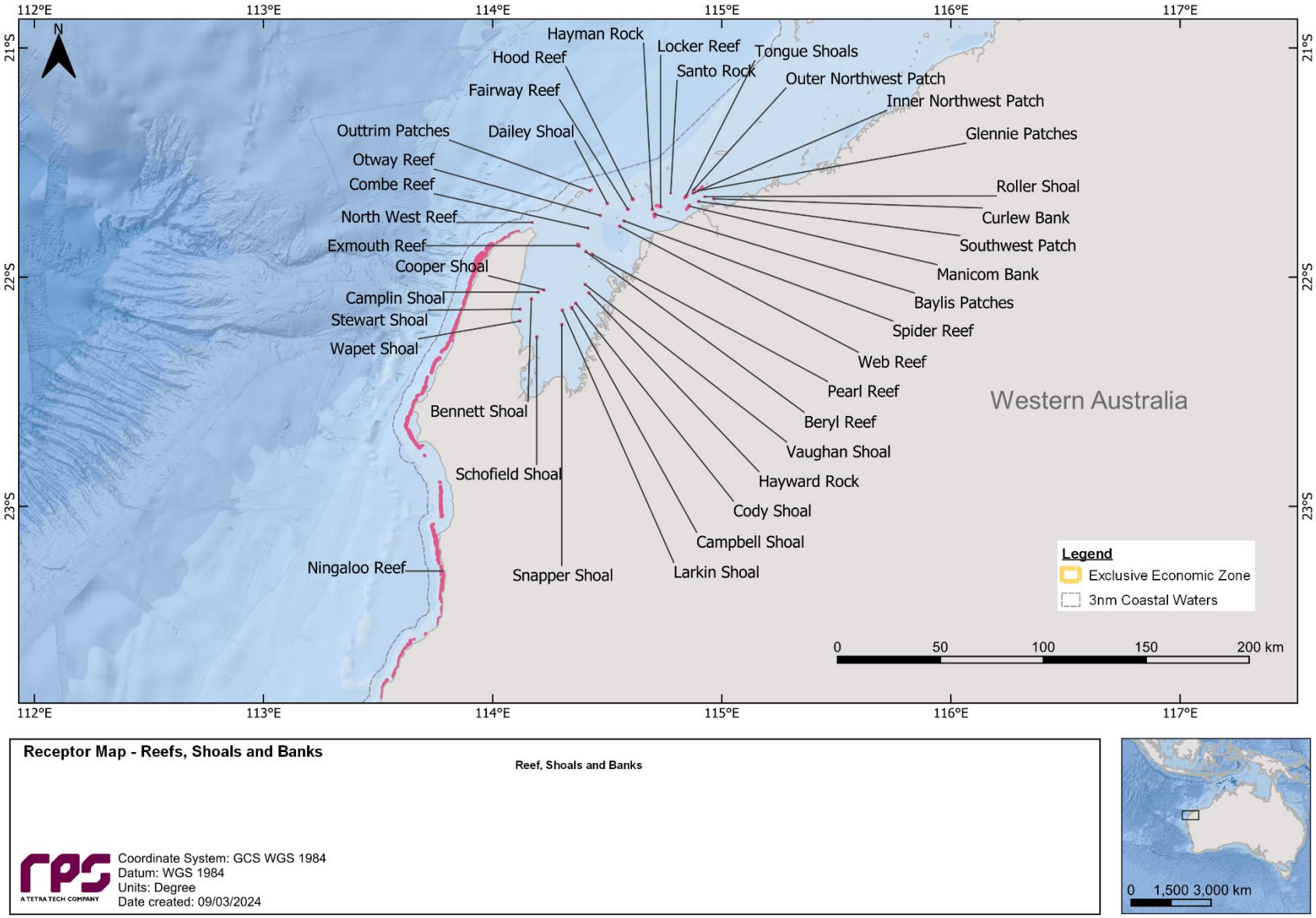


Figure 9.7 Receptor map for Reefs, Shoals and Banks (2 of 4)

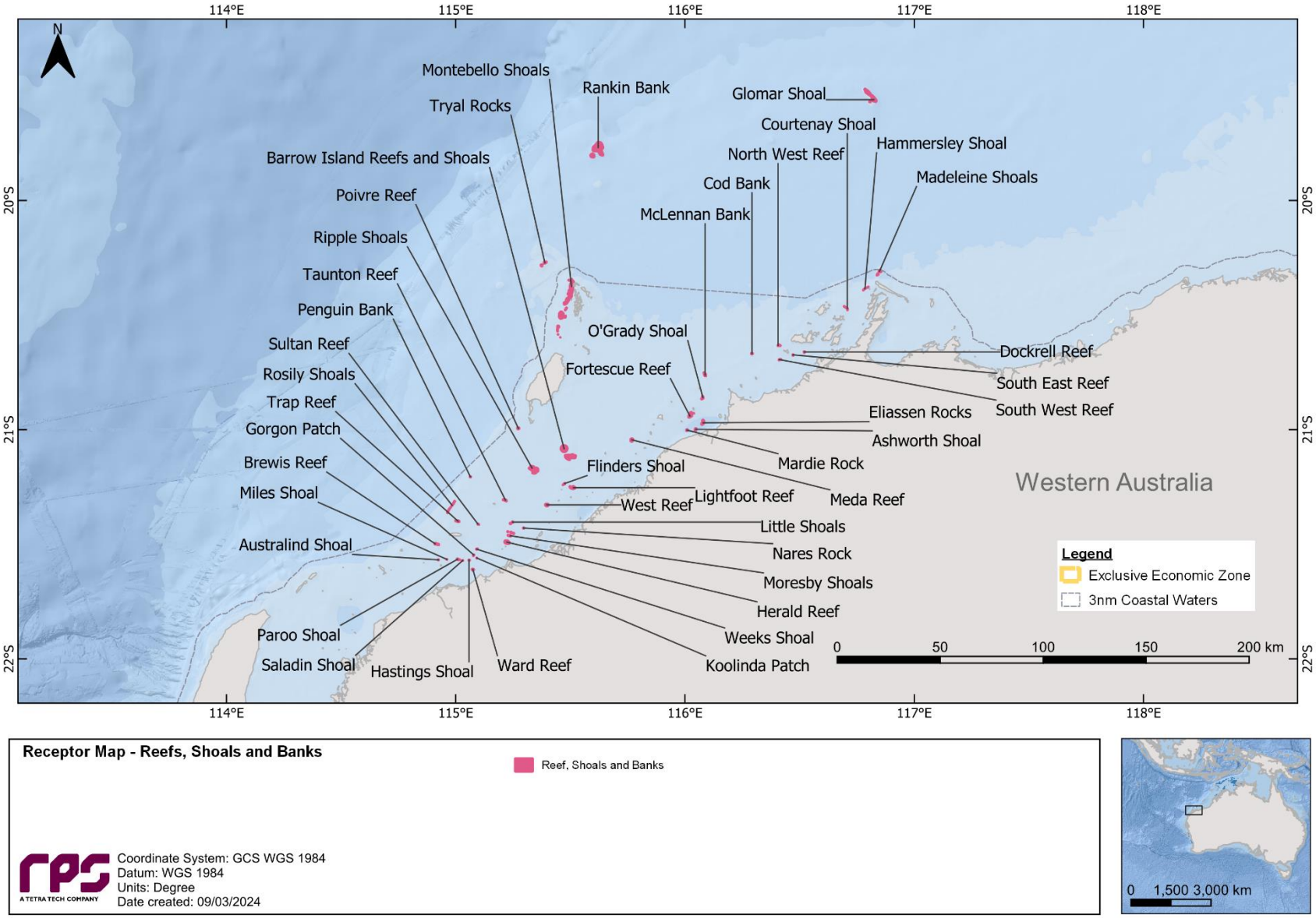


Figure 9.8 Receptor map for Reefs, Shoals and Banks (3 of 4)

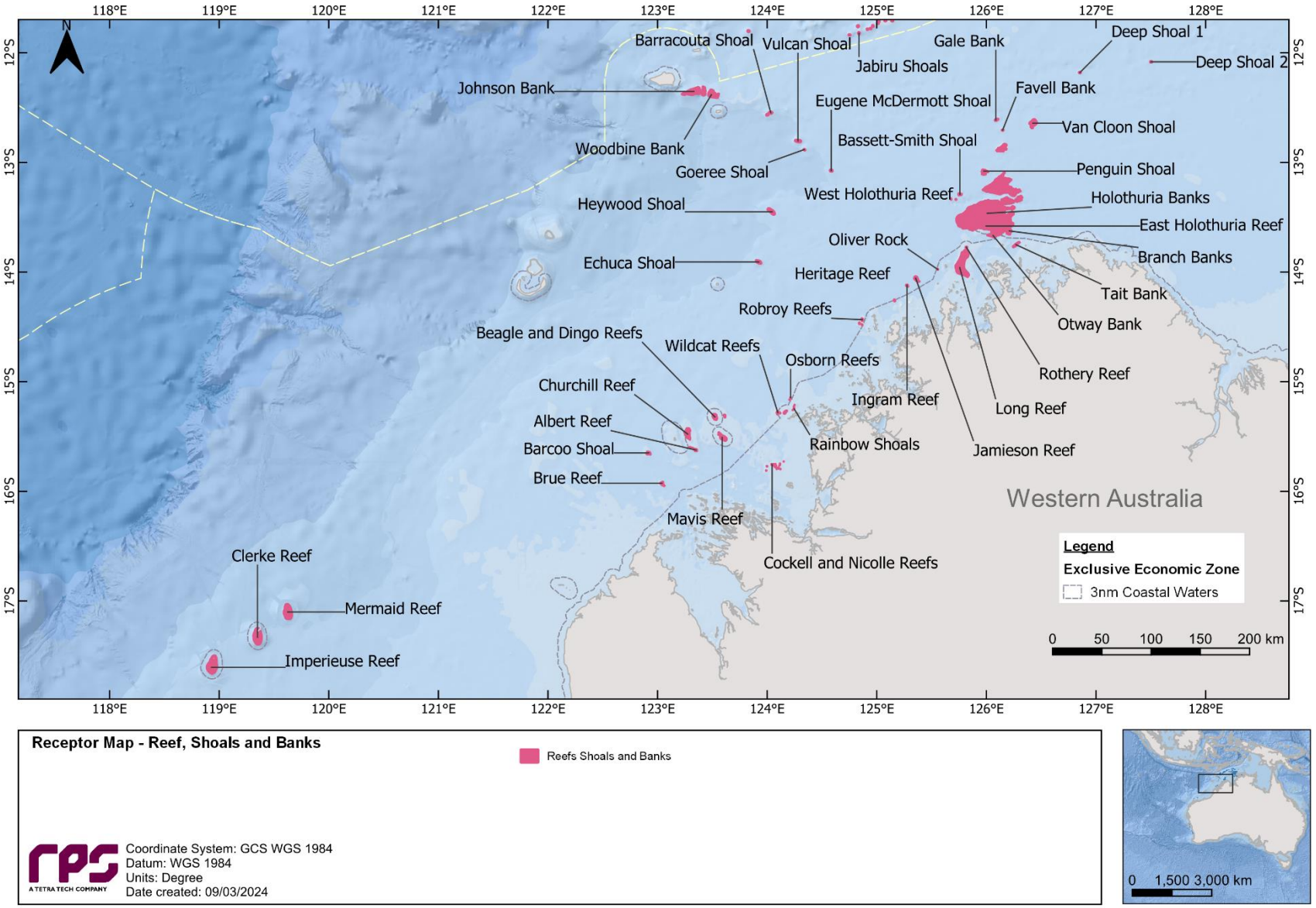


Figure 9.9 Receptor map for Reefs, Shoals and Banks (4 of 4)

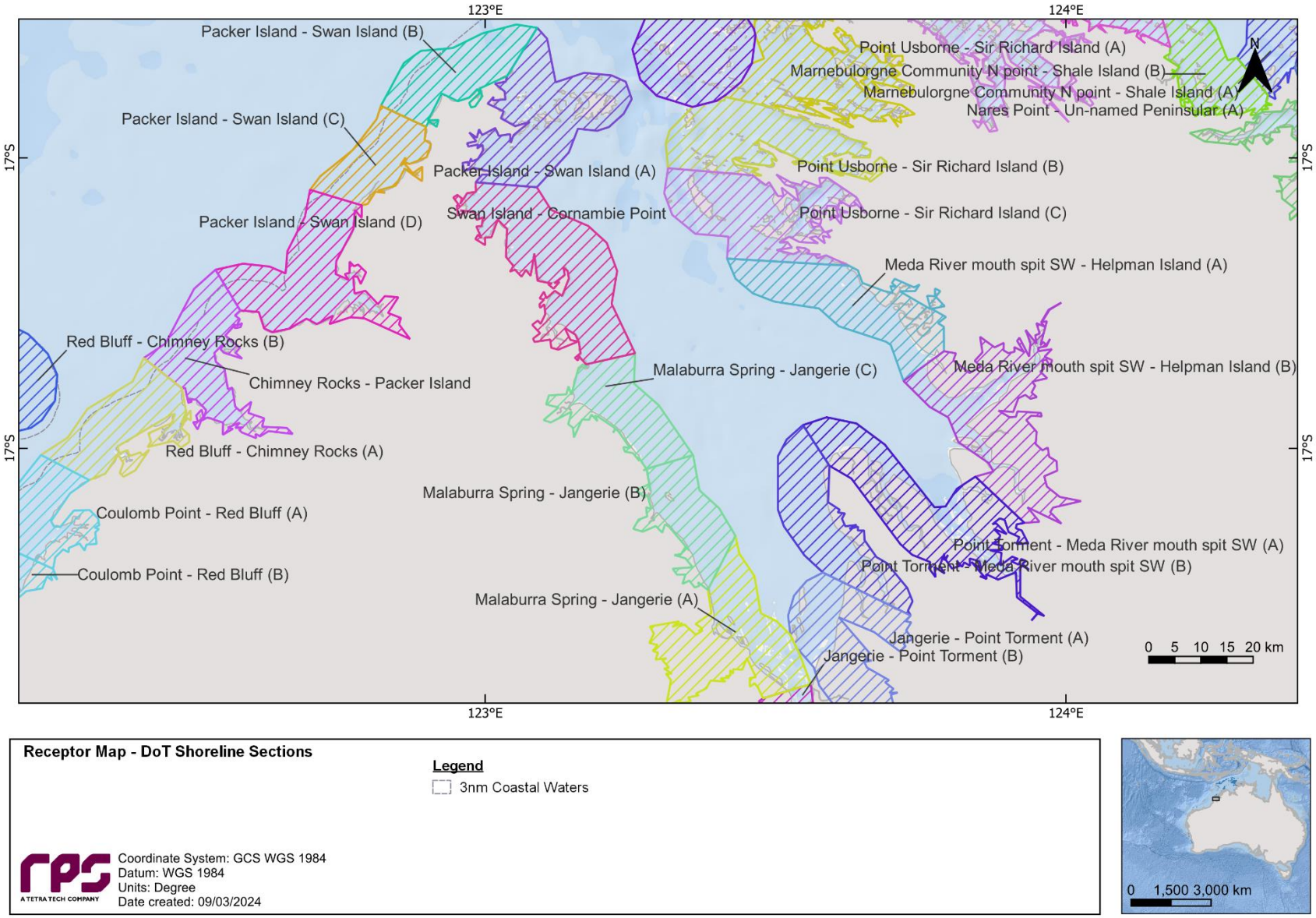


Figure 9.10 Receptor map for the WAMOPRA shoreline cells (1 of 10).

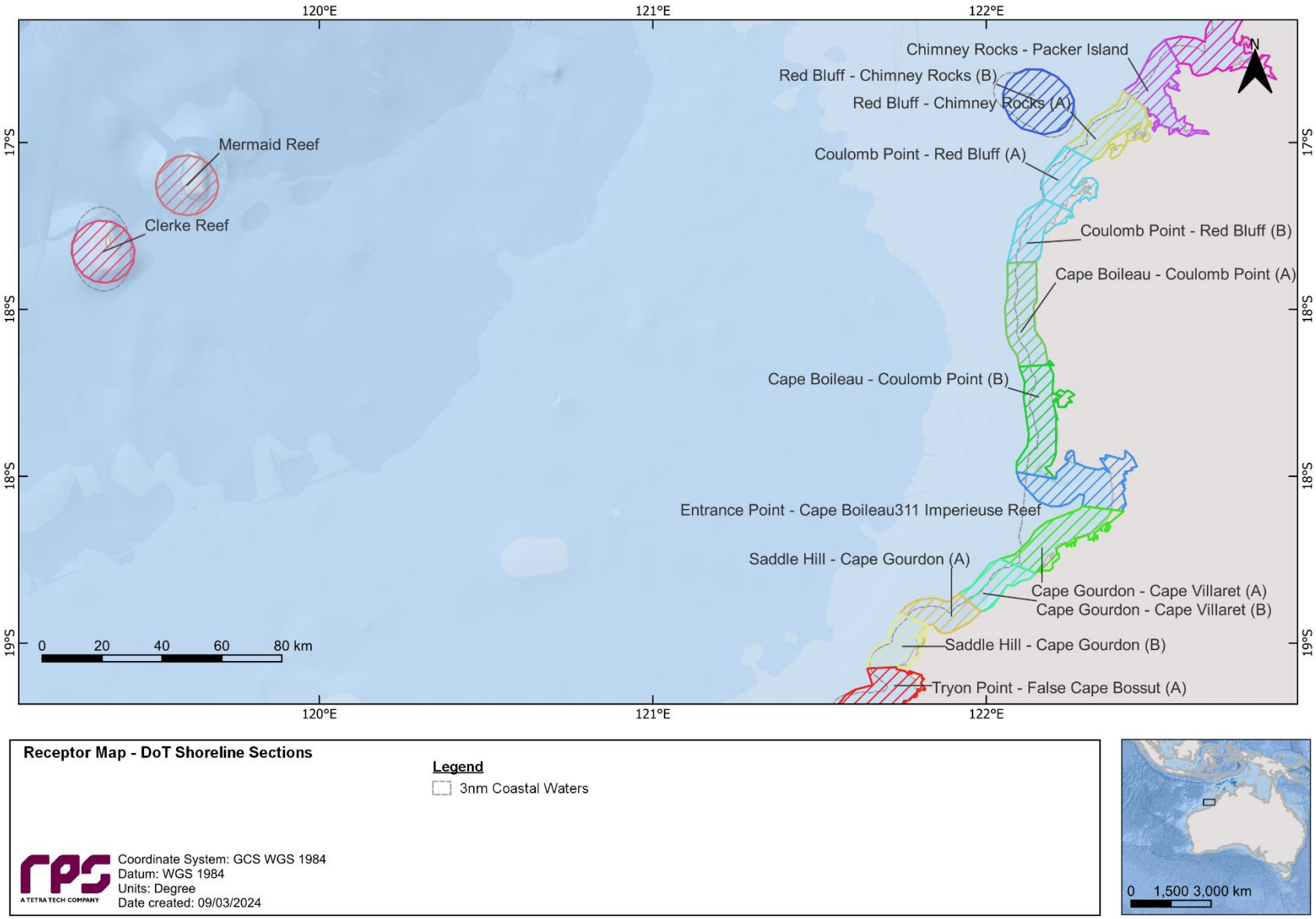


Figure 9.11 Receptor map for the WAMOPRA shoreline cells (2 of 10).

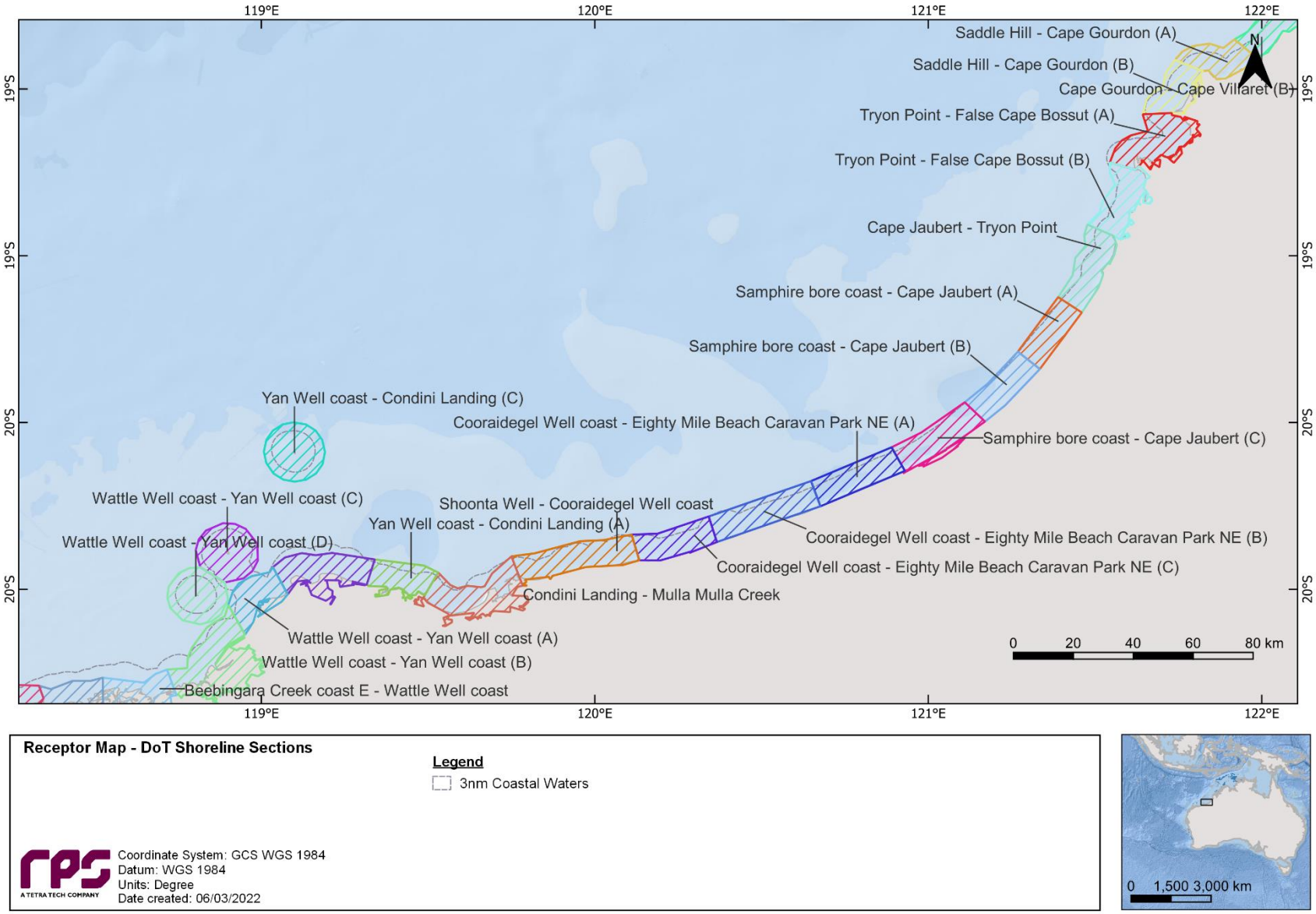


Figure 9.12 Receptor map for the WAMOPRA shoreline cells (3 of 10).

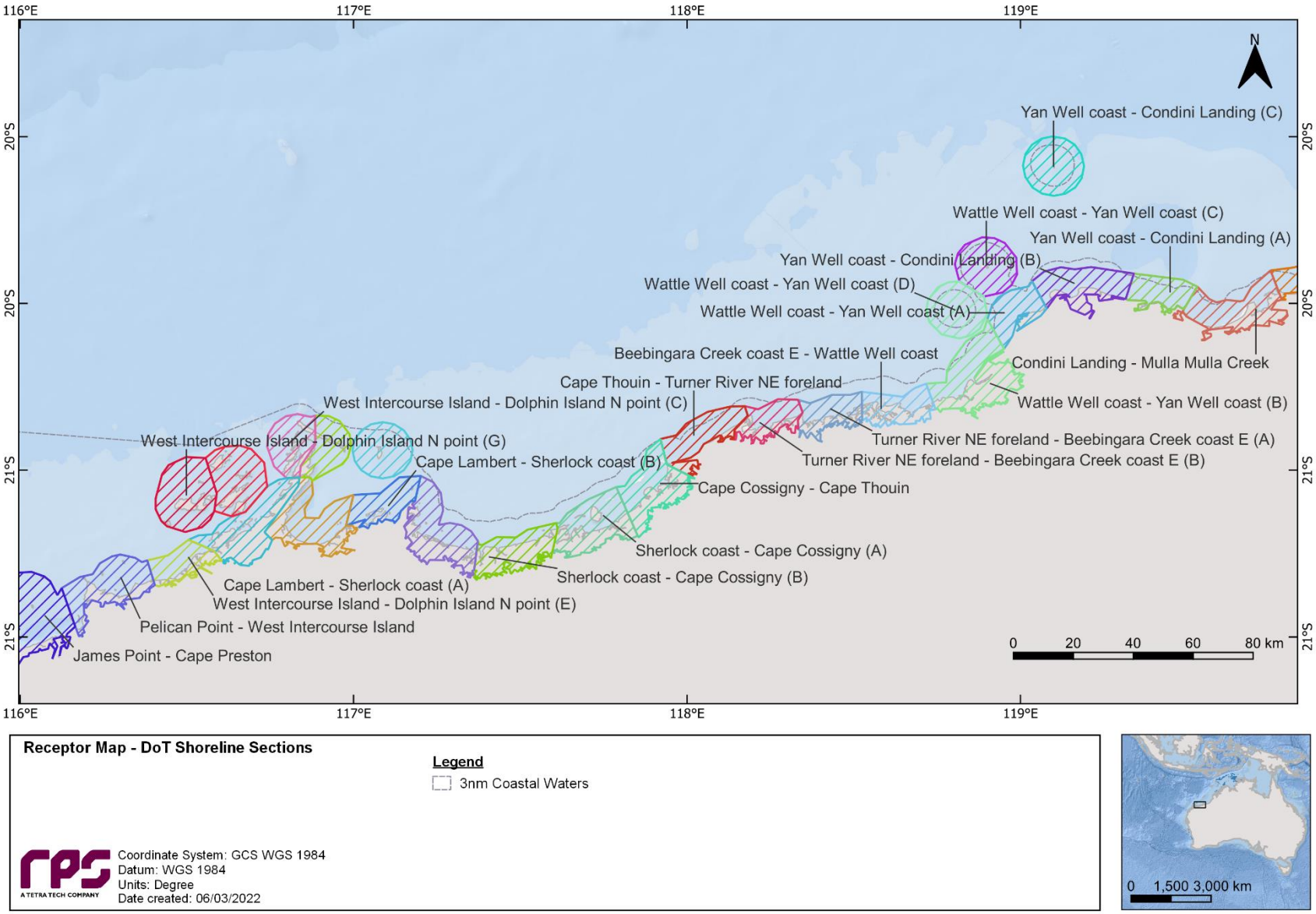


Figure 9.13 Receptor map for the WAMOPRA shoreline cells (4 of 10).

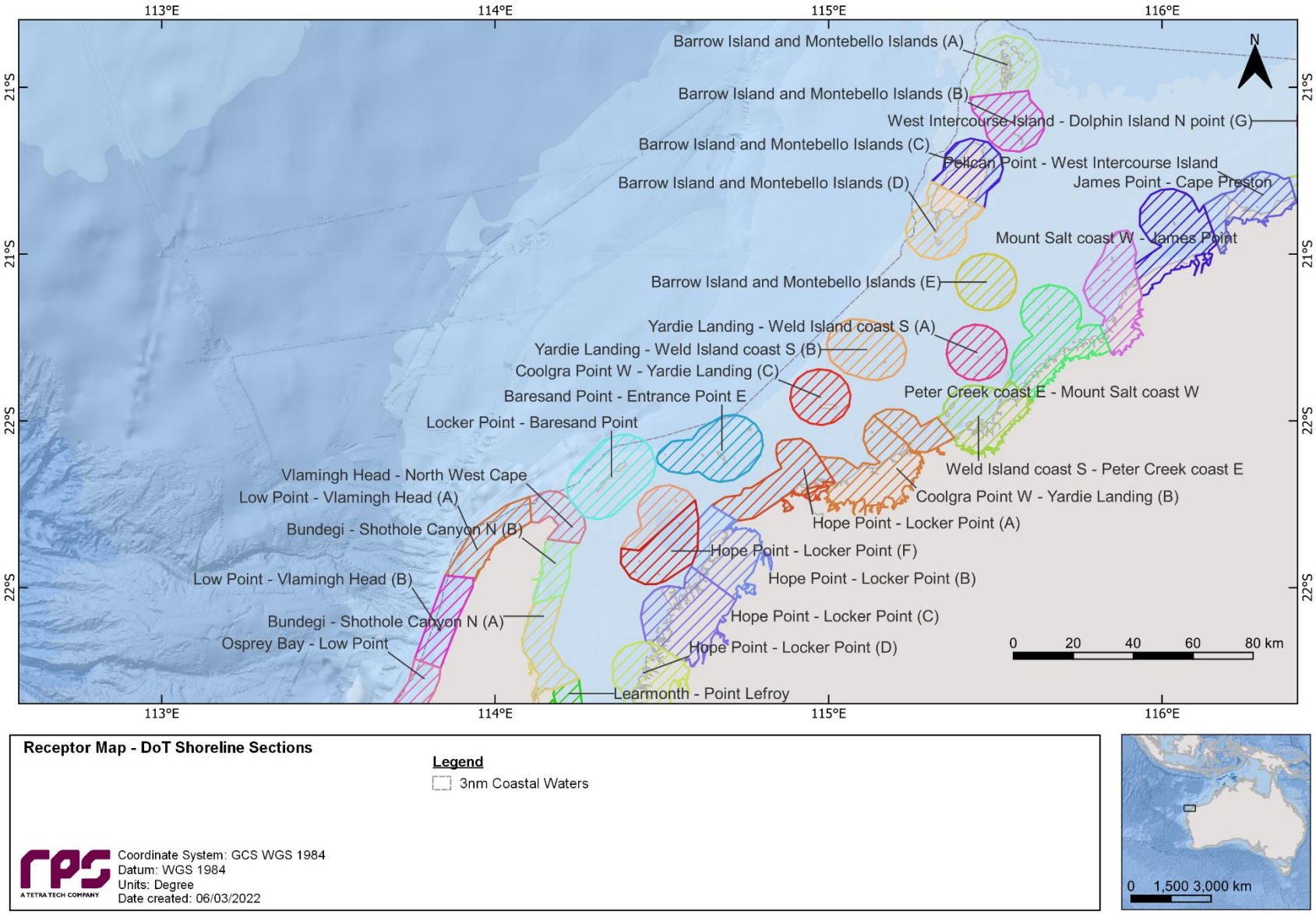


Figure 9.14 Receptor map for the WAMOPRA shoreline cells (5 of 10).

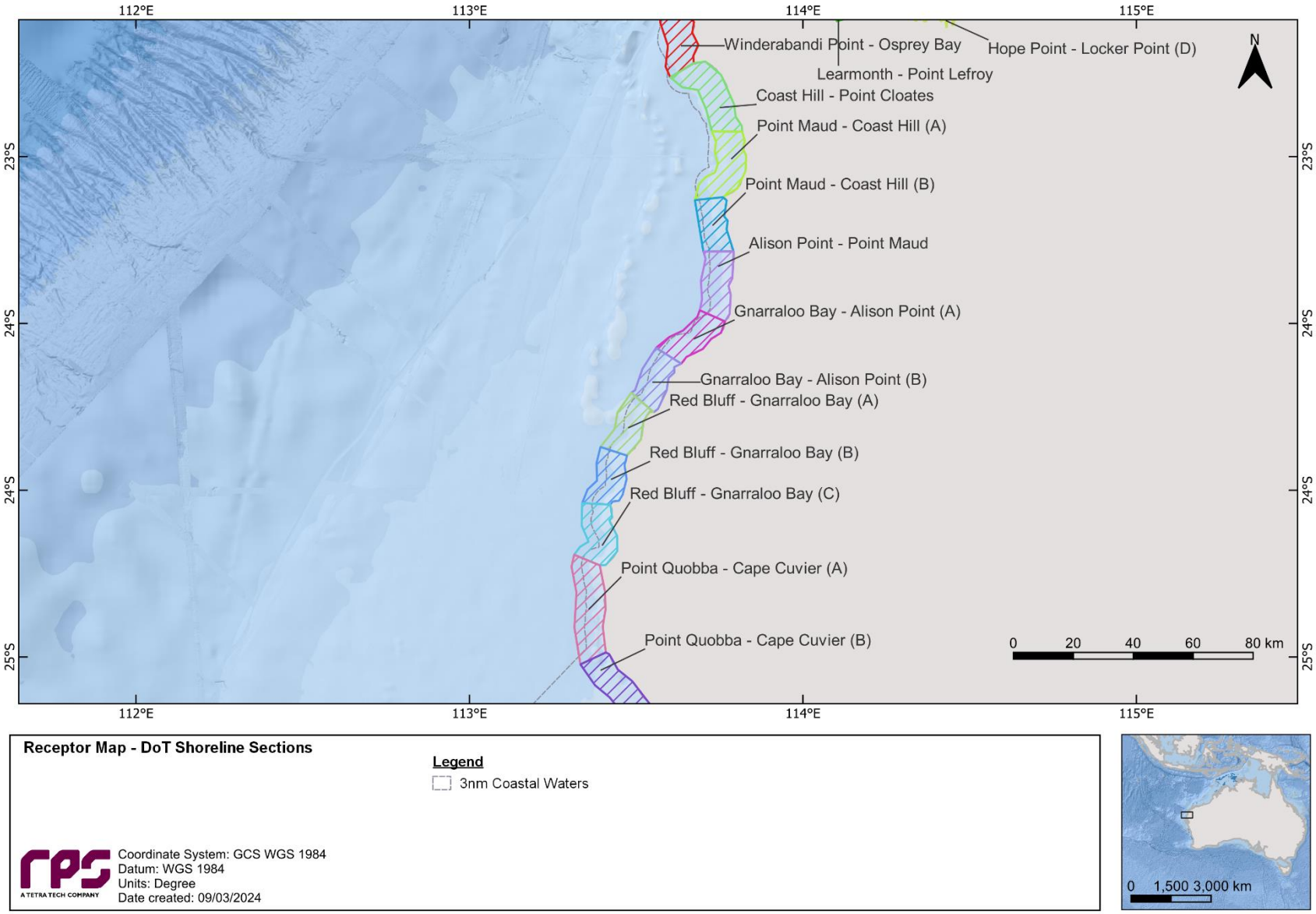


Figure 9.15 Receptor map for the WAMOPRA shoreline cells (6 of 10).

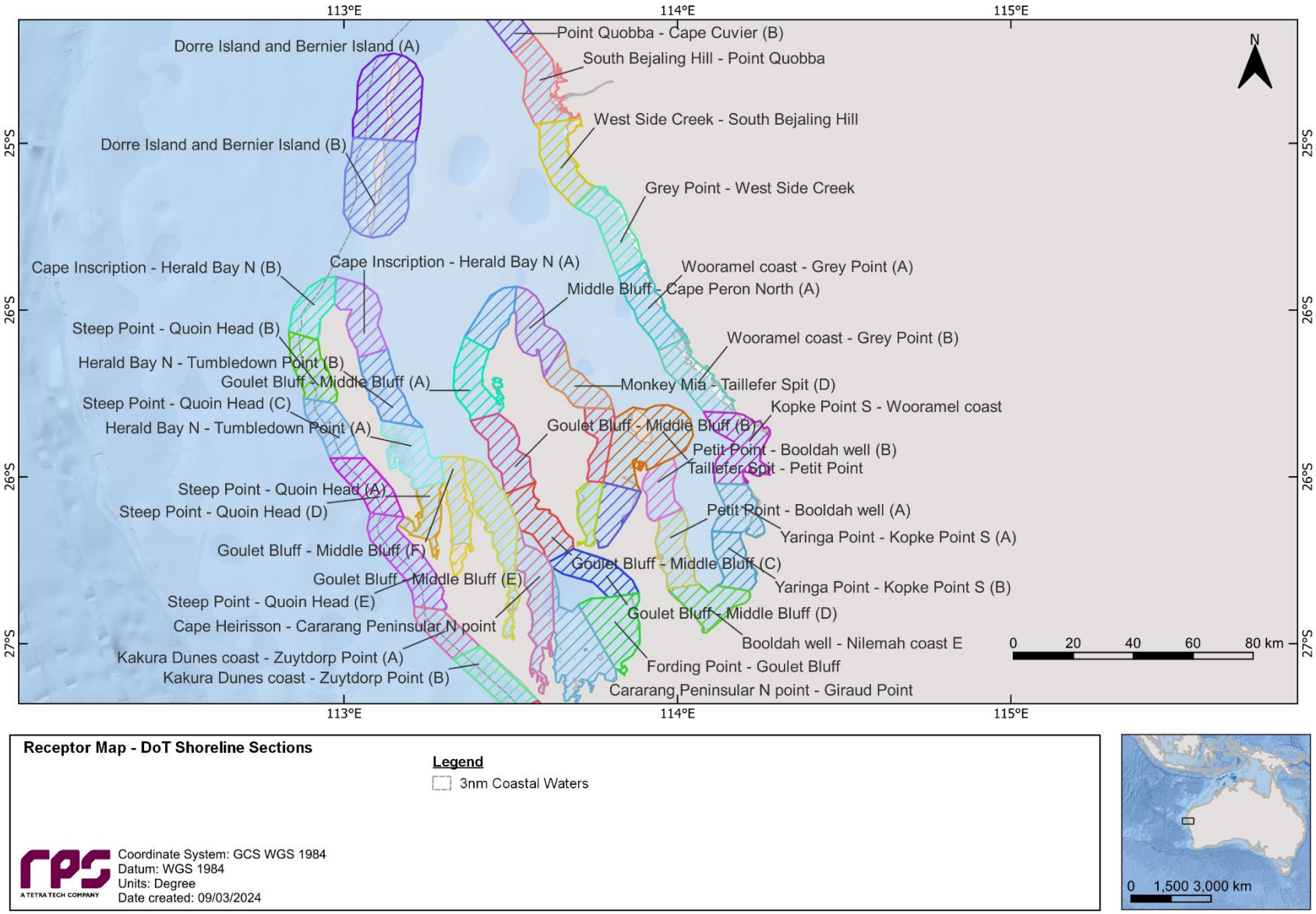


Figure 9.16 Receptor map for the WAMOPRA shoreline cells (7 of 10).

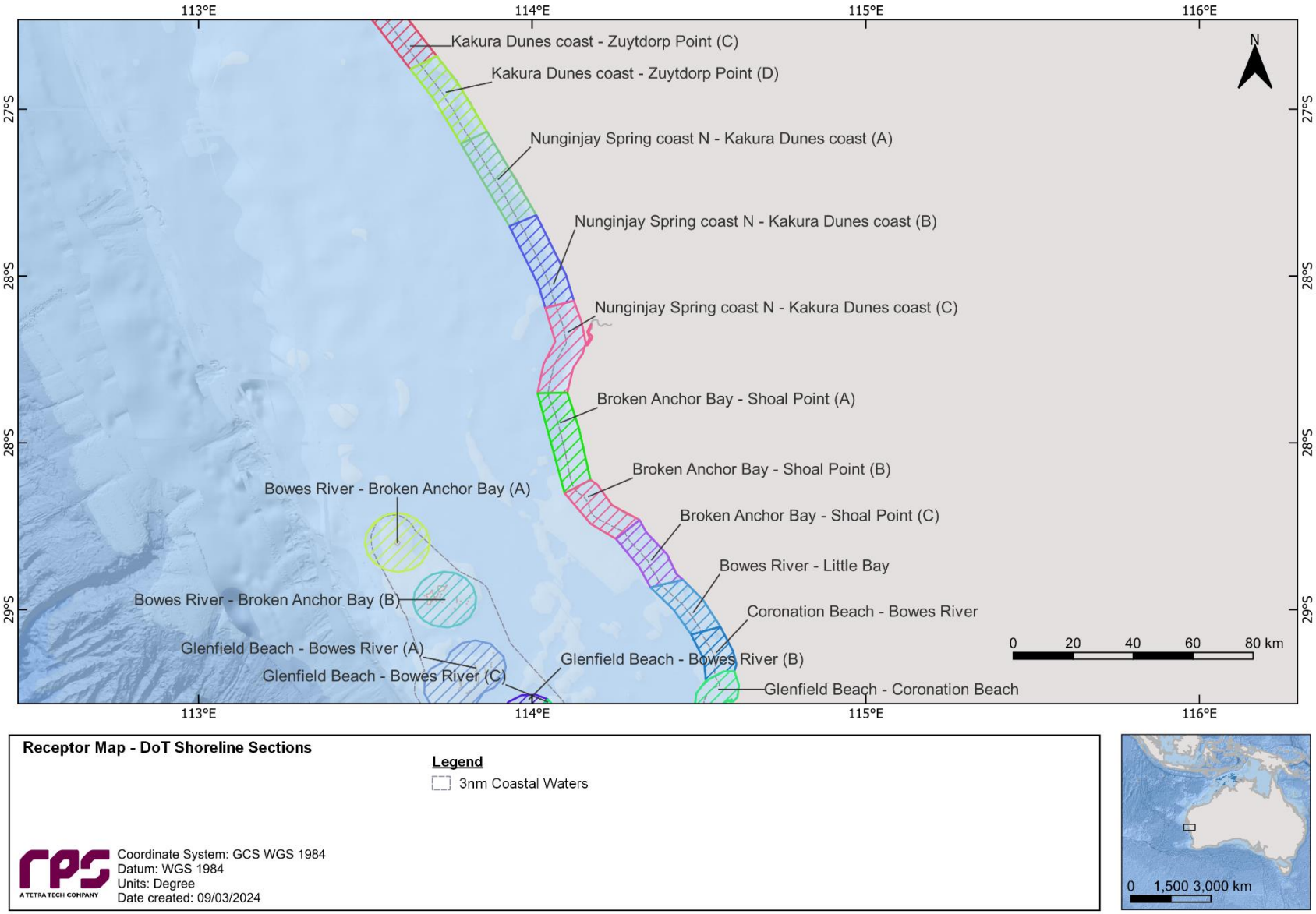


Figure 9.17 Receptor map for the WAMOPRA shoreline cells (8 of 10).

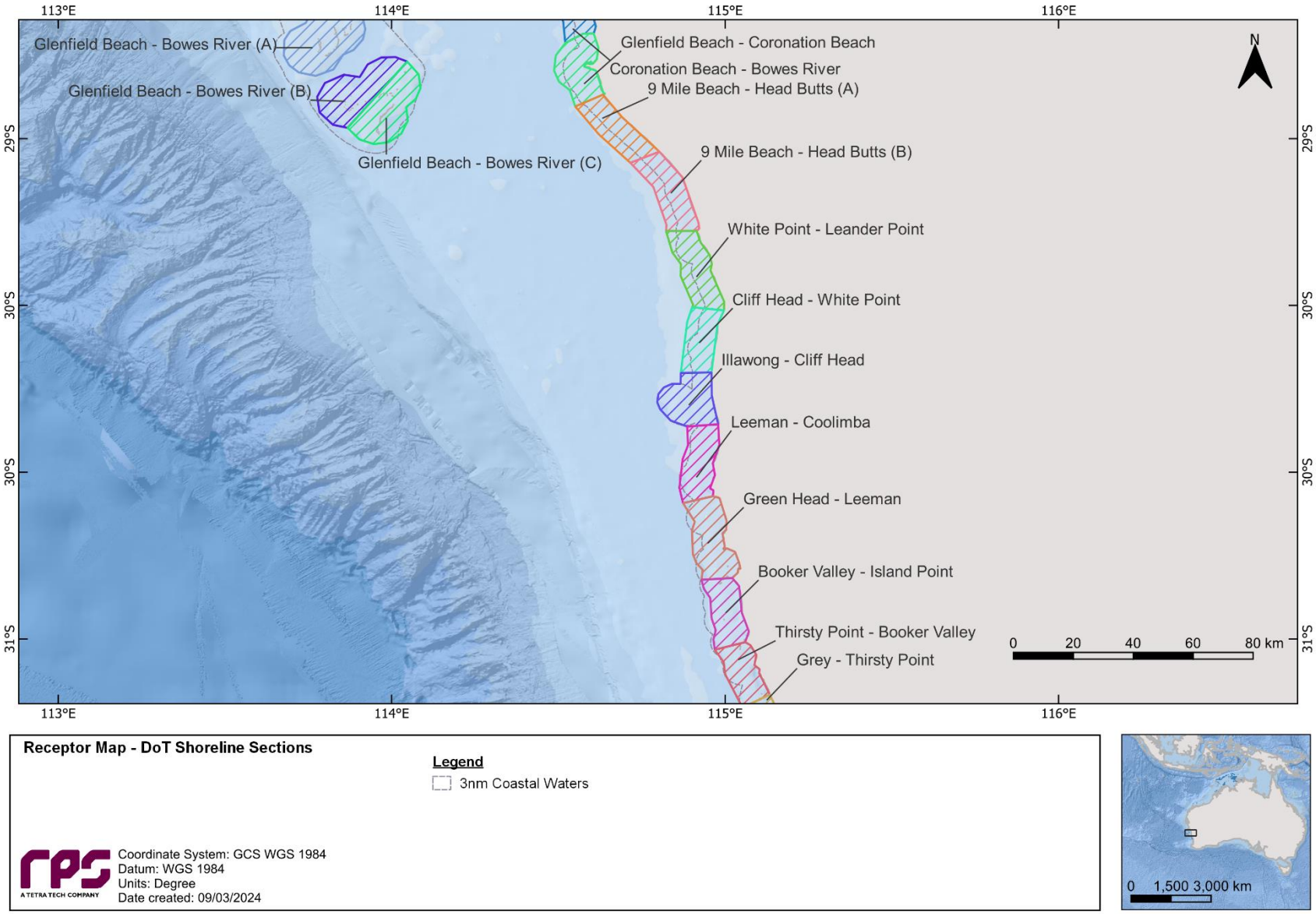


Figure 9.18 Receptor map for the WAMOPRA shoreline cells (9 of 10).

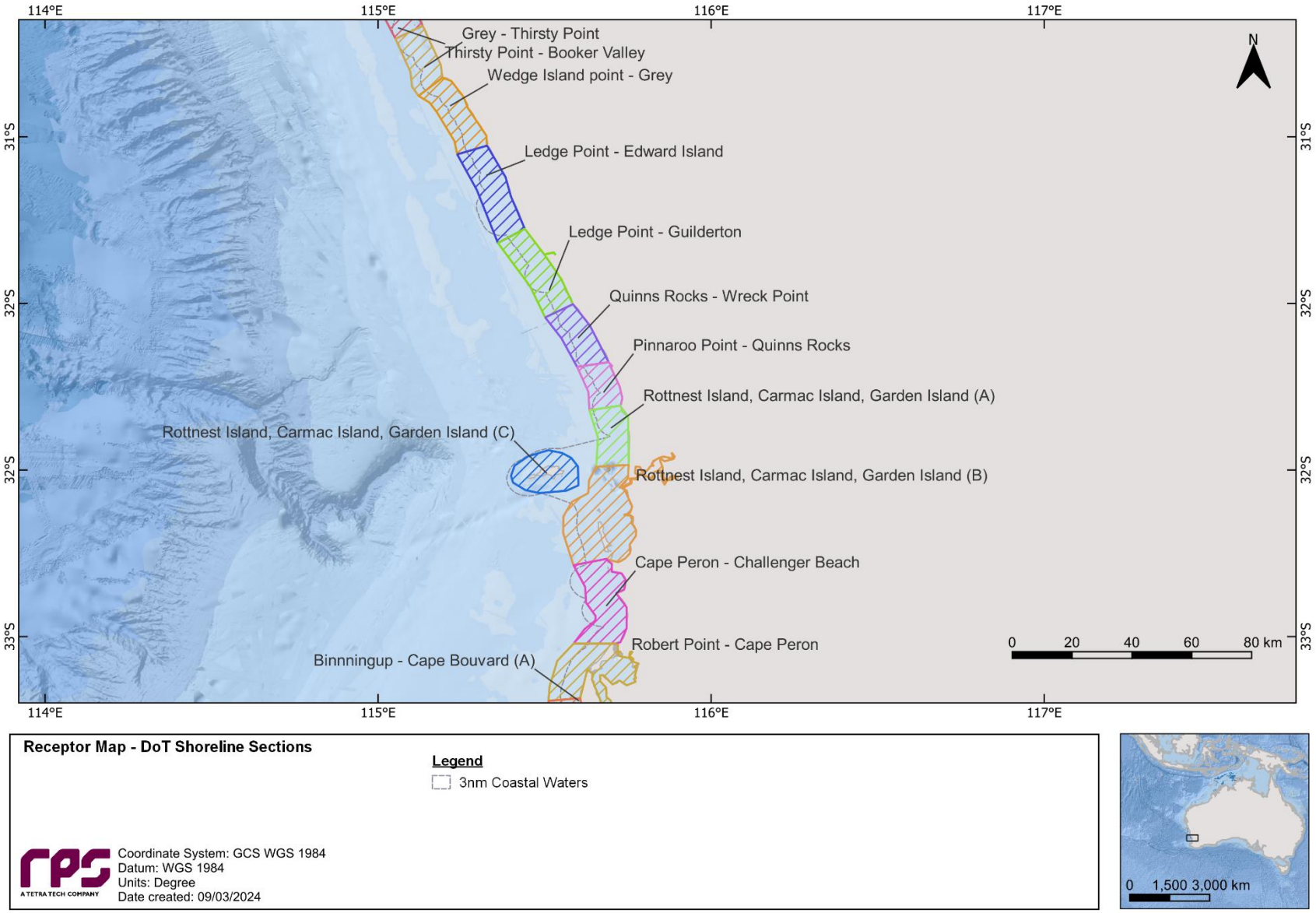


Figure 9.19 Receptor map for the WAMOPRA shoreline cells (10 of 10).

10 MODEL SETTINGS

Table 10.1 provides a summary of the oil spill model settings for Scenario 1 and Scenario 2. Additionally, Table 10.2 presents the summary of the daily varying oil rate applied for Scenario 1.

The simulation length for each scenario was carefully selected based on extensive sensitivity testing. During the sensitivity testing process, sample spill trajectories are run for longer than intended durations for each scenario. Upon completion of the spill trajectories, the results are carefully assessed to examine the persistence of the hydrocarbon (i.e. whether the maximum evaporative loss has been achieved for the period modelled; and whether a substantial volume of hydrocarbons remain in the water column (if any)) in conjunction with the extent of sea surface exposure based on reporting thresholds. Once there is agreement between the two factors (i.e., the final fate of hydrocarbon is accounted for, and the full exposure area is identified) the simulation length is deemed appropriate.

Table 10.1 Summary of the oil spill model settings used in this assessment.

	Scenario 1	Scenario 2
Description	Surface LOWC	Surface release from vessel collision
Number of spill simulations with randomly selected start times	100 per season	
Period	Summer (October to February) Winter (April to July) Transitional (March, August, and September)	
Spill volume	167,800 bbl (26,678 m^3)	300 m^3
Oil type	Wandoo crude	MDO
Release depth	0 m (surface)	0 m (surface)
Release duration	35 days	6 hours
Simulation length	56 days	30 days
Floating oil (NOPSEMA) thresholds	1 g/m^2, low exposure 10 g/m^2, moderate exposure 50 g/m^2, high exposure	
Shoreline accumulation (NOPSEMA) thresholds	10 g/m^2, low exposure 100 g/m^2, moderate exposure 1,000 g/m^2, high exposure	
Dissolved hydrocarbon (NOPSEMA) thresholds	10 ppb over 1 hour, low exposure 50 ppb over 1 hour, moderate exposure 400 ppb over 1 hour, high exposure	
Entrained hydrocarbon (NOPSEMA) thresholds	10 ppb over 1 hour, low exposure 100 ppb over 1 hour, moderate exposure	

Table 10.2 Summary of the daily varying oil rate applied for the surface LOWC.

Days	Oil Rate (stb/day)
1	5855.8
2	5767.2
3	5680.2
4	5594.6
5	5510.4
6	5427.7
7	5346.3
8	5266.3
9	5187.6
10	5110.2
11	5034.1
12	4959.3
13	4885.7
14	4813.3
15	4752.3
16	4741.1
17	4732.3
18	4723.6
19	4714.9
20	4706.2
21	4697.6
22	4689.0
23	4680.5
24	4672.0
25	4663.5
26	4655.1
27	4646.7
28	4638.4
29	4630.1
30	4621.8
31	4613.5
32	4605.3
33	4597.2
34	4589.0
35	4580.9

11 PRESENTATION AND INTERPRETATION OF MODEL RESULTS

The results from the modelling study are presented in a number of tables and figures, which aim to provide an understanding of the predicted sea-surface and water column (subsurface) exposure, and shoreline accumulation (if predicted).

11.1 Stochastic Modelling

If readers are not fully familiar with how to interpret stochastic modelling outputs, please refer to the relevant NOPSEMA factsheet (NOPSEMA, 2018) before reading this report section.

Predictions for the probability of contact and time to contact by oil concentrations equalling or exceeding defined thresholds for floating and shoreline oil, entrained oil and dissolved hydrocarbons are provided in the following sections to summarise the stochastic results, which are calculated and presented as follows:

a. ***Exposure Areas*** – encompasses the entire area that could be exposed and was derived from the annual stochastic modelling results based on the following thresholds:

   Low threshold Exposure Area (or EMBA)

   i. Floating oil – 1 g/m^2;
   ii. Shoreline oil accumulation – 10 g/m^2;
   iii. Dissolved hydrocarbons – 10 ppb; and
   iv. Entrained hydrocarbons –10 ppb.

   Moderate Threshold Exposure Area

   i. Floating oil – 10 g/m^2;
   ii. Shoreline oil accumulation – 100 g/m^2;
   iii. Dissolved hydrocarbons – 50 ppb; and
   iv. Entrained hydrocarbons –100 ppb.

   High Threshold Exposure Area

   i. Floating oil – 50 g/m^2;
   ii. Shoreline oil accumulation – 1,000 g/m^2; and
   iii. Dissolved hydrocarbons – 400 ppb.

b. ***Cross-sections of entrained and dissolved hydrocarbon concentrations*** – the predicted maximum entrained and dissolved hydrocarbon concentrations within the water column, along east-west and north-south transects in the vicinity of the release location.

c. ***Predicted zones of potential exposure*** – maps of floating oil exposure, shoreline oil accumulation, entrained and dissolved hydrocarbon exposure were generated based on the following thresholds:

   i. Floating oil – 1-10 g/m^2 (Low), 10-50 g/m^2 (Moderate) and ≥50 g/m^2 (High);
   ii. Shoreline oil accumulation – 10-100 g/m^2 (Low), 100-1,000 g/m^2 (Moderate) and ≥1,000 g/m^2 (High);
   iii. Entrained hydrocarbons – 10-100 ppb (Low) and ≥100 ppb (Moderate); and
   iv. Dissolved hydrocarbons – 10-50 ppb (Low), 50-400 ppb (Moderate) and ≥400 ppb (High).

d. ***The probability of oil exposure on the sea surface, in-water or shorelines*** – is calculated by dividing the number of spill simulations passing over a given grid cell at a given threshold, divided by the total number of simulations.

e. ***The minimum time before oil exposure on the sea surface, in-water or shorelines*** – is determined by ranking the elapsed time before sea surface exposure, entrained oil exposure or shoreline accumulation (at a given threshold) to a given location/grid cell for each of the spill simulations.

f. ***The maximum local accumulated concentration averaged over all replicate spills*** – the greatest concentration calculated for any point on the shoreline after averaging over all replicate simulations.

g. ***The maximum local accumulated concentration in the worst replicate spill*** – the greatest accumulation predicted for any point on the shoreline during any replicate simulation, and thus represents an extreme estimate.

h. ***The average volume of oil ashore*** – is determined by averaging the volume of oil ashore across all simulations predicted to make shoreline contact.

i. ***The maximum volume of oil ashore in the worst replicate spill*** – the greatest volume of oil predicted for any point on the shoreline during any replicate simulation, and thus represents an extreme estimate.

The mean and maximum shoreline concentrations indicate the concentrations forecast to potentially accumulate over time on any discrete part of a shoreline; calculated for individual portions of 1 km in length. Accumulated concentrations are calculated by summing the mass of oil that arrives at any concentration (including < threshold) over time at a model cell and subtracting any mass lost through evaporation and washing off, where relevant.

Note that it is possible that oil films arriving at concentrations that are less than the threshold may accumulate over the course of a spill event to result in concentrations that apparently exceed the threshold. Hence, the mean expected, and maximum concentrations of accumulated oil can exceed the threshold applied to the probability calculations for the arrival of floating oil even where no instantaneous exceedances above threshold are predicted. It is important to understand that the two parameters (floating concentration and shoreline concentration) are quite distinct, calculated in different ways and representative of alternative outcomes. The floating probability estimates, and the shoreline accumulative estimates should therefore be treated as independent estimators of different exposure outcomes, and not directly compared.

Readers should note that the contour maps presented in the stochastic modelling results, do not represent the predicted coverage of any one hydrocarbon spill or a depiction of a slick or plume at any instant in time. Rather, the contours are a composite of many theoretical slick paths, integrated over the full duration of the simulations relevant to each scenario. The stochastic modelling contour maps should be treated as indications of the probability of exposure at defined concentrations, for individual locations, at some point in time after the defined spill commences, given the trends and variations in metocean conditions that occur around the study area.

Locations with higher probability ratings were exposed during a greater number of spill simulations, indicating that the combination of the prevailing wind and current conditions are more likely to result in contact to these locations if the spill scenario were to occur in the future. The areas outside of the lowest-percentage contour indicate that contact will be less likely under the range of prevailing conditions for this region than areas falling within higher probability contours. It is important to note that the probabilities are derived from the samples of data used in the modelling. Therefore, locations that are not calculated to receive exposure at threshold concentrations or greater in any of the replicate simulations might possibly be contacted if very unusual conditions were to occur. Hence, we do not attribute a probability of nil to areas beyond the lowest probability contour.

11.2 Deterministic Modelling

While the stochastic modelling results provide an objective indication of all locations that may be exposed or contacted by oil above the reporting thresholds, the approach describes a larger potential area of influence than can be expected from any one single spill event. To inform spill response and OSM BIP capability requirements the following deterministic simulation for the LOWC scenario was identified and presented:

a. Greatest number of receptors with floating oil exposure at or above 1 g/m^2 within the first 7 days.

The following outputs have been presented for the deterministic simulation identified:

Tabulated results

- Minimum times to floating oil exposure for each threshold.
- Minimum times to entrained hydrocarbon exposure for each threshold.
- Minimum time to oil accumulation for each threshold at all shoreline receptors.
- Maximum loading and length of shoreline oil accumulation for each threshold; and
- Maximum shoreline oil accumulated volume for each threshold at all shoreline receptors.

Maps

- Map the outer boundaries of the EMBA derived from the 'low' threshold exposure values for floating oil exposure, in-water (entrained and dissolved) and shoreline accumulation.
- Maps of the predicted zones of floating oil exposure, in-water exposure (entrained and dissolved) and shoreline accumulation over the entire 56-day simulation; and
- Fates and weathering graph for the corresponding single spill trajectory, and a summary of the volumes at the conclusion of the simulation.

12 CALCULATION OF STOCHASTIC MODELLING EXPOSURE RISKS

During each simulation, the SIMAP model records the location (by latitude, longitude, and depth) of particles, which represent a mass of oil, on or, in the water column at regular time steps. For particles that contact the shoreline, the model records the accumulation of oil mass on each shoreline section over time, accounting for any mass lost to evaporation or removal by current and/or wind forces.

The data from all simulations are then analysed by dividing the study region into a three-dimensional grid. For particles classified as floating oil, the concentration of oil in each grid cell is estimated by summing the mass of all oil particles within that cell (factoring in spreading and dispersion) and dividing by the area of the grid cell. For entrained and dissolved oil, concentrations are calculated by dividing the mass of particles by the volume of the grid cell.

These oil concentrations are then examined to determine whether they exceed specific threshold levels over time. The risks are summarised as follows:

- The probability of exposure is calculated by dividing the number of spill simulations in which oil concentrations exceeded the threshold in a grid cell by the total number of simulations. For instance, if oil exposure above the threshold occurred in 21 out of 100 simulations, the probability of exposure for that location is 21%;
- The minimum potential time before exposure is determined by the shortest time it took for oil above the threshold concentration to travel from the release site to a grid cell in any of the simulations;
- Maximum potential oil accumulation on shorelines is calculated as the highest oil mass per square meter (m^2) in any simulation for a shoreline cell during any of the simulations;
- The average of the maximum oil accumulation is calculated as the average of the greatest oil mass per m^2 across all simulations.
- Similar calculations are undertaken for entrained oil and dissolved hydrocarbons.

Thus, the minimum time before oil accumulation on shorelines and maximum accumulation represent the worst case outcomes for each shoreline section, while the average provides a more general outlook of the potential outcomes.

It is important to clarify that each grid cell would be approximately 1 km and with shorelines stretching tens to hundreds of kilometres, that the maximum potential loading reported for any grid cell do not imply that such concentrations will occur uniformly across the entire section. Therefore, multiplying the maximum concentration estimates by the total area of the section would significantly overestimate the expected oil volume on that section. Furthermore, with a grid resolution of 1 km, it is not possible to resolve shorelines <100 m.

13 MODELLING RESULTS: LOSS OF WELL CONTROL

This scenario investigated the potential exposure from a 167,800 bbl (26,678 m^3) surface release of crude over 35 days resulting from a LOWC at Kullingal. The crude was tracked for an additional 21 days to allow the concentrations to decrease below the lowest thresholds. The modelling for this scenario assumed no mitigation efforts are undertaken to collect or otherwise affect the natural transport and weathering.

13.1 Stochastic Analysis

13.1.1 Exposure Areas

Figure 13.1 illustrates the exposure areas for the LOWC scenario, determined by integrating the low, moderate, and high threshold results of all 300 spill simulations.

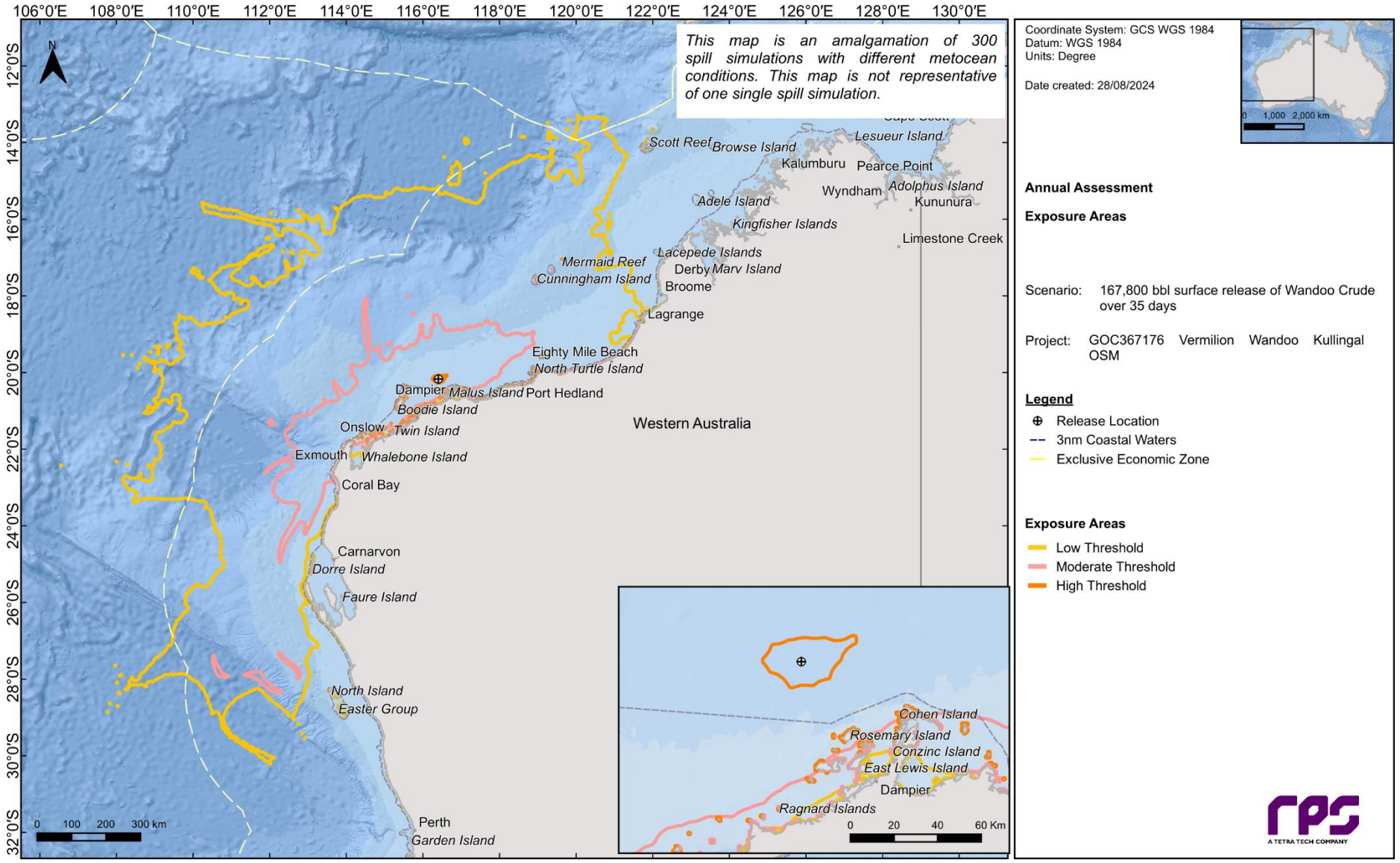


Figure 13.1 Predicted exposure areas following a surface LOWC at Kullingal, presented as an annual assessment. The exposure areas were determined by integrating the results of all 300 spill simulations across low, moderate and high thresholds.

13.1.2 Floating Oil Exposure

Table 13.1 summarises the maximum distances from the release location to floating oil exposure thresholds for each season. Concentrations exceeding 1 g/m^2 could extend up to 998 km from the release location. The maximum distances reduced to 473 km and 25 km as the threshold increases to 10 g/m^2 and 50 g/m^2, respectively.

Table 13.2 present the receptors predicted to be exposed by floating oil for each season.

The Glomar Shoals KEF (60%), Montebello AMP (79%) and Mermaid Reef AMP (97%) recorded the highest probability of exposure at, or above, 1 g/m^2 during summer, transitional and winter conditions, respectively. The Montebello AMP recorded the fastest time to exposure at 37 hours, for a spill commencing during transitional conditions.

Figure 13.2 to Figure 13.4 illustrate the extent floating oil exposure zones for each season. Figure 13.5 to Figure 13.22 depict the seasonal minimum times before exposure and probability of exposure for assessed thresholds.

Table 13.1 Maximum distances from the release location to floating oil exposure thresholds from a surface LOWC at Kullingal. Results were calculated from 100 spill simulations per season.

Season	Distance and direction travelled	Floating oil exposure thresholds		
		1 g/m^2	10 g/m^2	50 g/m^2
Summer	Maximum distance (km) from release location	647	55	15
	Direction	Northeast	West	East
Transitional	Maximum distance (km) from release location	998	473	25
	Direction	Southwest	West	Northeast
Winter	Maximum distance (km) from release location	741	311	13
	Direction	Northeast	Southwest	West

Table 13.2 Receptors predicted to be exposed by floating oil following a surface LOWC at Kullingal. Results were calculated from100 spill simulations per season.

Category	Name	Summer						Transitional						Winter					
		Probability (%) of floating oil at			Minimum times before floating oil exposure (hours)			Probability (%) of floating oil at			Minimum times before floating oil exposure (hours)			Probability (%) of floating oil at			Minimum times before floating oil exposure (hours)		
		≥ 1 g/m^2	≥ 10 g/m^2	≥ 50 g/m^2	≥ 1 g/m^2	≥ 10 g/m^2	≥ 50 g/m^2	≥ 1 g/m^2	≥ 10 g/m^2	≥ 50 g/m^2	≥ 1 g/m^2	≥ 10 g/m^2	≥ 50 g/m^2	≥ 1 g/m^2	≥ 10 g/m^2	≥ 50 g/m^2	≥ 1 g/m^2	≥ 10 g/m^2	≥ 50 g/m^2
AMP	Argo-Rowley Terrace	2	NC	NC	689	NC	NC	4	NC	NC	708	NC	NC	4	NC	NC	521	NC	NC
	Carnarvon Canyon	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	1,265	NC	NC
	Dampier	32	NC	NC	76	NC	NC	12	NC	NC	261	NC	NC	2	NC	NC	415	NC	NC
	Gascoyne	5	NC	NC	317	NC	NC	23	1	NC	320	1,183	NC	29	1	NC	240	605	NC
	Mermaid Reef	2	NC	NC	925	NC	NC	1	NC	NC	1,286	NC	NC	97	2	NC	38	122	NC
	Montebello	53	4	NC	63	64	NC	79	3	NC	37	108	NC	NC	NC	NC	NC	NC	NC
KEF	Ancient coastline at 125 m depth contour	33	NC	NC	173	NC	NC	46	NC	NC	150	NC	NC	56	5	NC	109	335	NC
	Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	10	NC	NC	298	NC	NC	27	NC	NC	273	NC	NC	42	NC	NC	182	NC	NC
	Commonwealth waters adjacent to Ningaloo Reef	4	NC	NC	381	NC	NC	30	2	NC	298	696	NC	34	1	NC	218	474	NC
	Continental Slope Demersal Fish Communities	18	NC	NC	201	NC	NC	42	1	NC	193	1,078	NC	31	3	NC	168	508	NC
	Exmouth Plateau	5	NC	NC	429	NC	NC	9	NC	NC	319	NC	NC	7	NC	NC	415	NC	NC
	Glomar Shoals	60	NC	NC	100	NC	NC	47	NC	NC	109	NC	NC	48	7	NC	63	101	NC
	Mermaid Reef and Commonwealth waters surrounding Rowley Shoals	3	NC	NC	688	NC	NC	1	NC	NC	913	NC	NC	4	NC	NC	639	NC	NC
	Western demersal slope and associated fish communities	NC	NC	NC	NC	NC	NC	1	NC	NC	676	NC	NC	NC	NC	NC	NC	NC	NC
MP	Barrow Island	14	NC	NC	199	NC	NC	29	NC	NC	144	NC	NC	38	NC	NC	108	NC	NC

	Eighty Mile Beach	2	NC	NC	573	NC	NC	1	NC	NC	770	NC	NC	NC	NC	NC	NC	NC	NC
	Montebello Islands	18	NC	NC	170	NC	NC	37	3	NC	130	768	NC	72	5	NC	78	570	NC
	Ningaloo	4	NC	NC	381	NC	NC	30	2	NC	298	696	NC	34	1	NC	218	474	NC
	Rowley Shoals	1	NC	NC	719	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	683	NC	NC
NR	Barrow Island	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	420	NC	NC
	Great Sandy Island	2	NC	NC	562	NC	NC	1	NC	NC	657	NC	NC	3	NC	NC	627	NC	NC
	Lowendal Islands	2	NC	NC	906	NC	NC	1	NC	NC	919	NC	NC	19	NC	NC	268	NC	NC
	Thevenard Island	1	NC	NC	743	NC	NC	7	NC	NC	203	NC	NC	9	NC	NC	290	NC	NC
RSB	Australind Shoal	1	NC	NC	759	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	445	NC	NC
	Barrow Island Reefs and Shoals	2	NC	NC	942	NC	NC	2	NC	NC	556	NC	NC	4	NC	NC	589	NC	NC
	Baylis Patches	1	NC	NC	792	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	482	NC	NC
	Brewis Reef	1	NC	NC	720	NC	NC	8	NC	NC	204	NC	NC	9	NC	NC	308	NC	NC
	Clerke Reef	1	NC	NC	796	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Cod Bank	10	NC	NC	377	NC	NC	8	NC	NC	552	NC	NC	1	NC	NC	617	NC	NC
	Combe Reef	NC	NC	NC	NC	NC	NC	2	NC	NC	638	NC	NC	2	NC	NC	381	NC	NC
	Courtenay Shoal	4	NC	NC	190	NC	NC	3	NC	NC	748	NC	NC	NC	NC	NC	NC	NC	NC
	Curlew Bank	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	475	NC	NC
	Dailey Shoal	3	NC	NC	719	NC	NC	12	NC	NC	428	NC	NC	8	NC	NC	263	NC	NC
	Dockrell Reef	NC	NC	NC	NC	NC	NC	4	NC	NC	712	NC	NC	1	NC	NC	1,310	NC	NC
	Fairway Reef	1	NC	NC	709	NC	NC	2	NC	NC	423	NC	NC	1	NC	NC	373	NC	NC
	Flinders Shoal	2	NC	NC	945	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Glennie Patches	1	NC	NC	781	NC	NC	NC	NC	NC	NC	NC	NC	3	NC	NC	444	NC	NC
	Glomar Shoal	39	NC	NC	201	NC	NC	28	NC	NC	208	NC	NC	32	NC	NC	108	NC	NC
	Gorgon Patch	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	450	NC	NC
	Hammersley Shoal	20	2	NC	166	207	NC	8	NC	NC	458	NC	NC	2	NC	NC	1,087	NC	NC
	Hastings Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	5	NC	NC	342	NC	NC
	Hayman Rock	1	NC	NC	795	NC	NC	NC	NC	NC	NC	NC	NC	3	NC	NC	481	NC	NC
	Herald Reef	1	NC	NC	1,051	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Hood Reef	2	NC	NC	672	NC	NC	4	NC	NC	613	NC	NC	6	NC	NC	272	NC	NC
	Imperieuse Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	905	NC	NC
	Inner Northwest Patch	1	NC	NC	769	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	448	NC	NC
	Koolinda Patch	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	475	NC	NC
	Lightfoot Reef	1	NC	NC	1,056	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Little Shoals	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	5	NC	NC	350	NC	NC
	Locker Reef	1	NC	NC	719	NC	NC	1	NC	NC	625	NC	NC	5	NC	NC	476	NC	NC
	Madeleine Shoals	28	NC	NC	167	NC	NC	9	NC	NC	277	NC	NC	2	NC	NC	528	NC	NC

	Manicom Bank	1	NC	NC	790	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	466	NC	NC
	McLennan Bank	5	NC	NC	713	NC	NC	1	NC	NC	500	NC	NC	9	NC	NC	372	NC	NC
	Meda Reef	1	NC	NC	564	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Mermaid Reef	2	NC	NC	930	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Miles Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	461	NC	NC
	Montebello Shoals	13	NC	NC	246	NC	NC	30	NC	NC	145	NC	NC	42	NC	NC	123	NC	NC
	Moresby Shoals	1	NC	NC	1,144	NC	NC	NC	NC	NC	NC	NC	NC	5	NC	NC	364	NC	NC
	Nares Rock	1	NC	NC	1,148	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Ningaloo Reef	1	NC	NC	935	NC	NC	6	NC	NC	663	NC	NC	NC	NC	NC	NC	NC	NC
	North West Reef	5	NC	NC	495	NC	NC	5	NC	NC	572	NC	NC	1	NC	NC	1,307	NC	NC
	O'Grady Shoal	NC	NC	NC	NC	NC	NC	1	NC	NC	617	NC	NC	1	NC	NC	400	NC	NC
	Otway Reef	1	NC	NC	1,148	NC	NC	7	NC	NC	628	NC	NC	7	NC	NC	342	NC	NC
	Outtrim Patches	3	NC	NC	699	NC	NC	9	NC	NC	419	NC	NC	6	NC	NC	283	NC	NC
	Paroo Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	455	NC	NC
	Penguin Bank	6	NC	NC	409	NC	NC	18	NC	NC	252	NC	NC	24	NC	NC	224	NC	NC
	Poivre Reef	3	NC	NC	455	NC	NC	17	NC	NC	295	NC	NC	16	NC	NC	287	NC	NC
	Rankin Bank	21	NC	NC	321	NC	NC	30	NC	NC	267	NC	NC	47	NC	NC	190	NC	NC
	Ripple Shoals	2	NC	NC	887	NC	NC	3	NC	NC	350	NC	NC	6	NC	NC	306	NC	NC
	Roller Shoal	1	NC	NC	807	NC	NC	NC	NC	NC	NC	NC	NC	3	NC	NC	466	NC	NC
	Rosily Shoals	6	NC	NC	424	NC	NC	17	NC	NC	184	NC	NC	26	NC	NC	186	NC	NC
	Saladin Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	457	NC	NC
	Santo Rock	3	NC	NC	732	NC	NC	2	NC	NC	731	NC	NC	3	NC	NC	456	NC	NC
	South East Reef	2	NC	NC	504	NC	NC	1	NC	NC	890	NC	NC	NC	NC	NC	NC	NC	NC
	South West Reef	4	NC	NC	503	NC	NC	1	NC	NC	875	NC	NC	NC	NC	NC	NC	NC	NC
	Southwest Patch	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	3	NC	NC	480	NC	NC
	Spider Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	678	NC	NC
	Sultan Reef	1	NC	NC	761	NC	NC	2	NC	NC	305	NC	NC	6	NC	NC	291	NC	NC
	Taunton Reef	NC	NC	NC	NC	NC	NC	3	NC	NC	614	NC	NC	6	NC	NC	306	NC	NC
	Tongue Shoals	1	NC	NC	758	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	448	NC	NC
	Trap Reef	2	NC	NC	708	NC	NC	7	NC	NC	285	NC	NC	8	NC	NC	359	NC	NC
	Tryal Rocks	19	NC	NC	125	NC	NC	40	NC	NC	86	NC	NC	65	NC	NC	137	NC	NC
	Ward Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	5	NC	NC	391	NC	NC
	Web Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	686	NC	NC
	Weeks Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	327	NC	NC
	West Reef	1	NC	NC	1,048	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
State and Territory Waters	WA	40	4	NC	53	125	NC	52	9	NC	37	52	NC	89	5	NC	31	74	NC

NC: No contact to receptor predicted for specified threshold.

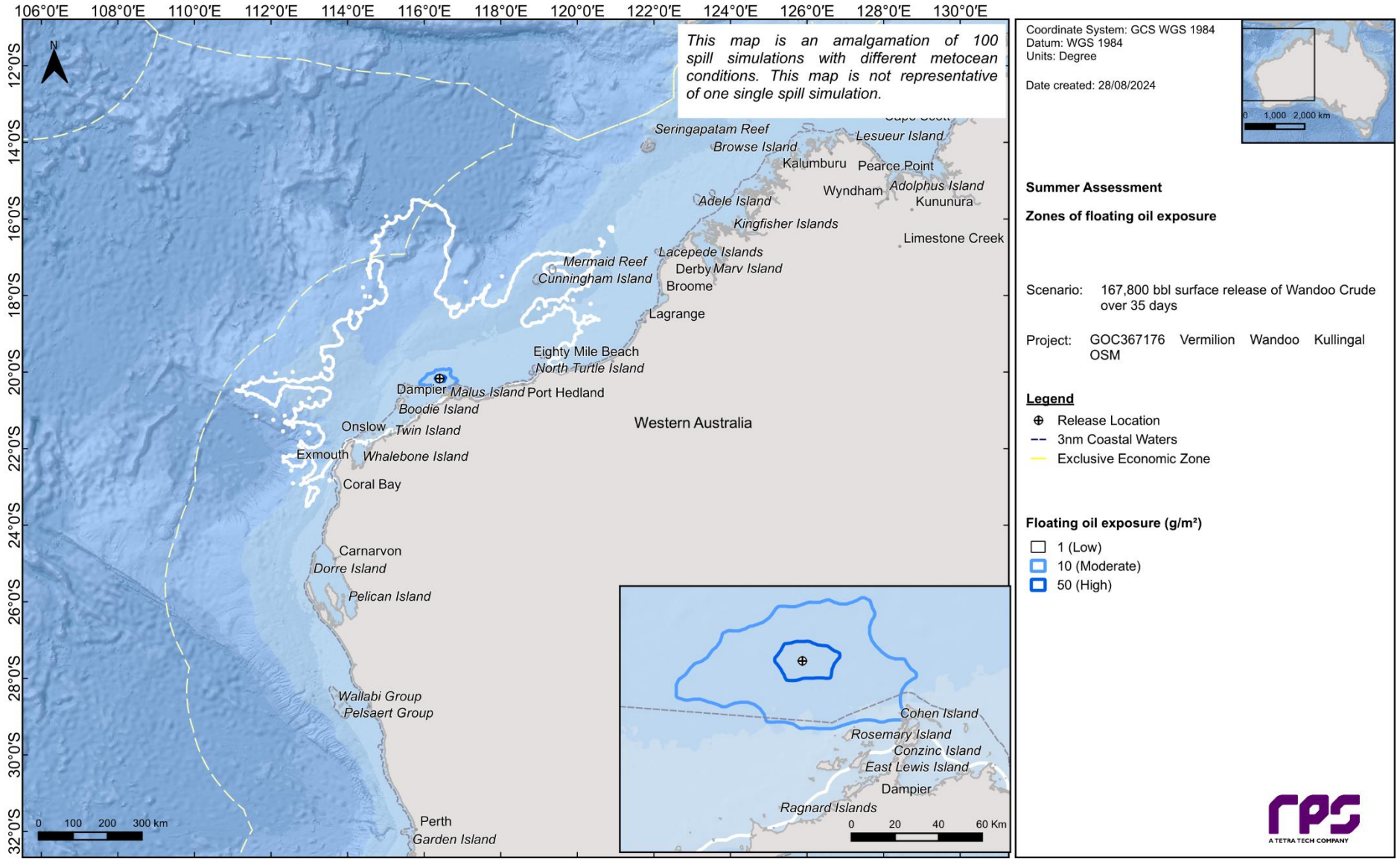


Figure 13.2 Predicted zones of floating oil exposure following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

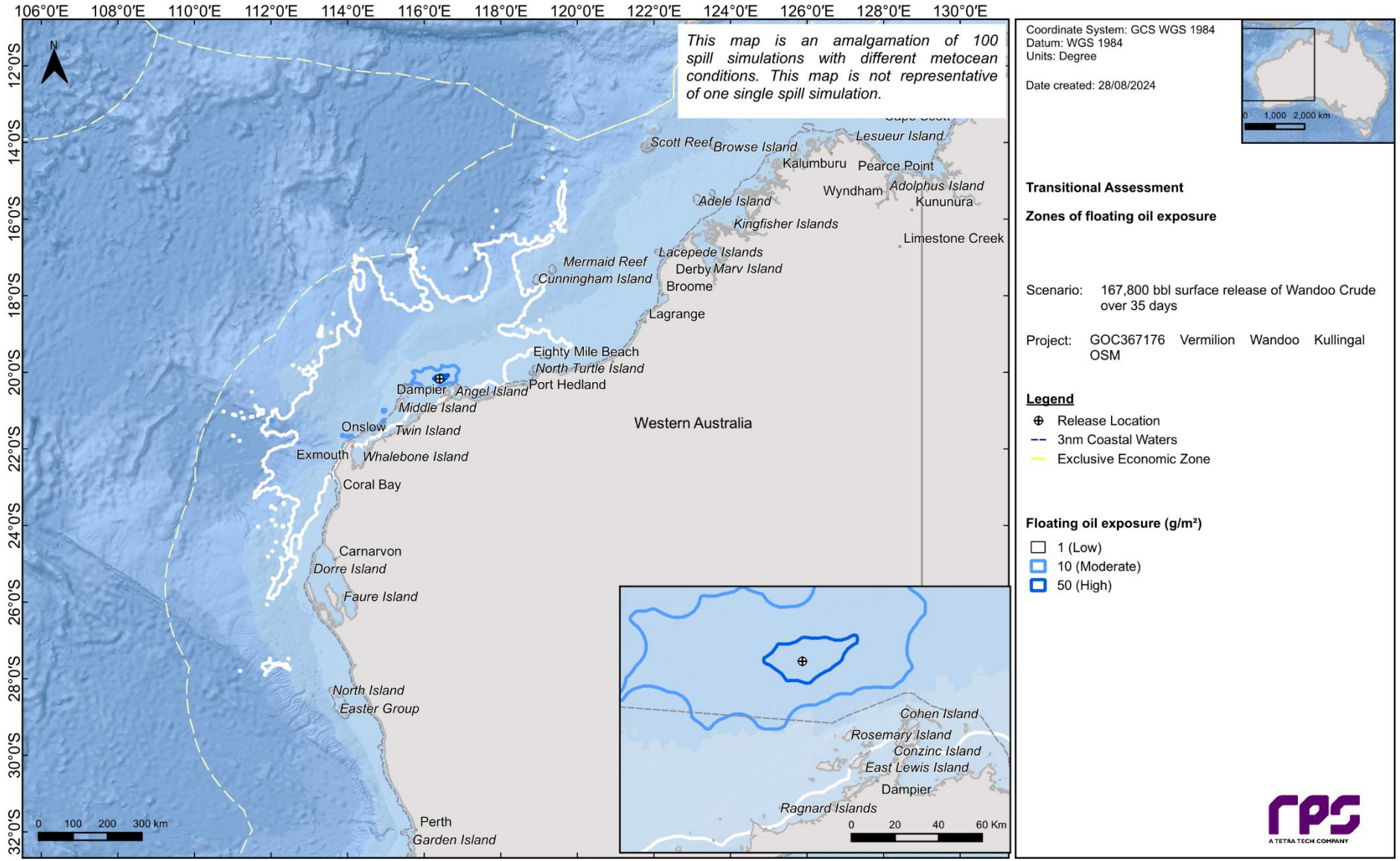


Figure 13.3 Predicted zones of floating oil exposure following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

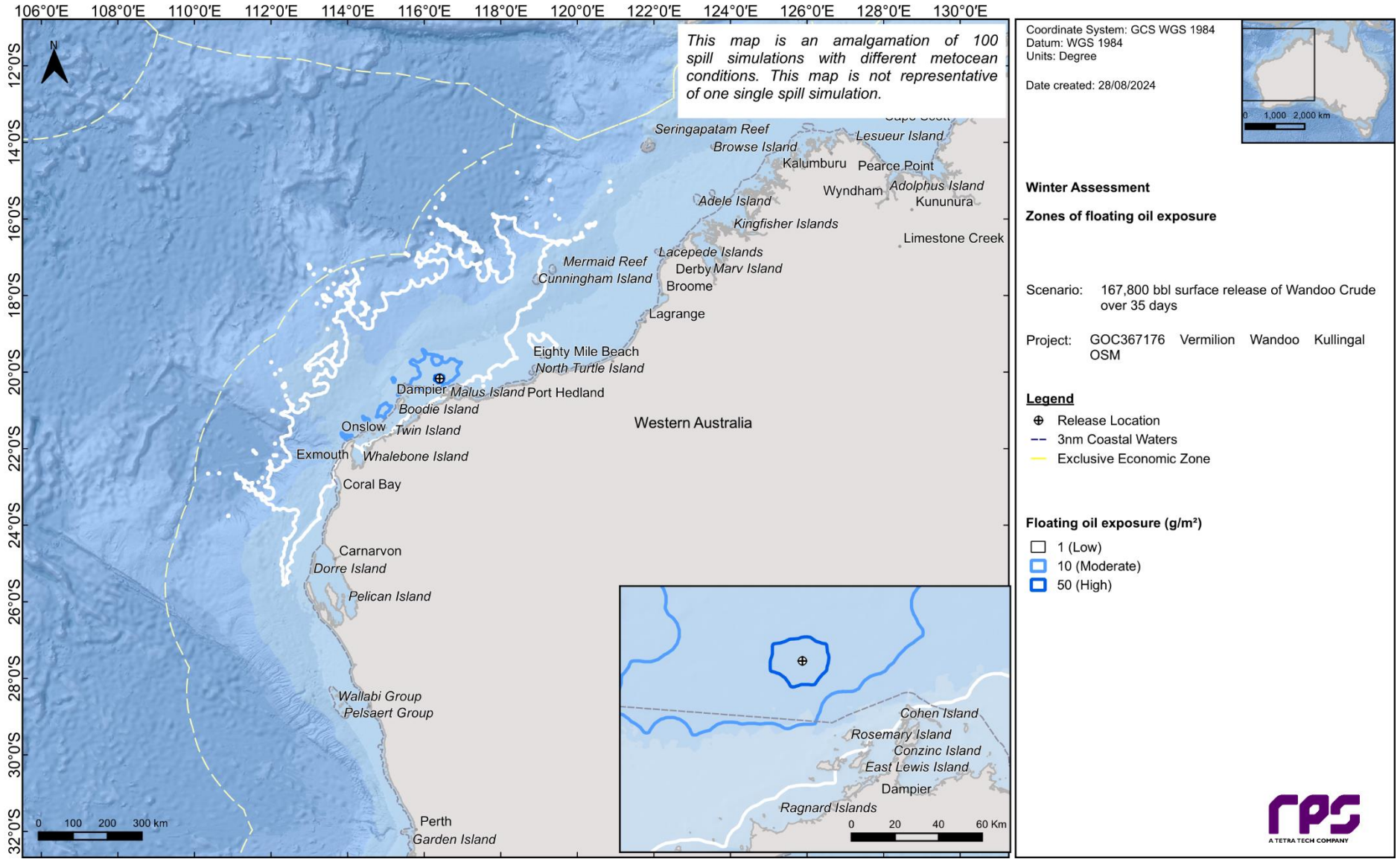


Figure 13.4 Predicted zones of floating oil exposure following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

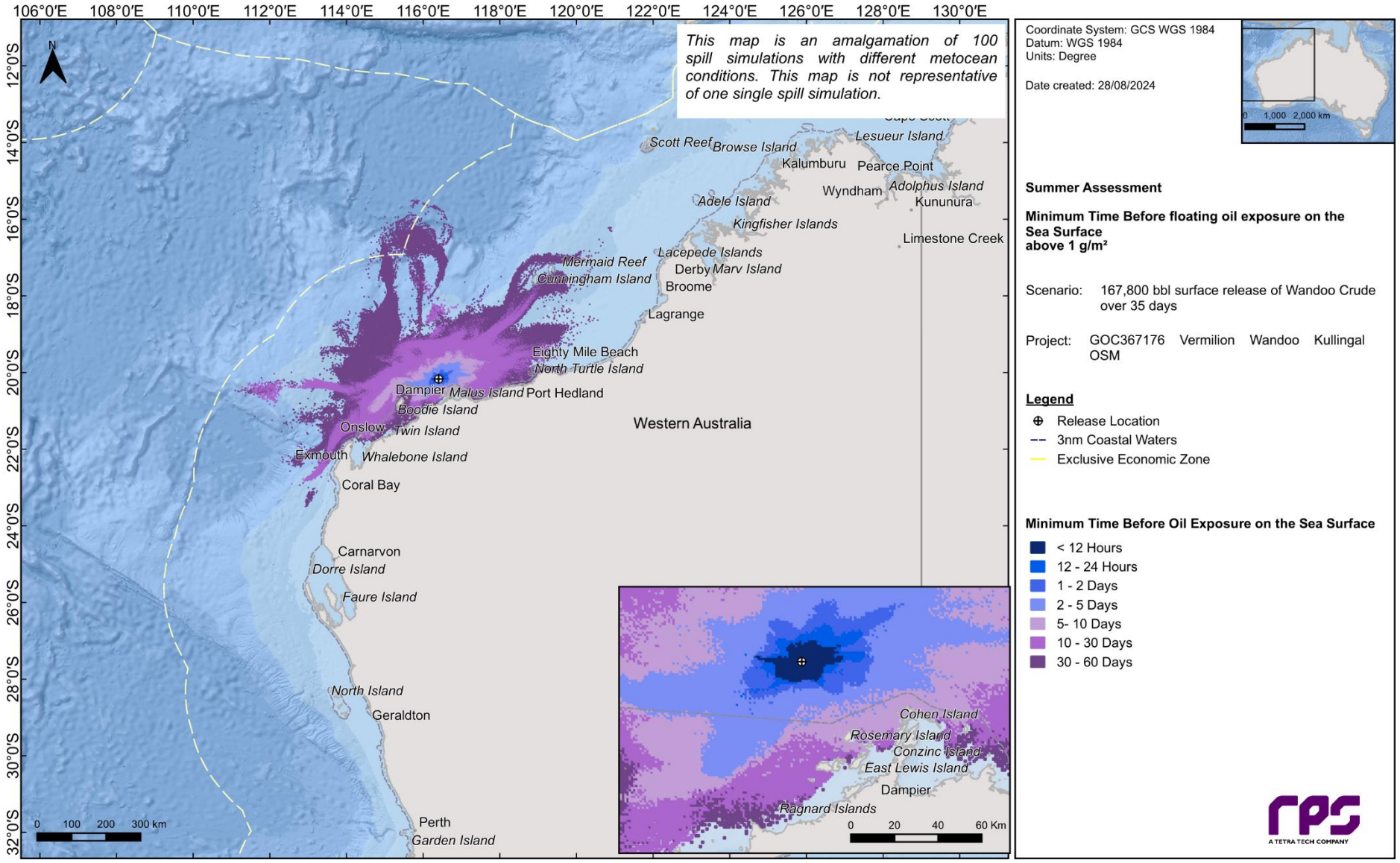


Figure 13.5 Minimum time before floating oil exposure at, or above, 1 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

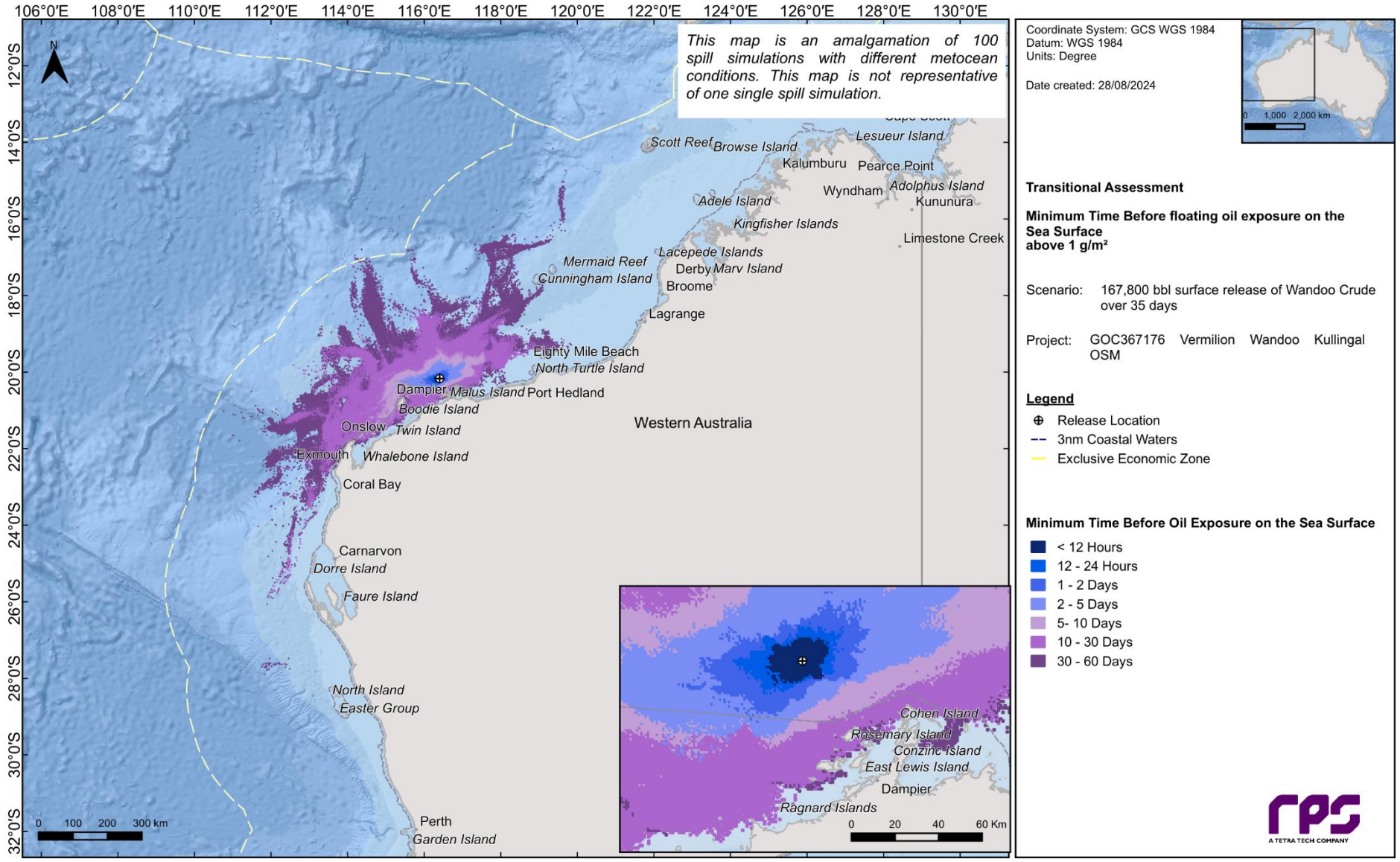


Figure 13.6 Minimum time before floating oil exposure at, or above, 1 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

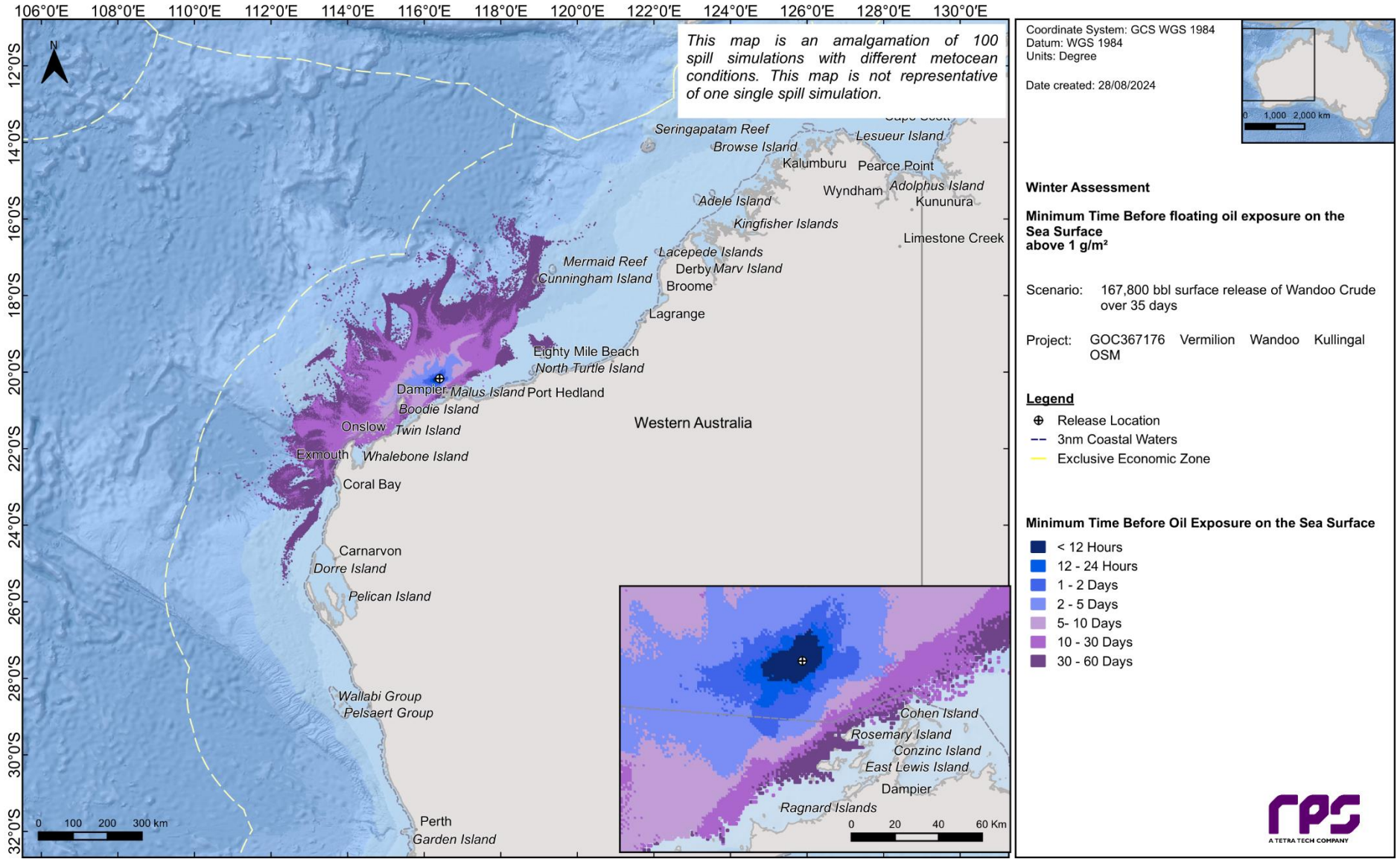


Figure 13.7 Minimum time before floating oil exposure at, or above, 1 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

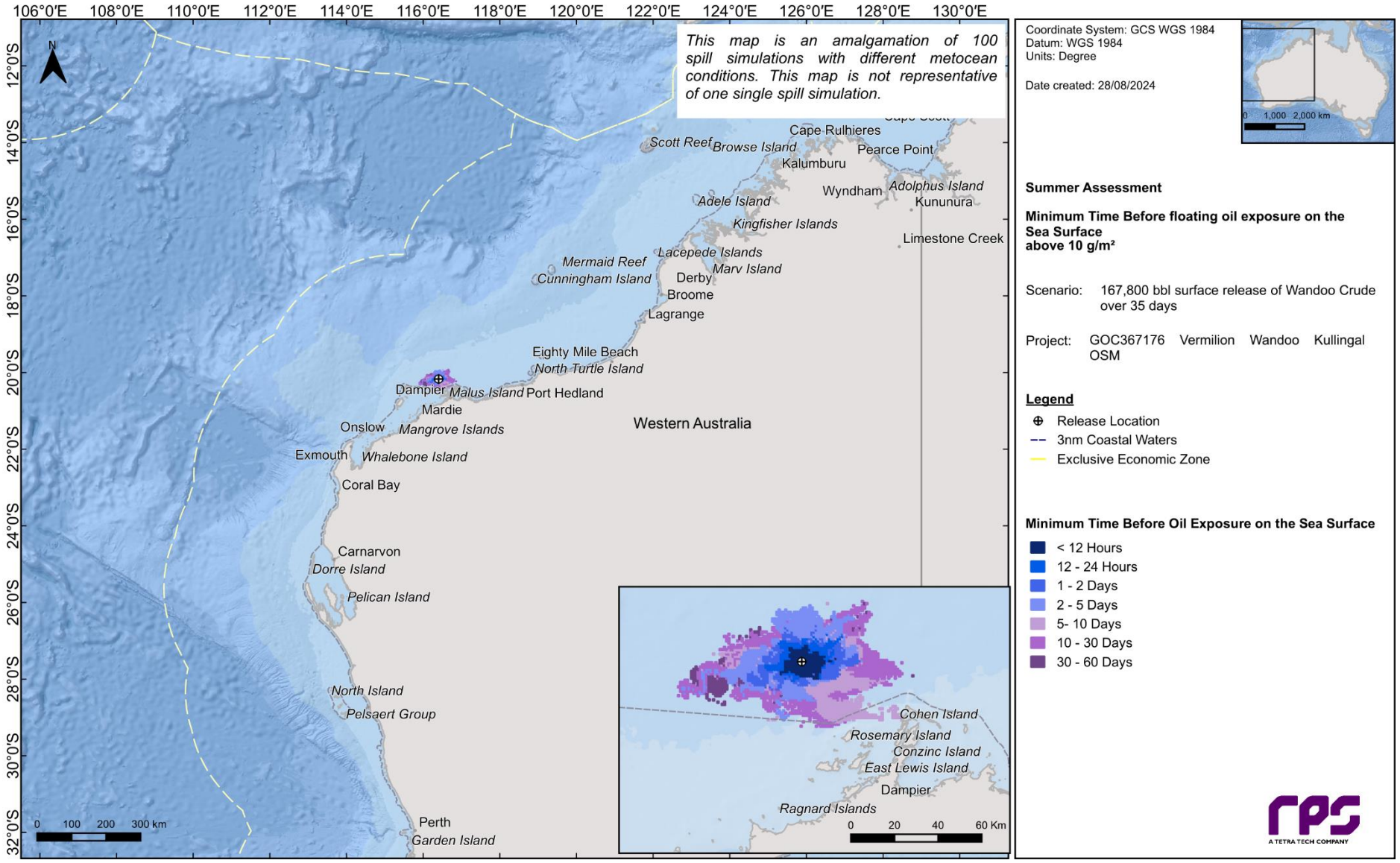


Figure 13.8 Minimum time before floating oil exposure at, or above, 10 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

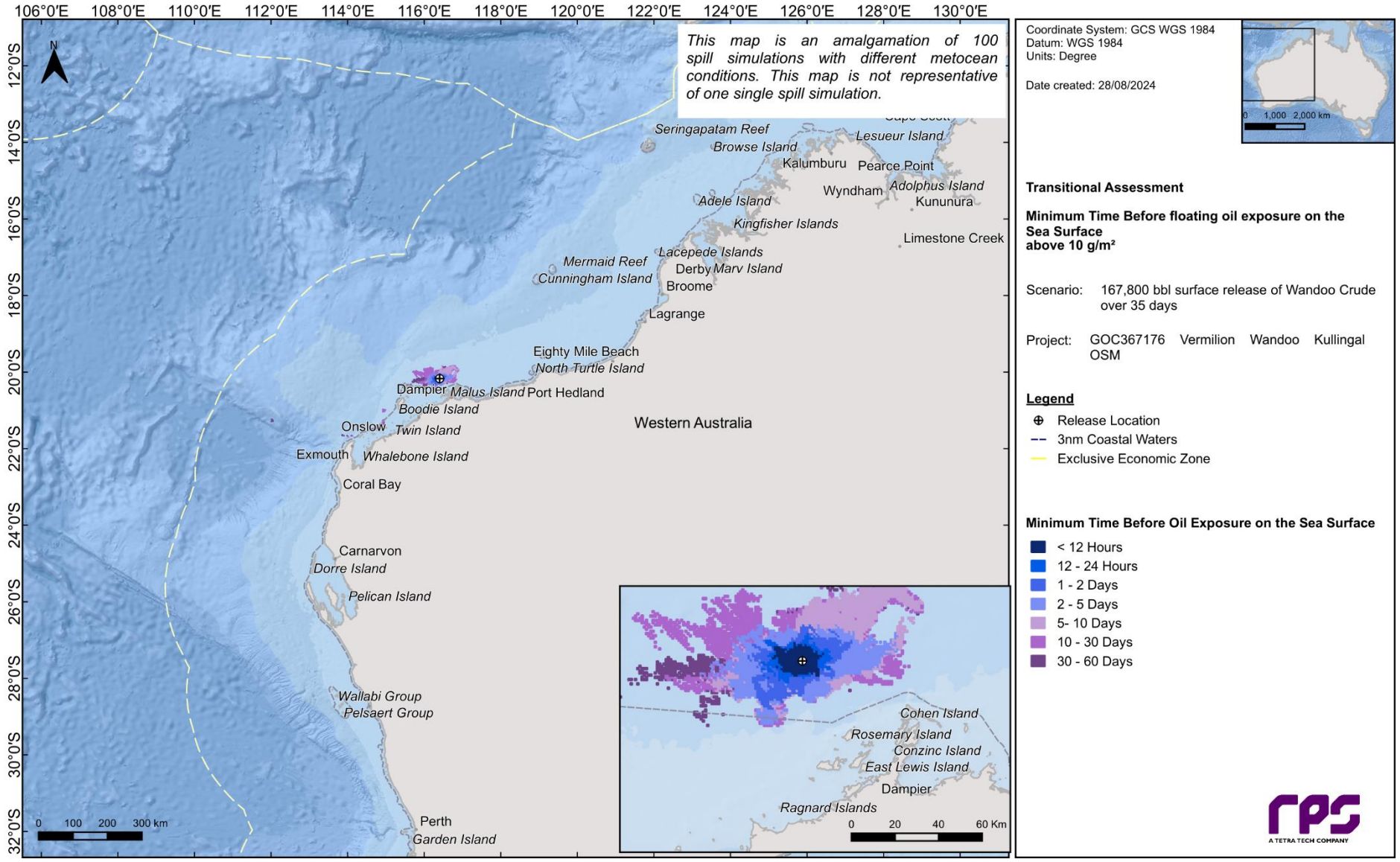


Figure 13.9 Minimum time before floating oil exposure at, or above, 10 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

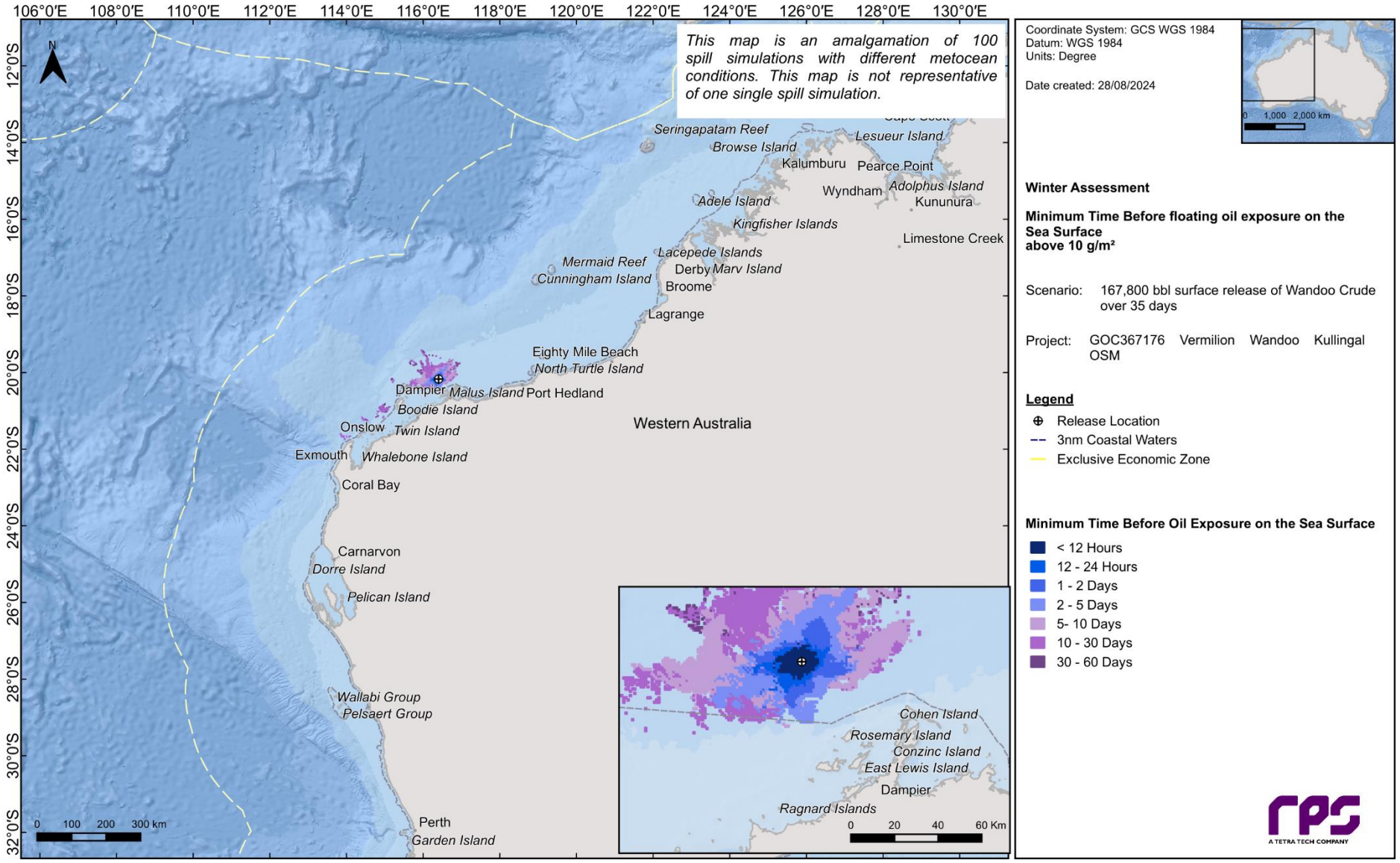


Figure 13.10 Minimum time before floating oil exposure at, or above, 10 g/m^2 following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

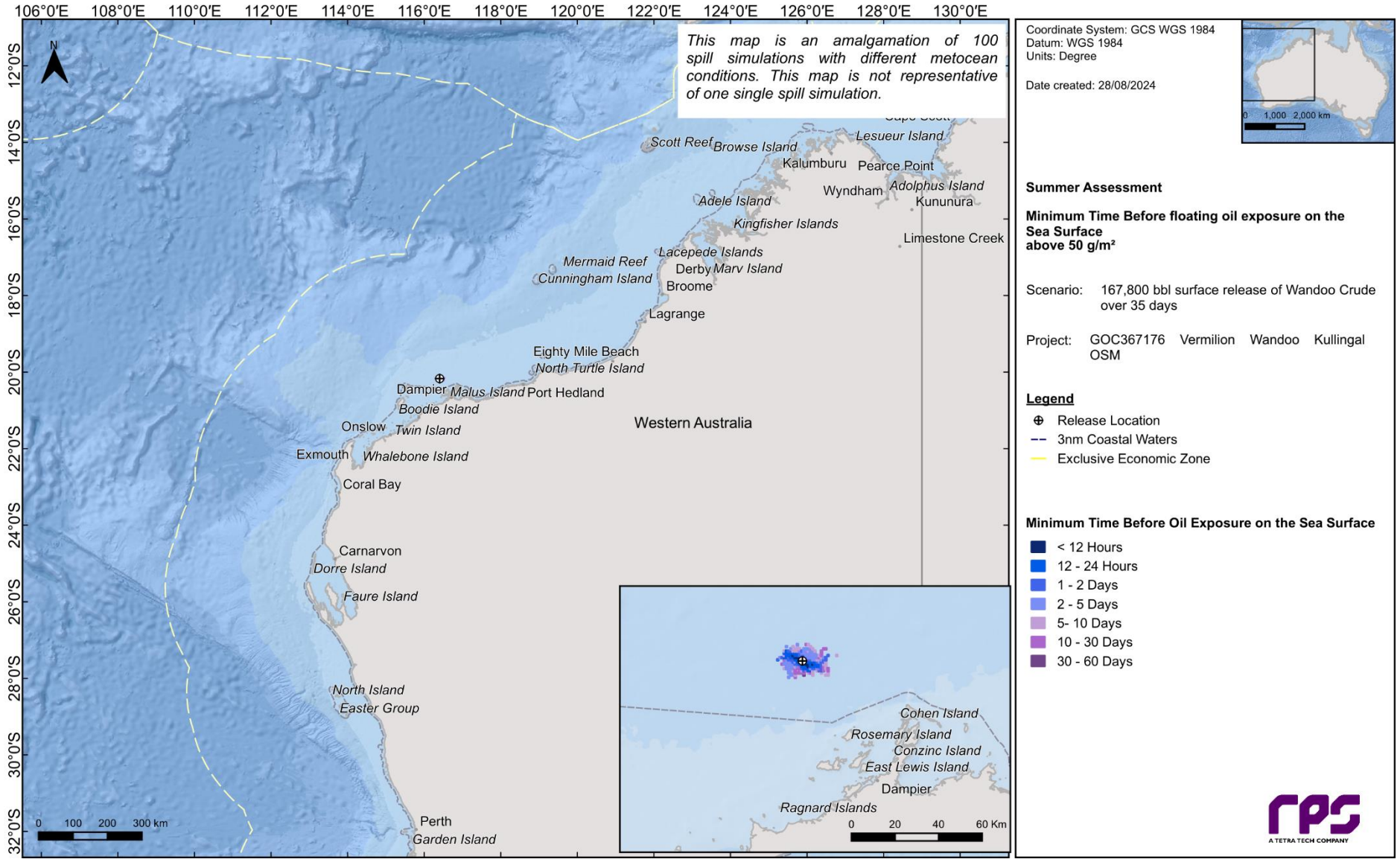


Figure 13.11 Minimum time before floating oil exposure at, or above, 50 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

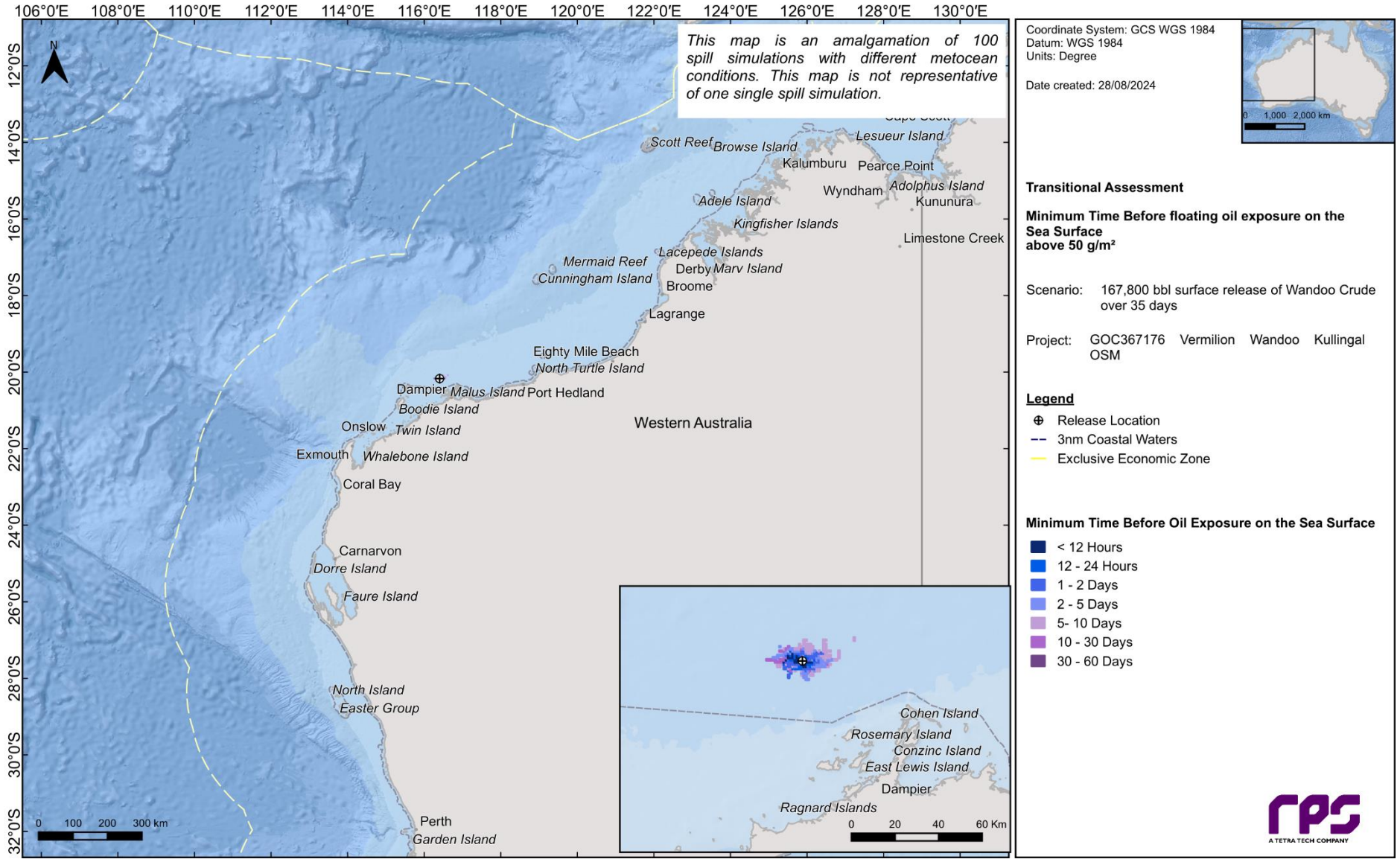


Figure 13.12 Minimum time before floating oil exposure at, or above, 50 g/m^2 following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

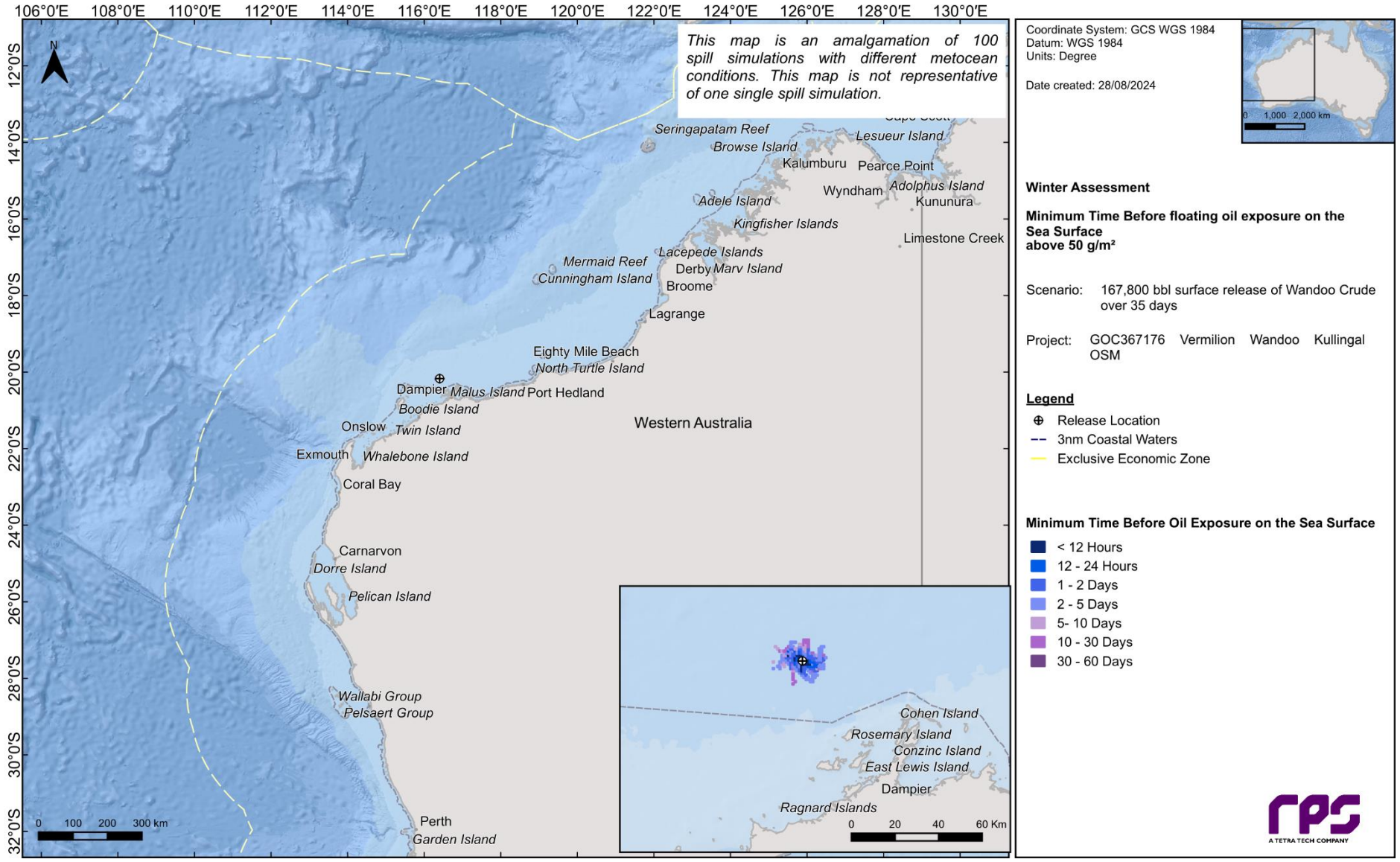


Figure 13.13 Minimum time before floating oil exposure at, or above, 50 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

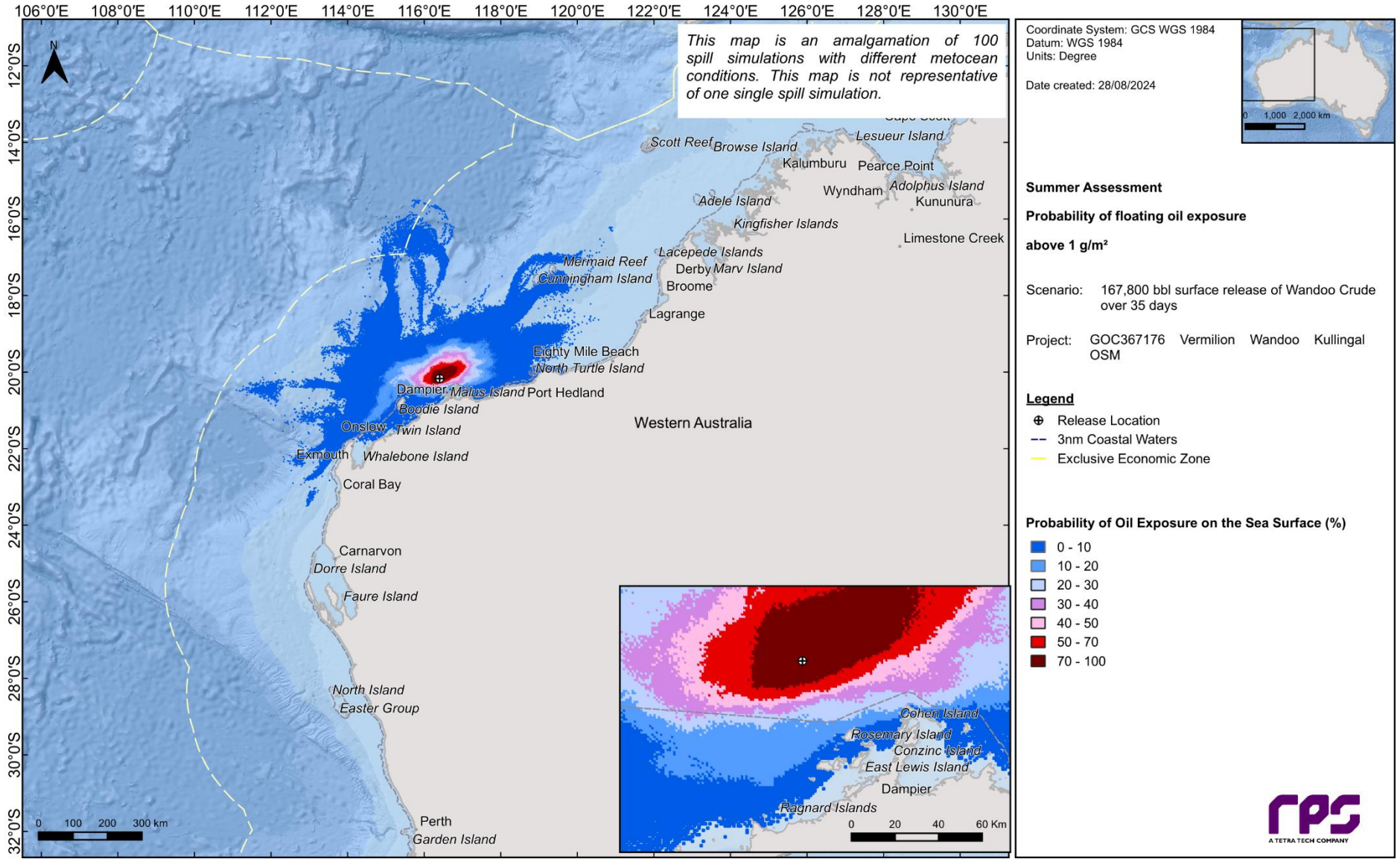


Figure 13.14 Probability of floating oil exposure at, or above, 1 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

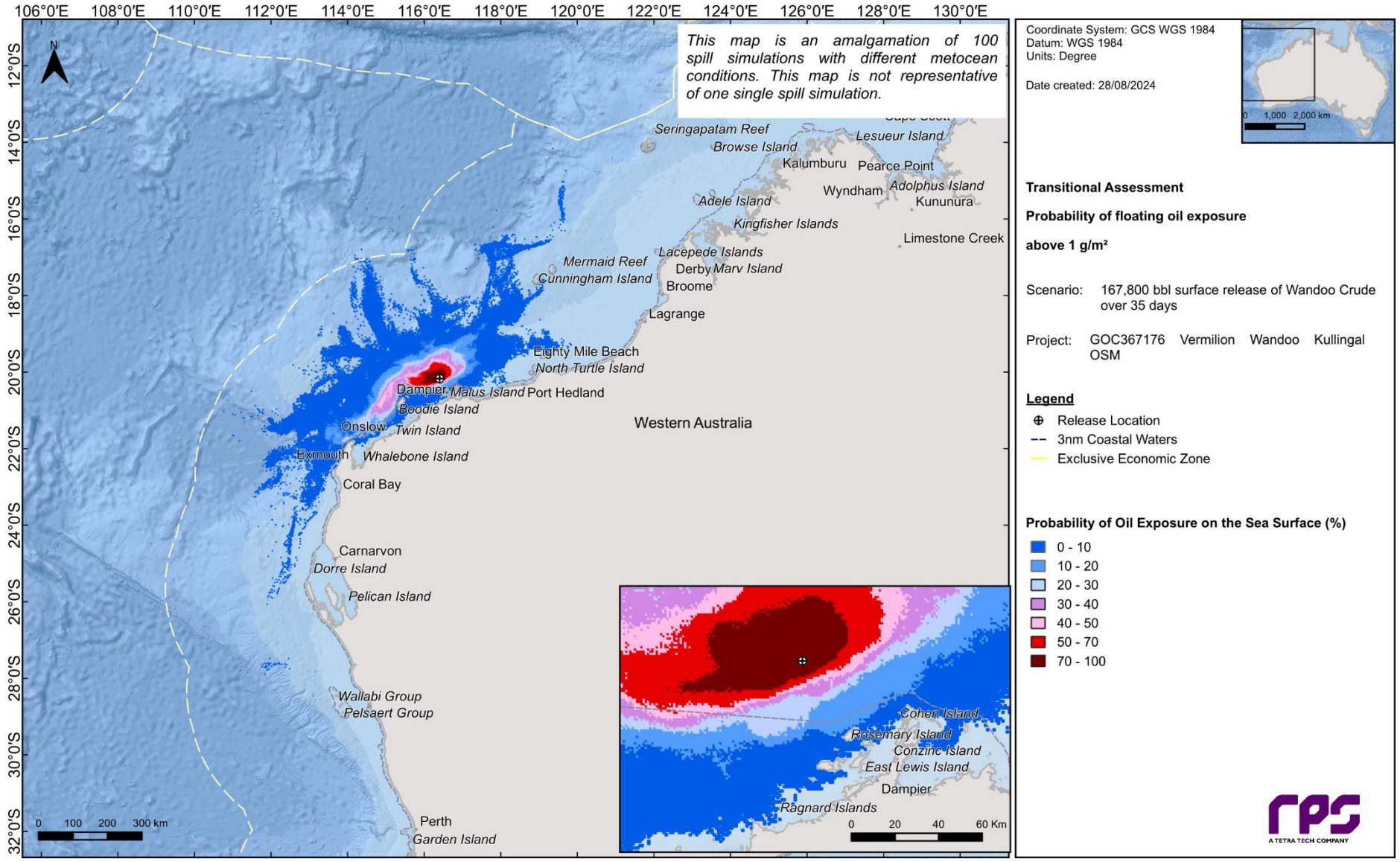


Figure 13.15 Probability of floating oil exposure at, or above, 1 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

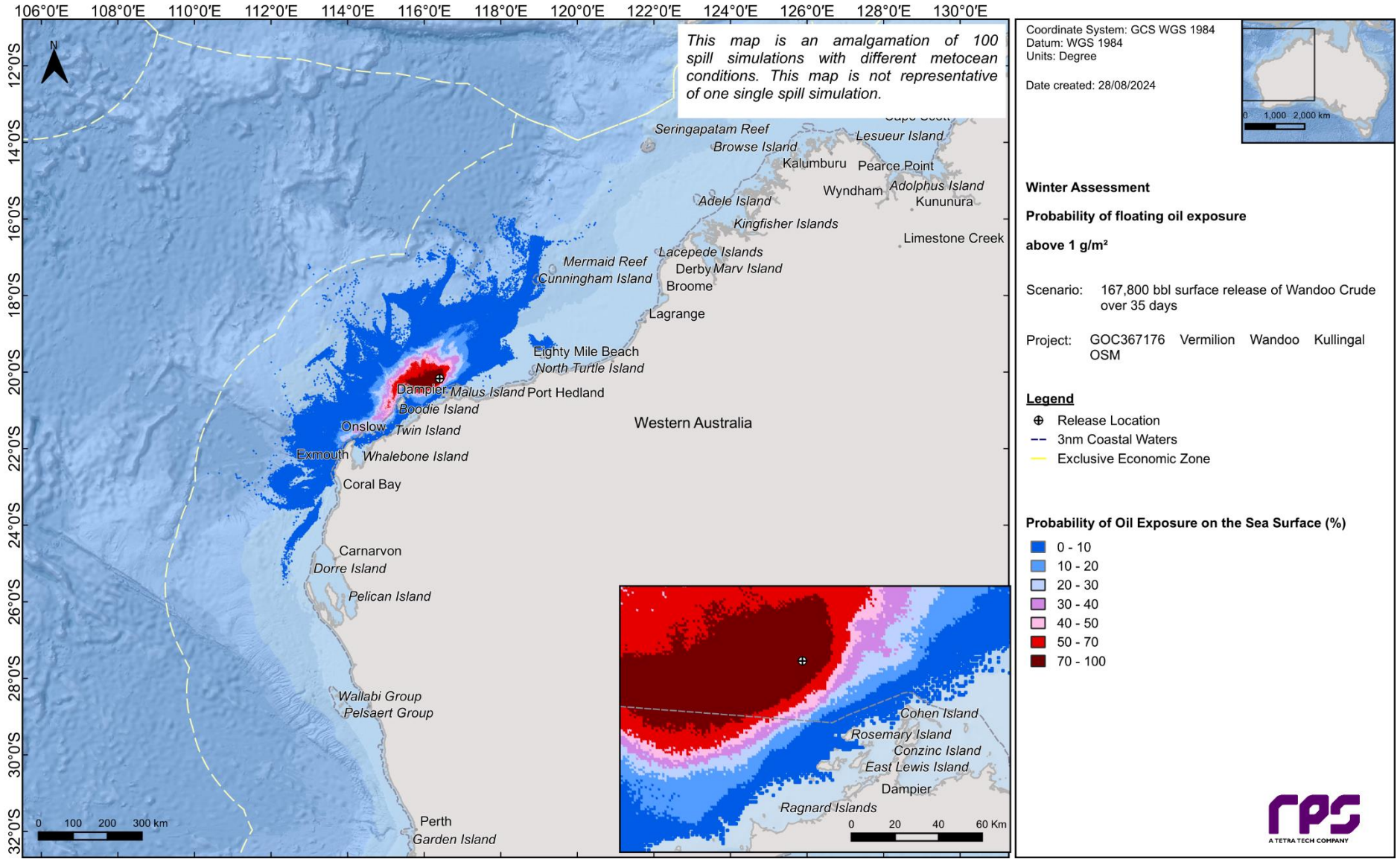


Figure 13.16 Probability of floating oil exposure at, or above, 1 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

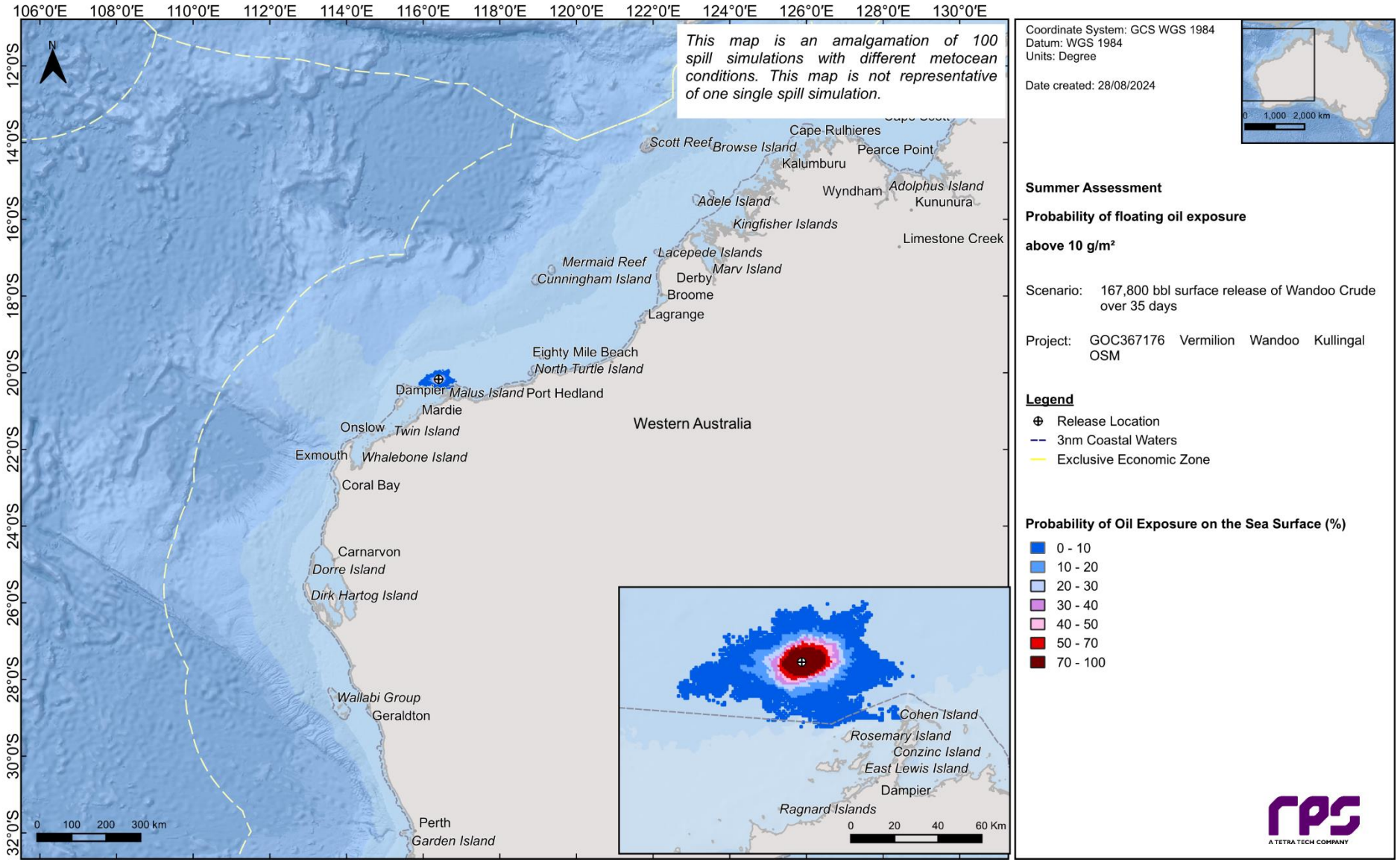


Figure 13.17 Probability of floating oil exposure at, or above, 10 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

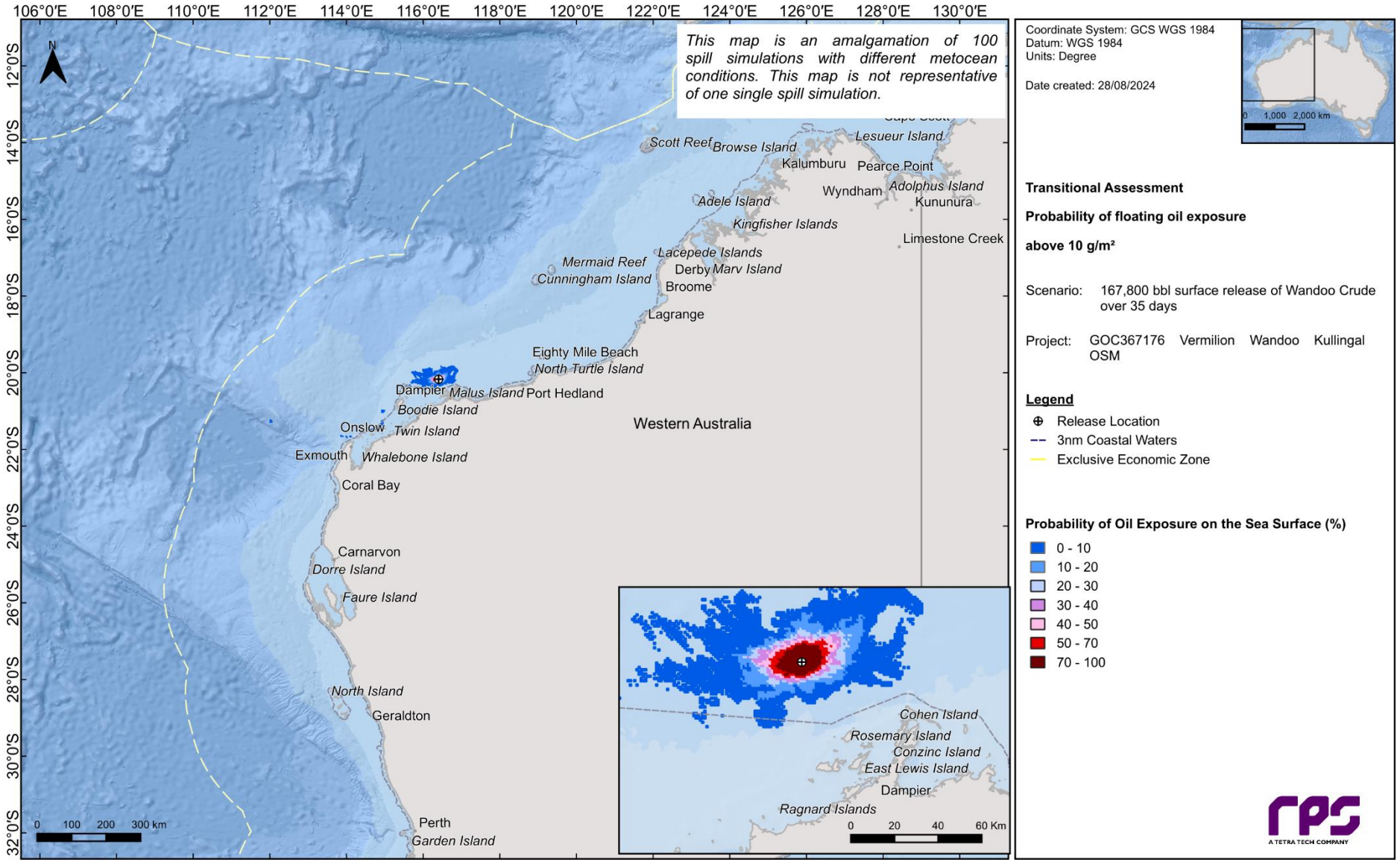


Figure 13.18 Probability of floating oil exposure at, or above, 10 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

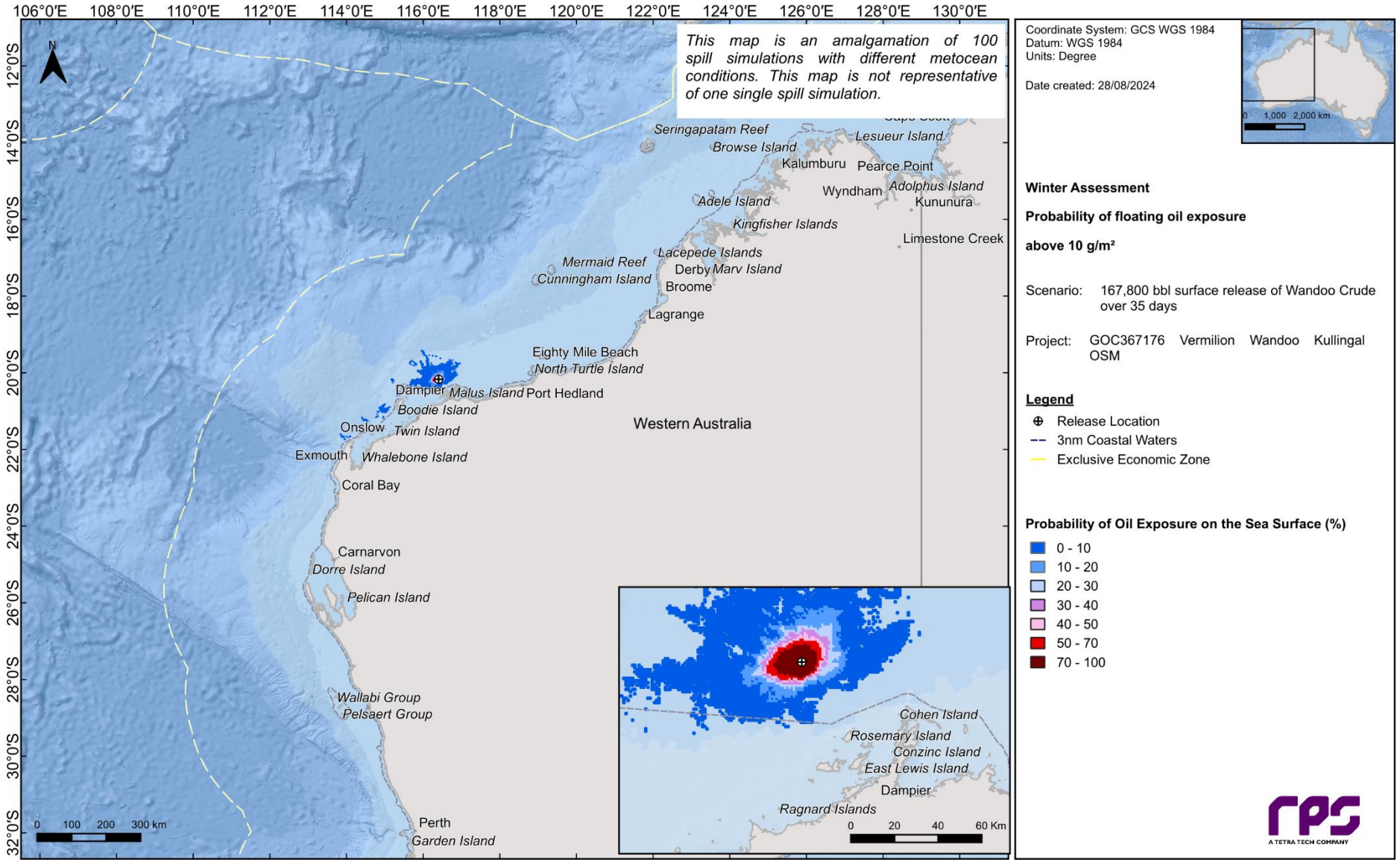


Figure 13.19 Probability of floating oil exposure at, or above, 10 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

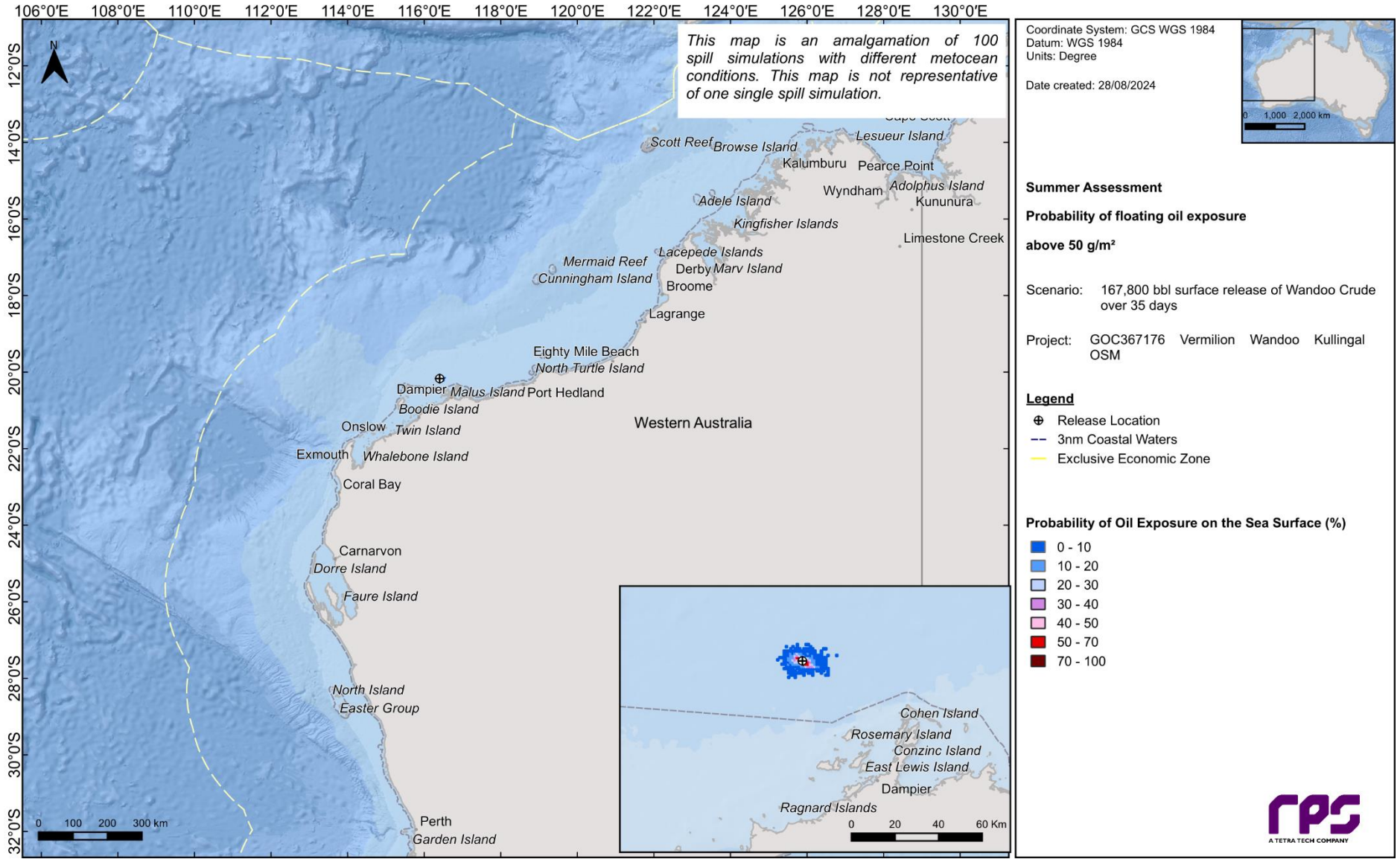


Figure 13.20 Probability of floating oil exposure at, or above, 50 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

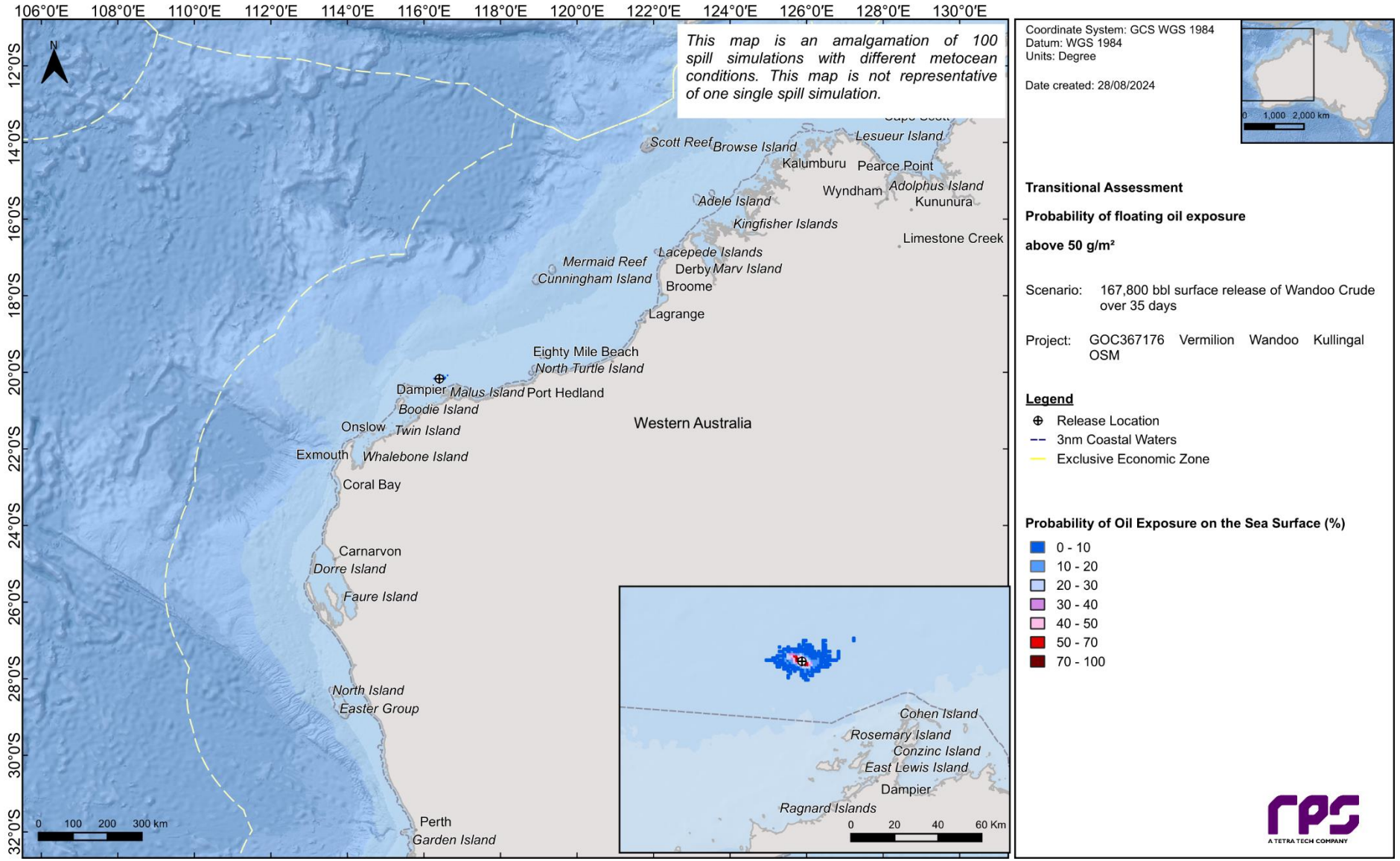


Figure 13.21 Probability of floating oil exposure at, or above, 50 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

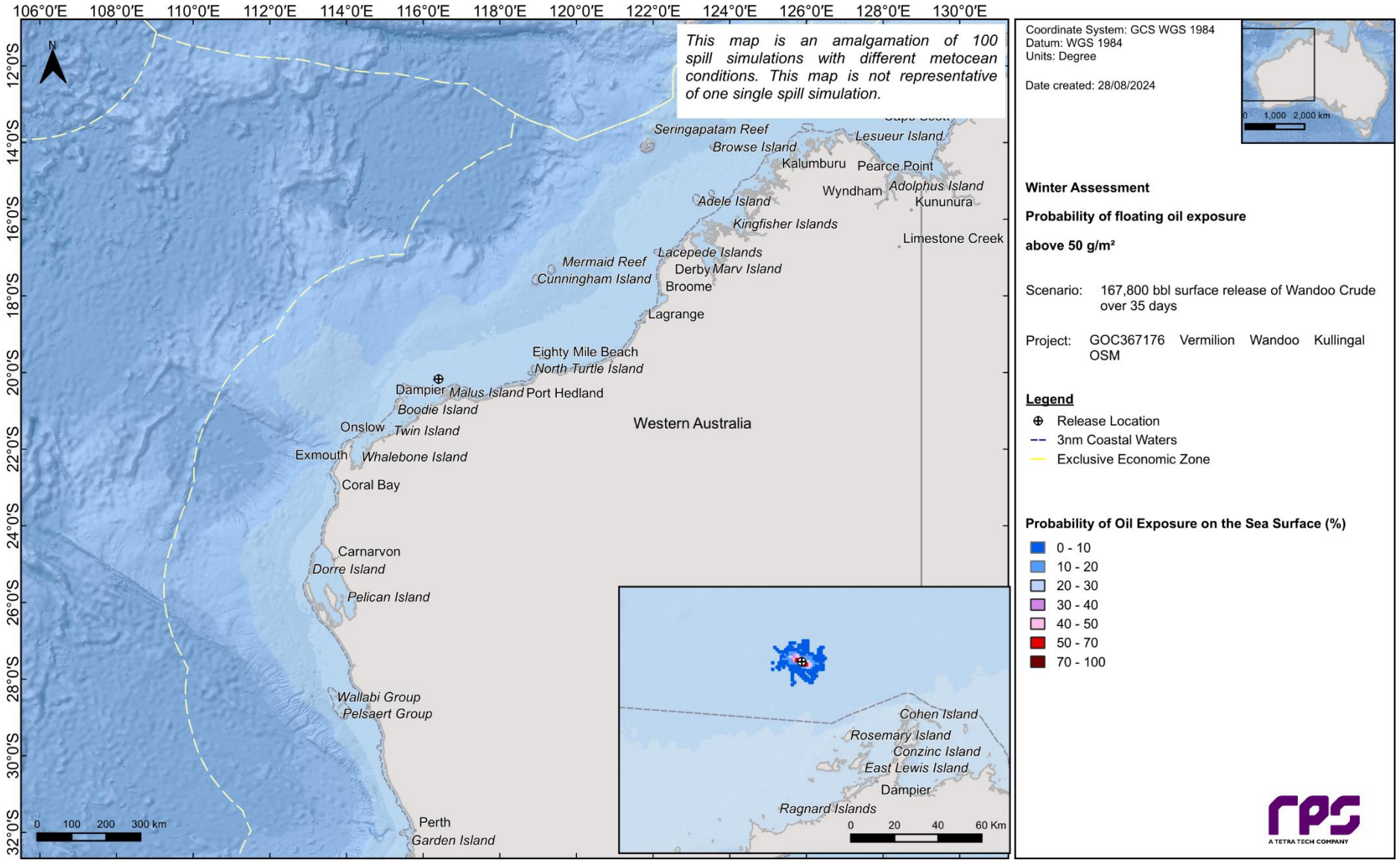


Figure 13.22 Probability of floating oil exposure at, or above, 50 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

13.1.3 Shoreline accumulation

Table 13.3 summarizes the predicted oil accumulation on shorelines across different seasons and thresholds. The highest probability of accumulation at, or above, the 10 g/m^2 threshold was recorded during winter, reaching 100%. The shortest time for oil to accumulate on any shoreline at this threshold was 69 hours, also during winter. The maximum volume of oil ashore from a single spill was 4,550.0 m^3, occurring during the summer season.

Table 13.4 to Table 13.6 present the predicted oil accumulation for specific shoreline cells for each season.

The highest probability of shoreline oil accumulation at, or above, the 10 g/m^2 threshold for a specific shoreline cell was forecast for WA11.West (318) - Barrow Island and Montebello Islands (A), with probabilities of 51%, 61%, and 92% during the summer, transitional, and winter seasons, respectively. During summer conditions, WA11.East (316) - West Intercourse Island - Dolphin Island North Point (F) shoreline cell recorded the fastest oil accumulation at 78 hours. During the transitional (85 hours) and winter (69 hours) conditions, WA11.West (318) - Barrow Island and Montebello Islands (A) recorded the quickest time for oil accumulation at, or above, the 10 g/m^2 threshold. Additionally, WA11.West (318) - Barrow Island and Montebello Islands (A) registered the highest volume of oil ashore across all shoreline cells, with 2,570 m^3, during a spill simulation that commenced under transitional conditions (see Table 13.5).

The maximum potential shoreline oil accumulation for each season are presented in Figure 13.23 to Figure 13.25. Probabilities of oil accumulation for each of the thresholds and seasons are presented in Figure 13.26 to Figure 13.34.

Table 13.3 Summary of oil accumulation on any shoreline following a surface LOWC at Kullingal. Results were calculated from 100 spill simulations per season.

Shoreline statistics	Summer			Transitional			Winter		
	Shoreline accumulation thresholds			Shoreline accumulation thresholds			Shoreline accumulation thresholds		
	10 g/m^2	100 g/m^2	1000 g/m^2	10 g/m^2	100 g/m^2	1,000 g/m^2	10 g/m^2	100 g/m^2	1,000 g/m^2
Probability of contact to any shoreline (%)	93	79	56	87	75	57	100	99	82
Absolute minimum time to shore (hours)	78	93	158	85	108	167	69	78	111
Maximum accumulated volume (m^3) from a single spill simulation	4,550.0	4,431.1	3,474.1	3,670.2	3,589.5	3,179.4	3,637.2	3,579.2	2,972.3
Average accumulated volume (m^3) across all spill simulations	719.9	668.5	400.0	719.0	688.6	516.3	1208.6	1170.0	901.7
Maximum length of shoreline (km) from a single spill simulation	1,320.0	588.0	122.0	524.0	268.0	102.0	518.0	248.0	85.0
Average length of shoreline (km) across all spill simulations	248.4	97.2	17.3	166.5	65.2	17.0	224.6	105.8	30.0

Table 13.4 Summary of shoreline oil accumulation on WAMOPRA shoreline cells following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

WAMOPRA shoreline cells	Probability (%) of shoreline oil on receptors at			Minimum time to receptor (hours) for shoreline oil at			Maximum local accumulated concentration (g/m²)		Maximum accumulated volume (m³) along this shoreline with concentrations ≥ 10 g/m²		Maximum accumulated volume (m³) along this shoreline with concentrations ≥ 100 g/m²		Maximum accumulated volume (m³) along this shoreline with concentrations ≥ 1,000 g/m²		Maximum length of shoreline (km) with concentrations ≥ 10 g/m²		Maximum length of shoreline (km) with concentrations ≥ 100 g/m²		Maximum length of shoreline (km) with concentrations ≥ 1,000 g/m²	
	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all replicate spills	in the worst replicate spill	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation
WA06 (199) - Wreck Point - Guilderton	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA07 (195) - Thirsty Point - Booker Valley	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA08 (332) - Bowes River - Broken Anchor Bay (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA08 (333) - Bowes River - Broken Anchor Bay (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA08 (334) - Glenfield Beach - Bowes River (A)	1	NC	NC	1,284	NC	NC	0.1	12	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA08 (335) - Glenfield Beach - Bowes River (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA08 (336) - Glenfield Beach - Bowes River (C)	1	NC	NC	1,263	NC	NC	0.1	12	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA09 (169) - Cape Inscription - Herald Bay N (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA09 (170) - Steep Point - Quoin Head (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA09 (171) - Steep Point - Quoin Head (C)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA09 (172) - Steep Point - Quoin Head (D)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA09 (173) - Steep Point - Quoin Head (E)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA09 (174) - Kakura Dunes coast - Zuytdorp Point (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA09 (175) - Kakura Dunes coast - Zuytdorp Point (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA09 (176) - Kakura Dunes coast - Zuytdorp Point (C)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA09 (177) - Kakura Dunes coast - Zuytdorp Point (D)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA09 (178) - Nunginjay Spring coast N - Kakura Dunes coast (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA09 (330) - Dorre Island and Bernier Island (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA09 (331) - Dorre Island and Bernier Island (B)	1	NC	NC	1,219	NC	NC	0.1	14	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA10 (120) - Bundegi - Shothole Canyon N (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA10 (121) - Bundegi - Shothole Canyon N (B)	1	NC	NC	1,188	NC	NC	0.1	14	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA10 (122) - Vlamingh Head - North West Cape	10	3	NC	462	932	NC	12	362	<1	9	<1	7	NC	NC	<1	9	<1	3	NC	NC
WA10 (123) - Low Point - Vlamingh Head (A)	11	4	NC	445	933	NC	8.8	275	<1	17	<1	15	NC	NC	2	15	<1	10	NC	NC
WA10 (124) - Low Point - Vlamingh Head (B)	11	4	NC	919	933	NC	17	636	2	50	2	47	NC	NC	2	19	<1	13	NC	NC
WA10 (125) - Osprey Bay - Low Point	5	4	NC	691	933	NC	15	540	2	51	2	50	NC	NC	<1	16	<1	15	NC	NC
WA10 (126) - Winderabandi Point - Osprey Bay	5	3	NC	651	929	NC	16	659	<1	27	<1	22	NC	NC	<1	18	<1	10	NC	NC
WA10 (127) - Coast Hill - Point Cloates	5	3	NC	813	979	NC	7.3	309	<1	22	<1	18	NC	NC	<1	16	<1	10	NC	NC
WA10 (128) - Point Maud - Coast Hill (A)	3	2	NC	1,047	1,196	NC	4.2	221	<1	5	<1	3	NC	NC	<1	11	<1	1	NC	NC
WA10 (130) - Alison Point - Point Maud	3	NC	NC	1,086	NC	NC	0.6	36	<1	<1	NC	NC	NC	NC	<1	5	NC	NC	NC	NC
WA10 (132) - Gnarraloo Bay - Alison Point (B)	1	NC	NC	1,271	NC	NC	0.1	13	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA10 (133) - Red Bluff - Gnarraloo Bay (A)	3	NC	NC	1,066	NC	NC	0.4	25	<1	<1	NC	NC	NC	NC	<1	5	NC	NC	NC	NC
WA10 (134) - Red Bluff - Gnarraloo Bay (B)	3	NC	NC	1,037	NC	NC	0.6	25	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA10 (135) - Red Bluff - Gnarraloo Bay (C)	2	NC	NC	1,182	NC	NC	0.3	25	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA10 (136) - Point Quobba - Cape Cuvier (A)	1	NC	NC	1,171	NC	NC	0.1	13	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA11.East (100) - Sherlock coast - Cape Cossigny (B)	20	10	3	409	525	710	84	2,988	7	262	6	260	3	146	4	36	1	31	<1	8
WA11.East (101) - Cape Lambert - Sherlock coast (A)	12	4	2	497	548	1,221	34	1,475	3	89	2	82	<1	29	2	42	<1	25	<1	2
WA11.East (102) - Cape Lambert - Sherlock coast (B)	26	13	3	337	525	694	153	5,573	5	160	5	153	3	131	3	26	<1	14	<1	5
WA11.East (103) - West Intercourse Island - Dolphin Island N point (A)	4	NC	NC	584	NC	NC	1.4	67	<1	2	NC	NC	NC	NC	<1	10	NC	NC	NC	NC

WA11.East (104) - West Intercourse Island - Dolphin Island N point (B)	32	15	4	214	288	652	126	3,379	5	107	4	104	2	73	4	25	<1	11	<1	3
WA11.East (105) - West Intercourse Island - Dolphin Island N point (C)	43	35	27	110	165	204	1,148	18,921	72	1,331	71	1,328	54	1,270	12	45	7	36	2	25
WA11.East (106) - West Intercourse Island - Dolphin Island N point (D)	16	5	NC	196	711	NC	13	264	<1	12	<1	6	NC	NC	3	25	<1	4	NC	NC
WA11.East (107) - West Intercourse Island - Dolphin Island N point (E)	10	4	NC	165	876	NC	6.6	142	<1	12	<1	5	NC	NC	2	22	<1	4	NC	NC
WA11.East (108) - Pelican Point - West Intercourse Island	19	10	4	126	563	737	104	1,963	6	107	5	101	<1	32	4	45	2	21	<1	2
WA11.East (109) - James Point - Cape Preston	18	14	9	318	487	576	159	2,127	8	125	7	116	4	61	4	40	2	24	<1	3
WA11.East (315) - Dolphin Island N point - Cinders Rd coast	34	22	5	215	230	288	315	7,435	10	223	9	222	6	210	3	12	2	10	<1	7
WA11.East (316) - West Intercourse Island - Dolphin Island N point (F)	39	30	21	78	93	158	829	12,152	54	737	52	728	41	638	12	63	5	43	2	17
WA11.East (317) - West Intercourse Island - Dolphin Island N point (G)	34	29	21	84	130	158	1,151	12,791	37	465	35	458	26	358	9	48	4	35	<1	11
WA11.East (95) - Turner River NE foreland - Beebingara Creek coast E (A)	39	21	8	424	470	756	194	2,614	12	154	11	150	4	95	8	28	3	20	<1	5
WA11.East (96) - Turner River NE foreland - Beebingara Creek coast E (B)	35	25	9	395	413	649	203	2,372	12	141	11	136	4	74	7	29	3	18	<1	4
WA11.East (97) - Cape Thouin - Turner River NE foreland	33	25	10	377	399	496	253	2,968	29	304	28	302	16	264	7	29	5	22	<1	16
WA11.East (98) - Cape Cossigny - Cape Thouin	26	20	3	378	400	502	145	3,512	16	381	15	376	9	326	6	30	3	22	<1	15
WA11.East (99) - Sherlock coast - Cape Cossigny (A)	23	15	3	377	449	684	135	3,624	14	383	12	377	8	288	6	55	2	35	<1	14
WA11.West (110) - Mount Salt coast W - James Point	16	11	5	284	499	570	79	1,992	12	319	11	315	5	190	4	48	2	40	<1	12
WA11.West (111) - Peter Creek coast E - Mount Salt coast W	17	10	3	301	326	949	118	3,649	12	398	11	389	7	286	4	55	2	40	<1	13
WA11.West (112) - Weld Island coast S - Peter Creek coast E	6	4	3	307	627	1,055	52	1,859	5	159	5	146	2	54	3	52	<1	30	<1	4
WA11.West (113) - Coolgra Point W - Yardie Landing (A)	6	4	2	299	833	1,050	35	1,219	2	43	2	40	<1	13	<1	14	<1	8	<1	1
WA11.West (114) - Coolgra Point W - Yardie Landing (B)	6	3	NC	596	1,009	NC	23	794	<1	26	<1	21	NC	NC	<1	22	<1	8	NC	NC
WA11.West (115) - Hope Point - Locker Point (A)	11	9	1	565	575	782	57	1,504	2	64	2	60	<1	41	2	31	<1	6	<1	3
WA11.West (116) - Hope Point - Locker Point (B)	6	2	NC	585	1,055	NC	4.9	184	<1	15	<1	8	NC	NC	<1	20	<1	5	NC	NC
WA11.West (117) - Hope Point - Locker Point (C)	3	NC	NC	1,014	NC	NC	1.8	68	<1	3	NC	NC	NC	NC	<1	11	NC	NC	NC	NC
WA11.West (318) - Barrow Island and Montebello Islands (A)	51	38	22	84	115	401	1,330	20,212	161	1,388	157	1,382	124	1,339	23	67	13	59	4	34
WA11.West (319) - Barrow Island and Montebello Islands (B)	46	33	8	142	204	801	311	4,969	26	382	25	382	17	368	5	15	3	15	<1	14
WA11.West (320) - Barrow Island and Montebello Islands (C)	33	21	5	169	196	660	113	1,664	19	240	17	232	5	152	10	56	4	34	<1	11
WA11.West (321) - Barrow Island and Montebello Islands (D)	40	22	10	173	194	398	188	2,320	20	271	18	269	7	167	9	44	4	33	<1	10
WA11.West (323) - Yardie Landing - Weld Island coast S (A)	13	6	3	275	314	941	138	5,904	7	240	7	240	6	240	<1	7	<1	7	<1	7
WA11.West (324) - Yardie Landing - Weld Island coast S (B)	17	13	4	195	219	805	85	2,055	3	59	3	59	2	59	<1	3	<1	3	<1	3
WA11.West (325) - Coolgra Point W - Yardie Landing (C)	16	11	3	193	499	764	76	1,984	5	103	5	103	<1	47	2	14	2	14	<1	3
WA11.West (326) - Baresand Point - Entrance Point E	27	17	6	406	487	541	203	6,645	18	345	17	342	9	295	4	24	3	23	<1	12
WA11.West (327) - Hope Point - Locker Point (E)	11	8	NC	552	584	NC	33	755	<1	13	<1	13	NC	NC	<1	2	<1	2	NC	NC
WA11.West (328) - Hope Point - Locker Point (F)	9	5	NC	564	580	NC	21	495	<1	22	<1	21	NC	NC	<1	13	<1	9	NC	NC
WA11.West (329) - Locker Point - Baresand Point	25	13	4	376	401	740	92	2,768	11	257	10	253	4	209	5	30	2	23	<1	12
WA12 (308) - Red Bluff - Chimney Rocks (B)	2	NC	NC	1,263	NC	NC	0.3	22	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA12 (309) - Mermaid Reef	11	5	1	804	881	953	72	5,454	2	111	2	111	2	111	<1	2	<1	2	<1	2
WA12 (310) - Clerke Reef	14	5	NC	722	787	NC	23	641	2	30	<1	27	NC	NC	<1	11	<1	6	NC	NC
WA12 (311) - Imperieuse Reef	22	9	3	621	665	826	75	2,553	6	163	5	161	3	143	3	19	<1	16	<1	10
WA12 (312) - Yan Well coast - Condini Landing (C)	39	31	15	433	455	587	277	3,197	7	72	7	72	4	62	2	4	<1	4	<1	2

WA12 (313) - Wattle Well coast - Yan Well coast (C)	43	32	14	445	469	564	371	4,256	10	100	9	100	6	100	2	4	2	4	<1	4
WA12 (314) - Wattle Well coast - Yan Well coast (D)	42	37	18	426	469	520	733	8,861	8	92	8	92	7	92	<1	1	<1	1	<1	1
WA12 (69) - Red Bluff - Chimney Rocks (A)	1	NC	NC	1,227	NC	NC	0.1	12	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA12 (70) - Coulomb Point - Red Bluff (A)	2	NC	NC	1,302	NC	NC	0.2	12	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA12 (72) - Cape Boileau - Coulomb Point (A)	1	NC	NC	1,298	NC	NC	0.1	12	<1	<1	NC	NC	NC	NC	<1	4	NC	NC	NC	NC
WA12 (73) - Cape Boileau - Coulomb Point (B)	1	NC	NC	1,298	NC	NC	0.1	12	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA12 (75) - Cape Gourdon - Cape Villaret (A)	2	NC	NC	1,245	NC	NC	0.4	33	<1	<1	NC	NC	NC	NC	<1	5	NC	NC	NC	NC
WA12 (76) - Cape Gourdon - Cape Villaret (B)	2	NC	NC	1,127	NC	NC	0.9	87	<1	4	NC	NC	NC	NC	<1	9	NC	NC	NC	NC
WA12 (77) - Saddle Hill - Cape Gourdon (A)	2	NC	NC	1,105	NC	NC	1.1	98	<1	4	NC	NC	NC	NC	<1	8	NC	NC	NC	NC
WA12 (78) - Saddle Hill - Cape Gourdon (B)	3	2	NC	1,067	1,312	NC	2.3	131	<1	12	<1	7	NC	NC	<1	16	<1	5	NC	NC
WA12 (79) - Tryon Point - False Cape Bossut (A)	2	2	NC	1,046	1,201	NC	4.2	265	<1	18	<1	12	NC	NC	<1	28	<1	6	NC	NC
WA12 (80) - Tryon Point - False Cape Bossut (B)	3	2	NC	979	1,235	NC	5	404	<1	27	<1	22	NC	NC	<1	21	<1	12	NC	NC
WA12 (81) - Cape Jaubert - Tryon Point	4	2	NC	878	1,108	NC	4	273	<1	22	<1	18	NC	NC	<1	14	<1	9	NC	NC
WA12 (82) - Samphire bore coast - Cape Jaubert (A)	5	2	NC	921	1,115	NC	5.1	274	<1	12	<1	12	NC	NC	<1	5	<1	5	NC	NC
WA12 (83) - Samphire bore coast - Cape Jaubert (B)	6	2	NC	895	1,031	NC	7	327	<1	19	<1	18	NC	NC	<1	9	<1	8	NC	NC
WA12 (84) - Samphire bore coast - Cape Jaubert (C)	11	3	NC	793	909	NC	9.5	451	2	49	<1	47	NC	NC	2	23	<1	18	NC	NC
WA12 (85) - Cooraidegel Well coast - Eighty Mile Beach Caravan Park NE (A)	17	6	NC	684	853	NC	17	541	2	34	<1	33	NC	NC	2	10	<1	9	NC	NC
WA12 (86) - Cooraidegel Well coast - Eighty Mile Beach Caravan Park NE (B)	17	10	NC	679	773	NC	26	619	3	48	2	47	NC	NC	3	16	<1	14	NC	NC
WA12 (87) - Cooraidegel Well coast - Eighty Mile Beach Caravan Park NE (C)	17	11	NC	633	746	NC	28	569	3	40	2	39	NC	NC	3	14	<1	14	NC	NC
WA12 (88) - Shoonta Well - Cooraidegel Well coast	21	15	NC	563	631	NC	89	976	7	70	6	67	NC	NC	5	25	2	22	NC	NC
WA12 (89) - Condini Landing - Mulla Mulla Creek	27	17	1	508	609	1,195	91	1,834	9	210	8	205	2	114	7	44	3	31	<1	8
WA12 (90) - Yan Well coast - Condini Landing (A)	27	15	1	493	615	1,077	62	2,105	4	106	3	106	<1	65	3	13	<1	13	<1	4
WA12 (91) - Yan Well coast - Condini Landing (B)	37	26	10	422	506	603	279	3,552	21	283	20	280	9	189	9	39	4	28	<1	9
WA12 (92) - Wattle Well coast - Yan Well coast (A)	37	25	10	434	531	885	217	2,500	20	228	19	228	11	189	6	19	3	16	<1	10
WA12 (93) - Wattle Well coast - Yan Well coast (B)	37	23	9	462	514	835	219	2,984	29	326	27	323	14	242	10	34	5	25	<1	12
WA12 (94) - Beebingara Creek coast E - Wattle Well coast	38	28	8	439	533	811	196	2,392	14	156	12	154	4	77	9	34	3	24	<1	4
WA13 (305) - Seringapatam Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA13 (306) - Scott Reef North	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA13 (307) - Scott Reef South	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC

Table 13.5 Summary of shoreline oil accumulation on WAMOPRA shoreline cells following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

WAMOPRA shoreline cells	Probability (%) of shoreline oil on receptors at			Minimum time to receptor (hours) for shoreline oil at			Maximum local accumulated concentration (g/m²)		Maximum accumulated volume (m³) along this shoreline with concentrations ≥ 10 g/m²		Maximum accumulated volume (m³) along this shoreline with concentrations ≥ 100 g/m²		Maximum accumulated volume (m³) along this shoreline with concentrations ≥ 1,000 g/m²		Maximum length of shoreline (km) with concentrations ≥ 10 g/m²		Maximum length of shoreline (km) with concentrations ≥ 100 g/m²		Maximum length of shoreline (km) with concentrations ≥ 1,000 g/m²	
	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all replicate spills	in the worst replicate spill	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation
WA06 (199) - Wreck Point - Guilderton	1	NC	NC	1,253	NC	NC	0.1	14	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA07 (195) - Thirsty Point - Booker Valley	1	NC	NC	1,322	NC	NC	0.1	13	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA08 (332) - Bowes River - Broken Anchor Bay (A)	6	1	NC	1,167	1,315	NC	2.6	107	<1	2	<1	2	NC	NC	<1	5	<1	1	NC	NC
WA08 (333) - Bowes River - Broken Anchor Bay (B)	6	NC	NC	1,179	NC	NC	2.3	97	<1	6	NC	NC	NC	NC	<1	22	NC	NC	NC	NC
WA08 (334) - Glenfield Beach - Bowes River (A)	7	NC	NC	1,170	NC	NC	2.1	62	<1	5	NC	NC	NC	NC	<1	16	NC	NC	NC	NC
WA08 (335) - Glenfield Beach - Bowes River (B)	6	NC	NC	1,191	NC	NC	2.5	82	<1	3	NC	NC	NC	NC	<1	6	NC	NC	NC	NC
WA08 (336) - Glenfield Beach - Bowes River (C)	5	NC	NC	1,174	NC	NC	1.2	49	<1	3	NC	NC	NC	NC	<1	11	NC	NC	NC	NC
WA09 (169) - Cape Inscription - Herald Bay N (B)	3	NC	NC	869	NC	NC	0.7	34	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA09 (170) - Steep Point - Quoin Head (B)	9	NC	NC	847	NC	NC	2.9	59	<1	4	NC	NC	NC	NC	<1	13	NC	NC	NC	NC
WA09 (171) - Steep Point - Quoin Head (C)	6	NC	NC	860	NC	NC	2.2	70	<1	4	NC	NC	NC	NC	<1	12	NC	NC	NC	NC
WA09 (172) - Steep Point - Quoin Head (D)	6	NC	NC	980	NC	NC	3.2	85	<1	6	NC	NC	NC	NC	<1	10	NC	NC	NC	NC
WA09 (173) - Steep Point - Quoin Head (E)	7	2	NC	1,116	1,198	NC	4.8	152	<1	11	<1	2	NC	NC	2	20	<1	1	NC	NC
WA09 (174) - Kakura Dunes coast - Zuytdorp Point (A)	5	NC	NC	1,139	NC	NC	1.8	82	<1	4	NC	NC	NC	NC	<1	11	NC	NC	NC	NC
WA09 (175) - Kakura Dunes coast - Zuytdorp Point (B)	3	NC	NC	1,200	NC	NC	0.6	25	<1	<1	NC	NC	NC	NC	<1	6	NC	NC	NC	NC
WA09 (176) - Kakura Dunes coast - Zuytdorp Point (C)	4	NC	NC	1,222	NC	NC	0.6	25	<1	<1	NC	NC	NC	NC	<1	5	NC	NC	NC	NC
WA09 (177) - Kakura Dunes coast - Zuytdorp Point (D)	3	NC	NC	1,138	NC	NC	0.4	14	<1	<1	NC	NC	NC	NC	<1	4	NC	NC	NC	NC
WA09 (178) - Nunginjay Spring coast N - Kakura Dunes coast (A)	1	NC	NC	1,230	NC	NC	0.2	24	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA09 (330) - Dorre Island and Bernier Island (A)	5	NC	NC	851	NC	NC	0.9	61	<1	3	NC	NC	NC	NC	<1	19	NC	NC	NC	NC
WA09 (331) - Dorre Island and Bernier Island (B)	11	1	NC	862	967	NC	3.3	132	<1	10	<1	2	NC	NC	3	40	<1	1	NC	NC
WA10 (120) - Bundegi - Shothole Canyon N (A)	3	NC	NC	1,045	NC	NC	0.4	15	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA10 (121) - Bundegi - Shothole Canyon N (B)	36	12	NC	461	742	NC	50	956	<1	16	<1	15	NC	NC	2	10	<1	4	NC	NC
WA10 (122) - Vlamingh Head - North West Cape	45	33	4	400	437	777	199	2,927	9	101	8	101	3	96	4	9	2	9	<1	6
WA10 (123) - Low Point - Vlamingh Head (A)	37	20	3	491	593	788	69	1,238	6	74	5	74	<1	13	5	15	2	14	<1	1
WA10 (124) - Low Point - Vlamingh Head (B)	36	15	2	499	507	1,031	63	2,029	7	186	6	186	2	113	5	19	2	19	<1	8
WA10 (125) - Osprey Bay - Low Point	22	8	NC	588	801	NC	16	677	2	25	<1	23	NC	NC	3	15	<1	10	NC	NC
WA10 (126) - Winderabandi Point - Osprey Bay	22	4	NC	637	982	NC	12	171	<1	10	<1	5	NC	NC	3	15	<1	3	NC	NC
WA10 (127) - Coast Hill - Point Cloates	20	7	NC	727	1,014	NC	15	195	<1	5	<1	4	NC	NC	<1	10	<1	2	NC	NC
WA10 (128) - Point Maud - Coast Hill (A)	4	1	NC	1,142	1,335	NC	1.8	121	<1	5	<1	2	NC	NC	<1	11	<1	1	NC	NC
WA10 (130) - Alison Point - Point Maud	2	NC	NC	1,297	NC	NC	0.5	25	<1	2	NC	NC	NC	NC	<1	8	NC	NC	NC	NC
WA10 (132) - Gnarraloo Bay - Alison Point (B)	3	NC	NC	1,222	NC	NC	0.4	25	<1	<1	NC	NC	NC	NC	<1	5	NC	NC	NC	NC
WA10 (133) - Red Bluff - Gnarraloo Bay (A)	5	NC	NC	1,115	NC	NC	0.8	35	<1	2	NC	NC	NC	NC	<1	7	NC	NC	NC	NC

WA10 (134) - Red Bluff - Gnarraloo Bay (B)	5	NC	NC	1,169	NC	NC	0.7	36	<1	<1	NC	NC	NC	NC	<1	4	NC	NC	NC	NC
WA10 (135) - Red Bluff - Gnarraloo Bay (C)	5	NC	NC	1,142	NC	NC	0.9	40	<1	2	NC	NC	NC	NC	<1	9	NC	NC	NC	NC
WA10 (136) - Point Quobba - Cape Cuvier (A)	1	NC	NC	1,245	NC	NC	0.1	13	<1	<1	NC	NC	NC	NC	<1	4	NC	NC	NC	NC
WA11.East (100) - Sherlock coast - Cape Cossigny (B)	2	NC	NC	1,222	NC	NC	0.6	42	<1	2	NC	NC	NC	NC	<1	4	NC	NC	NC	NC
WA11.East (101) - Cape Lambert - Sherlock coast (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA11.East (102) - Cape Lambert - Sherlock coast (B)	3	NC	NC	581	NC	NC	0.4	32	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA11.East (103) - West Intercourse Island - Dolphin Island N point (A)	1	1	NC	1,191	1,203	NC	3.2	321	<1	6	<1	5	NC	NC	<1	5	<1	2	NC	NC
WA11.East (104) - West Intercourse Island - Dolphin Island N point (B)	13	3	NC	451	589	NC	9.1	525	<1	38	<1	32	NC	NC	<1	27	<1	12	NC	NC
WA11.East (105) - West Intercourse Island - Dolphin Island N point (C)	23	18	10	196	404	485	283	4,547	13	183	12	177	7	119	5	37	2	22	<1	5
WA11.East (106) - West Intercourse Island - Dolphin Island N point (D)	5	3	NC	557	765	NC	4.7	150	<1	7	<1	6	NC	NC	<1	11	<1	4	NC	NC
WA11.East (107) - West Intercourse Island - Dolphin Island N point (E)	4	NC	NC	716	NC	NC	1.2	48	<1	3	NC	NC	NC	NC	<1	8	NC	NC	NC	NC
WA11.East (108) - Pelican Point - West Intercourse Island	6	2	1	475	484	517	19	1,592	2	112	2	105	<1	40	<1	40	<1	21	<1	3
WA11.East (109) - James Point - Cape Preston	8	5	1	401	426	627	30	2,189	2	68	<1	66	<1	44	<1	18	<1	7	<1	2
WA11.East (315) - Dolphin Island N point - Cinders Rd coast	15	6	NC	381	418	NC	30	817	<1	17	<1	15	NC	NC	<1	9	<1	4	NC	NC
WA11.East (316) - West Intercourse Island - Dolphin Island N point (F)	22	17	7	251	376	611	346	5,954	23	421	22	412	17	364	5	57	3	32	<1	10
WA11.East (317) - West Intercourse Island - Dolphin Island N point (G)	22	19	7	327	374	589	563	10,808	19	414	19	410	15	345	4	43	2	30	<1	10
WA11.East (95) - Turner River NE foreland - Beebingara Creek coast E (A)	4	2	NC	1,176	1,234	NC	11	579	<1	38	<1	33	NC	NC	<1	26	<1	11	NC	NC
WA11.East (96) - Turner River NE foreland - Beebingara Creek coast E (B)	6	2	NC	1,157	1,202	NC	16	830	<1	50	<1	48	NC	NC	<1	22	<1	15	NC	NC
WA11.East (97) - Cape Thouin - Turner River NE foreland	6	2	1	858	1,172	1,296	20	1,099	3	118	2	117	<1	23	<1	26	<1	21	<1	2
WA11.East (98) - Cape Cossigny - Cape Thouin	5	2	NC	656	1,178	NC	9.4	492	<1	42	<1	39	NC	NC	<1	24	<1	17	NC	NC
WA11.East (99) - Sherlock coast - Cape Cossigny (A)	3	2	NC	642	1,232	NC	2.2	128	<1	9	<1	3	NC	NC	<1	20	<1	2	NC	NC
WA11.West (110) - Mount Salt coast W - James Point	6	2	NC	427	1,013	NC	3	139	<1	9	<1	3	NC	NC	<1	24	<1	2	NC	NC
WA11.West (111) - Peter Creek coast E - Mount Salt coast W	11	3	NC	623	906	NC	7.1	221	<1	11	<1	6	NC	NC	<1	18	<1	3	NC	NC
WA11.West (112) - Weld Island coast S - Peter Creek coast E	3	1	NC	623	903	NC	2.3	104	<1	5	<1	2	NC	NC	<1	13	<1	1	NC	NC
WA11.West (113) - Coolgra Point W - Yardie Landing (A)	4	NC	NC	690	NC	NC	2.4	89	<1	2	NC	NC	NC	NC	<1	4	NC	NC	NC	NC
WA11.West (114) - Coolgra Point W - Yardie Landing (B)	6	3	NC	649	776	NC	7.1	235	<1	4	<1	3	NC	NC	<1	5	<1	1	NC	NC
WA11.West (115) - Hope Point - Locker Point (A)	24	13	NC	458	602	NC	38	585	<1	6	<1	6	NC	NC	<1	11	<1	2	NC	NC
WA11.West (116) - Hope Point - Locker Point (B)	3	NC	NC	896	NC	NC	0.9	57	<1	<1	NC	NC	NC	NC	<1	4	NC	NC	NC	NC
WA11.West (117) - Hope Point - Locker Point (C)	4	1	NC	907	1,340	NC	2.1	151	<1	5	<1	2	NC	NC	<1	12	<1	1	NC	NC
WA11.West (318) - Barrow Island and Montebello Islands (A)	61	56	47	85	108	167	3,597	22,688	335	2,570	331	2,565	287	2,493	28	65	18	56	7	31
WA11.West (319) - Barrow Island and Montebello Islands (B)	49	41	21	116	137	202	641	5,979	32	343	32	343	17	338	7	15	5	15	<1	14
WA11.West (320) - Barrow Island and Montebello Islands (C)	39	18	5	137	176	513	88	1,774	17	251	14	248	3	73	13	56	4	40	<1	6
WA11.West (321) - Barrow Island and Montebello Islands (D)	46	35	7	141	174	379	248	3,229	32	435	29	427	14	317	15	49	6	38	<1	17
WA11.West (323) - Yardie Landing - Weld Island coast S (A)	10	5	NC	604	641	NC	20	561	<1	12	<1	10	NC	NC	<1	7	<1	4	NC	NC
WA11.West (324) - Yardie Landing - Weld Island coast S (B)	28	15	2	205	229	772	91	1,644	3	48	3	48	<1	48	<1	3	<1	3	<1	3
WA11.West (325) - Coolgra Point W - Yardie Landing (C)	34	22	2	203	205	305	120	1,947	7	93	7	90	<1	57	4	14	2	13	<1	4

WA11.West (326) - Baresand Point - Entrance Point E	54	52	39	211	279	408	1,404	6,843	91	555	90	554	65	525	12	24	9	24	4	18
WA11.West (327) - Hope Point - Locker Point (E)	43	30	NC	290	493	NC	125	946	3	18	3	18	NC	NC	<1	2	<1	2	NC	NC
WA11.West (328) - Hope Point - Locker Point (F)	40	8	NC	326	776	NC	30	723	2	42	<1	41	NC	NC	2	13	<1	12	NC	NC
WA11.West (329) - Locker Point - Baresand Point	55	53	43	224	291	425	1,388	7,009	125	667	123	665	106	654	14	30	9	24	5	22
WA12 (308) - Red Bluff - Chimney Rocks (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (309) - Mermaid Reef	8	3	NC	1,082	1,159	NC	12	612	<1	11	<1	11	NC	NC	<1	2	<1	2	NC	NC
WA12 (310) - Clerke Reef	6	1	NC	656	1,017	NC	5.4	315	<1	10	<1	7	NC	NC	<1	8	<1	3	NC	NC
WA12 (311) - Imperieuse Reef	10	7	1	506	638	1,206	43	1,394	4	99	3	98	<1	51	2	19	<1	19	<1	4
WA12 (312) - Yan Well coast - Condini Landing (C)	9	4	NC	467	820	NC	12	339	<1	9	<1	9	NC	NC	<1	4	<1	4	NC	NC
WA12 (313) - Wattle Well coast - Yan Well coast (C)	6	1	NC	1,173	1,284	NC	2.5	168	<1	5	<1	4	NC	NC	<1	4	<1	2	NC	NC
WA12 (314) - Wattle Well coast - Yan Well coast (D)	6	2	NC	1,067	1,282	NC	5.2	191	<1	2	<1	2	NC	NC	<1	1	<1	1	NC	NC
WA12 (69) - Red Bluff - Chimney Rocks (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (70) - Coulomb Point - Red Bluff (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (72) - Cape Boileau - Coulomb Point (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (73) - Cape Boileau - Coulomb Point (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (75) - Cape Gourdon - Cape Villaret (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (76) - Cape Gourdon - Cape Villaret (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (77) - Saddle Hill - Cape Gourdon (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (78) - Saddle Hill - Cape Gourdon (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (79) - Tryon Point - False Cape Bossut (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (80) - Tryon Point - False Cape Bossut (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (81) - Cape Jaubert - Tryon Point	1	NC	NC	1,187	NC	NC	0.3	35	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA12 (82) - Samphire bore coast - Cape Jaubert (A)	3	NC	NC	1,180	NC	NC	0.7	46	<1	<1	NC	NC	NC	NC	<1	4	NC	NC	NC	NC
WA12 (83) - Samphire bore coast - Cape Jaubert (B)	3	1	NC	1,178	1,333	NC	2.2	114	<1	4	<1	2	NC	NC	<1	8	<1	1	NC	NC
WA12 (84) - Samphire bore coast - Cape Jaubert (C)	4	2	NC	1,088	1,254	NC	3.6	216	<1	21	<1	14	NC	NC	<1	22	<1	9	NC	NC
WA12 (85) - Cooraidegel Well coast - Eighty Mile Beach Caravan Park NE (A)	4	1	NC	904	1,320	NC	2.4	103	<1	5	<1	2	NC	NC	<1	10	<1	1	NC	NC
WA12 (86) - Cooraidegel Well coast - Eighty Mile Beach Caravan Park NE (B)	4	NC	NC	889	NC	NC	1.1	58	<1	4	NC	NC	NC	NC	<1	12	NC	NC	NC	NC
WA12 (87) - Cooraidegel Well coast - Eighty Mile Beach Caravan Park NE (C)	2	NC	NC	858	NC	NC	0.4	24	<1	<1	NC	NC	NC	NC	<1	5	NC	NC	NC	NC
WA12 (88) - Shoonta Well - Cooraidegel Well coast	2	NC	NC	883	NC	NC	0.2	15	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA12 (89) - Condini Landing - Mulla Mulla Creek	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (90) - Yan Well coast - Condini Landing (A)	1	NC	NC	750	NC	NC	0.2	17	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA12 (91) - Yan Well coast - Condini Landing (B)	2	NC	NC	1,022	NC	NC	0.3	23	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA12 (92) - Wattle Well coast - Yan Well coast (A)	2	NC	NC	1,225	NC	NC	0.3	24	<1	<1	NC	NC	NC	NC	<1	6	NC	NC	NC	NC
WA12 (93) - Wattle Well coast - Yan Well coast (B)	3	1	NC	1,167	1,320	NC	1.7	141	<1	7	<1	2	NC	NC	<1	19	<1	1	NC	NC
WA12 (94) - Beebingara Creek coast E - Wattle Well coast	4	2	NC	1,240	1,254	NC	6.3	538	<1	27	<1	21	NC	NC	<1	25	<1	8	NC	NC
WA13 (305) - Seringapatam Reef	2	NC	NC	1,295	NC	NC	0.3	35	<1	3	NC	NC	NC	NC	<1	11	NC	NC	NC	NC
WA13 (306) - Scott Reef North	3	NC	NC	1,290	NC	NC	0.6	35	<1	3	NC	NC	NC	NC	<1	12	NC	NC	NC	NC
WA13 (307) - Scott Reef South	2	NC	NC	1,199	NC	NC	0.8	46	<1	2	NC	NC	NC	NC	<1	7	NC	NC	NC	NC

Table 13.6 Summary of shoreline oil accumulation on WAMOPRA shoreline cells following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

WAMOPRA shoreline cells	Probability (%) of shoreline oil on receptors at			Minimum time to receptor (hours) for shoreline oil at			Maximum local accumulated concentration (g/m²)		Maximum accumulated volume (m³) along this shoreline with concentrations ≥ 10 g/m²		Maximum accumulated volume (m³) along this shoreline with concentrations ≥ 100 g/m²		Maximum accumulated volume (m³) along this shoreline with concentrations ≥ 1,000 g/m²		Maximum length of shoreline (km) with concentrations ≥ 10 g/m²		Maximum length of shoreline (km) with concentrations ≥ 100 g/m²		Maximum length of shoreline (km) with concentrations ≥ 1,000 g/m²	
	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all replicate spills	in the worst replicate spill	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation
WA06 (199) - Wreck Point - Guilderton	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA07 (195) - Thirsty Point - Booker Valley	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA08 (332) - Bowes River - Broken Anchor Bay (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA08 (333) - Bowes River - Broken Anchor Bay (B)	2	NC	NC	1,081	NC	NC	0.3	14	<1	<1	NC	NC	NC	NC	<1	5	NC	NC	NC	NC
WA08 (334) - Glenfield Beach - Bowes River (A)	3	NC	NC	1,084	NC	NC	0.5	35	<1	2	NC	NC	NC	NC	<1	8	NC	NC	NC	NC
WA08 (335) - Glenfield Beach - Bowes River (B)	1	NC	NC	1,103	NC	NC	0.1	14	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA08 (336) - Glenfield Beach - Bowes River (C)	1	NC	NC	1,165	NC	NC	0.4	37	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA09 (169) - Cape Inscription - Herald Bay N (B)	1	NC	NC	1,327	NC	NC	0.1	13	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA09 (170) - Steep Point - Quoin Head (B)	1	NC	NC	1,208	NC	NC	0.1	13	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA09 (171) - Steep Point - Quoin Head (C)	2	NC	NC	1,080	NC	NC	0.2	14	<1	<1	NC	NC	NC	NC	<1	4	NC	NC	NC	NC
WA09 (172) - Steep Point - Quoin Head (D)	1	NC	NC	1,294	NC	NC	0.2	24	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA09 (173) - Steep Point - Quoin Head (E)	3	NC	NC	1,062	NC	NC	0.7	46	<1	<1	NC	NC	NC	NC	<1	6	NC	NC	NC	NC
WA09 (174) - Kakura Dunes coast - Zuytdorp Point (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA09 (175) - Kakura Dunes coast - Zuytdorp Point (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA09 (176) - Kakura Dunes coast - Zuytdorp Point (C)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA09 (177) - Kakura Dunes coast - Zuytdorp Point (D)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA09 (178) - Nunginjay Spring coast N - Kakura Dunes coast (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA09 (330) - Dorre Island and Bernier Island (A)	1	NC	NC	1,327	NC	NC	0.1	12	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA09 (331) - Dorre Island and Bernier Island (B)	2	NC	NC	918	NC	NC	0.3	23	<1	<1	NC	NC	NC	NC	<1	5	NC	NC	NC	NC
WA10 (120) - Bundegi - Shothole Canyon N (A)	8	1	NC	420	1,343	NC	2.3	104	<1	4	<1	2	NC	NC	<1	8	<1	1	NC	NC
WA10 (121) - Bundegi - Shothole Canyon N (B)	46	15	2	255	272	540	75	1,338	2	20	<1	17	<1	14	2	10	<1	4	<1	1
WA10 (122) - Vlamingh Head - North West Cape	59	45	5	238	249	413	283	3,476	10	110	9	109	3	107	5	9	3	9	<1	6
WA10 (123) - Low Point - Vlamingh Head (A)	45	16	1	242	295	877	56	1,177	4	71	3	71	<1	13	5	15	<1	14	<1	1
WA10 (124) - Low Point - Vlamingh Head (B)	48	13	3	293	357	607	92	2,706	9	211	8	211	4	160	7	19	2	19	<1	11
WA10 (125) - Osprey Bay - Low Point	26	5	NC	477	599	NC	20	551	2	26	<1	24	NC	NC	3	16	<1	11	NC	NC
WA10 (126) - Winderabandi Point - Osprey Bay	17	4	NC	477	609	NC	14	375	<1	19	<1	13	NC	NC	2	18	<1	6	NC	NC
WA10 (127) - Coast Hill - Point Cloates	14	3	NC	603	640	NC	7.5	251	<1	12	<1	7	NC	NC	<1	13	<1	4	NC	NC
WA10 (128) - Point Maud - Coast Hill (A)	3	NC	NC	781	NC	NC	1.1	83	<1	4	NC	NC	NC	NC	<1	8	NC	NC	NC	NC
WA10 (130) - Alison Point - Point Maud	1	NC	NC	845	NC	NC	0.1	15	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA10 (132) - Gnarraloo Bay - Alison Point (B)	2	NC	NC	849	NC	NC	0.3	15	<1	<1	NC	NC	NC	NC	<1	5	NC	NC	NC	NC
WA10 (133) - Red Bluff - Gnarraloo Bay (A)	2	NC	NC	797	NC	NC	0.7	41	<1	2	NC	NC	NC	NC	<1	7	NC	NC	NC	NC

WA10 (134) - Red Bluff - Gnarraloo Bay (B)	2	NC	NC	803	NC	NC	0.3	29	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA10 (135) - Red Bluff - Gnarraloo Bay (C)	1	NC	NC	890	NC	NC	0.4	42	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA10 (136) - Point Quobba - Cape Cuvier (A)	2	NC	NC	849	NC	NC	0.3	16	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA11.East (100) - Sherlock coast - Cape Cossigny (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA11.East (101) - Cape Lambert - Sherlock coast (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA11.East (102) - Cape Lambert - Sherlock coast (B)	1	NC	NC	1,198	NC	NC	0.2	25	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA11.East (103) - West Intercourse Island - Dolphin Island N point (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA11.East (104) - West Intercourse Island - Dolphin Island N point (B)	6	1	NC	633	1,197	NC	4	170	<1	5	<1	2	NC	NC	<1	9	<1	1	NC	NC
WA11.East (105) - West Intercourse Island - Dolphin Island N point (C)	13	6	2	409	483	1,168	46	1,078	3	56	2	50	<1	12	2	35	<1	16	<1	1
WA11.East (106) - West Intercourse Island - Dolphin Island N point (D)	1	NC	NC	1,318	NC	NC	0.6	64	<1	3	NC	NC	NC	NC	<1	7	NC	NC	NC	NC
WA11.East (107) - West Intercourse Island - Dolphin Island N point (E)	1	NC	NC	1,315	NC	NC	0.4	36	<1	2	NC	NC	NC	NC	<1	7	NC	NC	NC	NC
WA11.East (108) - Pelican Point - West Intercourse Island	17	1	NC	399	1,333	NC	6.9	113	<1	4	<1	2	NC	NC	<1	10	<1	1	NC	NC
WA11.East (109) - James Point - Cape Preston	28	17	6	184	206	393	99	1,478	3	26	2	24	<1	16	3	16	<1	4	<1	1
WA11.East (315) - Dolphin Island N point - Cinders Rd coast	4	2	NC	437	789	NC	4.3	188	<1	5	<1	2	NC	NC	<1	8	<1	1	NC	NC
WA11.East (316) - West Intercourse Island - Dolphin Island N point (F)	12	5	1	266	483	1,334	40	1,620	3	122	2	114	<1	73	2	37	<1	15	<1	5
WA11.East (317) - West Intercourse Island - Dolphin Island N point (G)	15	8	1	267	312	1,314	53	3,403	3	181	2	173	2	136	2	41	<1	22	<1	8
WA11.East (95) - Turner River NE foreland - Beebingara Creek coast E (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA11.East (96) - Turner River NE foreland - Beebingara Creek coast E (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA11.East (97) - Cape Thouin - Turner River NE foreland	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA11.East (98) - Cape Cossigny - Cape Thouin	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA11.East (99) - Sherlock coast - Cape Cossigny (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA11.West (110) - Mount Salt coast W - James Point	21	5	NC	293	424	NC	13	186	<1	7	<1	5	NC	NC	3	22	<1	3	NC	NC
WA11.West (111) - Peter Creek coast E - Mount Salt coast W	27	10	NC	417	566	NC	62	824	2	14	<1	13	NC	NC	2	19	<1	2	NC	NC
WA11.West (112) - Weld Island coast S - Peter Creek coast E	5	NC	NC	1,043	NC	NC	1.9	77	<1	4	NC	NC	NC	NC	<1	14	NC	NC	NC	NC
WA11.West (113) - Coolgra Point W - Yardie Landing (A)	10	1	NC	388	1,221	NC	4	137	<1	3	<1	2	NC	NC	<1	5	<1	1	NC	NC
WA11.West (114) - Coolgra Point W - Yardie Landing (B)	10	7	4	336	345	533	64	1,370	<1	15	<1	14	<1	14	<1	6	<1	1	<1	1
WA11.West (115) - Hope Point - Locker Point (A)	39	18	4	271	308	444	120	2,198	6	128	6	124	4	99	3	28	<1	16	<1	6
WA11.West (116) - Hope Point - Locker Point (B)	11	2	NC	292	665	NC	4.7	127	<1	4	<1	2	NC	NC	<1	12	<1	1	NC	NC
WA11.West (117) - Hope Point - Locker Point (C)	7	2	NC	543	853	NC	4.6	202	<1	9	<1	5	NC	NC	<1	17	<1	3	NC	NC
WA11.West (318) - Barrow Island and Montebello Islands (A)	92	88	75	69	78	111	7,498	22,738	683	2,377	676	2,371	611	2,319	49	65	33	53	15	31
WA11.West (319) - Barrow Island and Montebello Islands (B)	89	81	53	102	131	189	1,432	5,992	116	515	115	515	91	515	13	15	10	15	5	15
WA11.West (320) - Barrow Island and Montebello Islands (C)	79	60	6	127	222	557	321	2,380	53	213	47	208	7	99	29	53	13	39	<1	7
WA11.West (321) - Barrow Island and Montebello Islands (D)	78	64	14	116	120	318	380	3,010	65	327	59	323	20	216	30	51	14	40	2	15
WA11.West (323) - Yardie Landing - Weld Island coast S (A)	22	12	NC	557	668	NC	32	329	<1	9	<1	8	NC	NC	<1	7	<1	4	NC	NC
WA11.West (324) - Yardie Landing - Weld Island coast S (B)	57	35	7	288	296	335	280	3,514	8	94	8	94	5	94	2	3	<1	3	<1	3
WA11.West (325) - Coolgra Point W - Yardie Landing (C)	59	37	10	175	178	432	242	2,230	16	148	15	148	7	131	6	14	3	14	<1	8

WA11.West (326) - Baresand Point - Entrance Point E	76	70	54	174	175	244	1,648	8,305	102	682	100	681	64	644	16	24	12	24	4	16
WA11.West (327) - Hope Point - Locker Point (E)	61	46	2	236	274	846	179	1,141	4	21	4	21	<1	12	2	2	<1	2	<1	1
WA11.West (328) - Hope Point - Locker Point (F)	49	28	4	277	464	484	155	2,143	4	66	4	64	<1	22	3	13	<1	12	<1	1
WA11.West (329) - Locker Point - Baresand Point	74	68	52	200	214	323	1,836	10,168	141	608	138	601	114	591	19	30	12	25	5	14
WA12 (308) - Red Bluff - Chimney Rocks (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (309) - Mermaid Reef	6	2	NC	878	973	NC	5.6	302	<1	6	<1	6	NC	NC	<1	2	<1	2	NC	NC
WA12 (310) - Clerke Reef	20	4	NC	752	964	NC	11	170	<1	6	<1	2	NC	NC	2	10	<1	1	NC	NC
WA12 (311) - Imperieuse Reef	25	18	6	569	674	944	113	1,579	8	108	7	106	2	42	4	19	2	19	<1	3
WA12 (312) - Yan Well coast - Condini Landing (C)	3	NC	NC	1,185	NC	NC	0.7	45	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA12 (313) - Wattle Well coast - Yan Well coast (C)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (314) - Wattle Well coast - Yan Well coast (D)	2	NC	NC	1,269	NC	NC	0.2	13	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA12 (69) - Red Bluff - Chimney Rocks (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (70) - Coulomb Point - Red Bluff (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (72) - Cape Boileau - Coulomb Point (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (73) - Cape Boileau - Coulomb Point (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (75) - Cape Gourdon - Cape Villaret (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (76) - Cape Gourdon - Cape Villaret (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (77) - Saddle Hill - Cape Gourdon (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (78) - Saddle Hill - Cape Gourdon (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (79) - Tryon Point - False Cape Bossut (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (80) - Tryon Point - False Cape Bossut (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (81) - Cape Jaubert - Tryon Point	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (82) - Samphire bore coast - Cape Jaubert (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (83) - Samphire bore coast - Cape Jaubert (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (84) - Samphire bore coast - Cape Jaubert (C)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (85) - Cooraidegel Well coast - Eighty Mile Beach Caravan Park NE (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (86) - Cooraidegel Well coast - Eighty Mile Beach Caravan Park NE (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (87) - Cooraidegel Well coast - Eighty Mile Beach Caravan Park NE (C)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (88) - Shoonta Well - Cooraidegel Well coast	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (89) - Condini Landing - Mulla Mulla Creek	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (90) - Yan Well coast - Condini Landing (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (91) - Yan Well coast - Condini Landing (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (92) - Wattle Well coast - Yan Well coast (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (93) - Wattle Well coast - Yan Well coast (B)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA12 (94) - Beebingara Creek coast E - Wattle Well coast	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA13 (305) - Seringapatam Reef	1	NC	NC	1,328	NC	NC	0.1	12	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA13 (306) - Scott Reef North	1	NC	NC	1,293	NC	NC	0.5	46	<1	4	NC	NC	NC	NC	<1	13	NC	NC	NC	NC
WA13 (307) - Scott Reef South	1	1	NC	1,262	1,329	NC	1	103	<1	10	<1	2	NC	NC	<1	30	<1	1	NC	NC

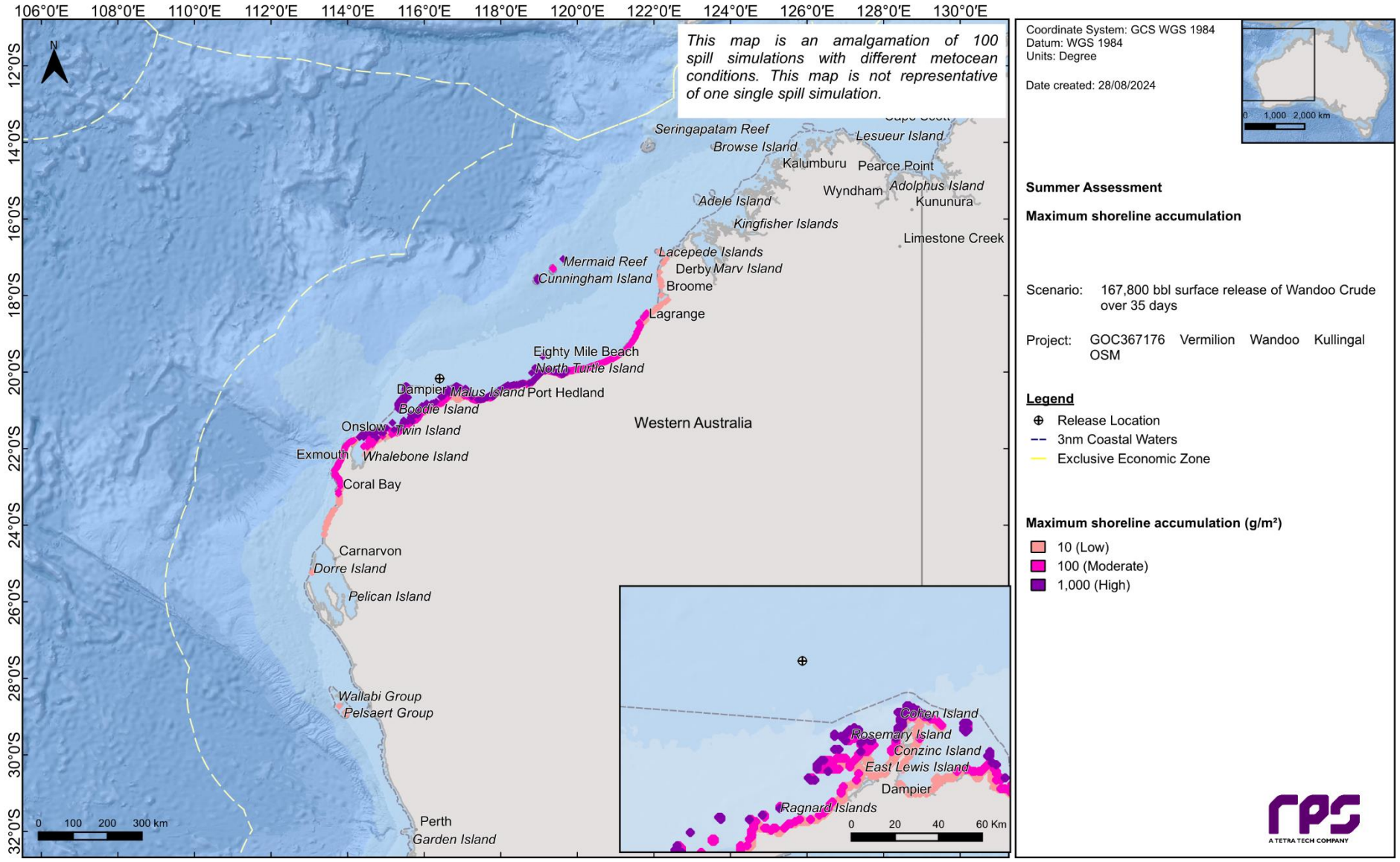


Figure 13.23 Maximum potential shoreline oil accumulation following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

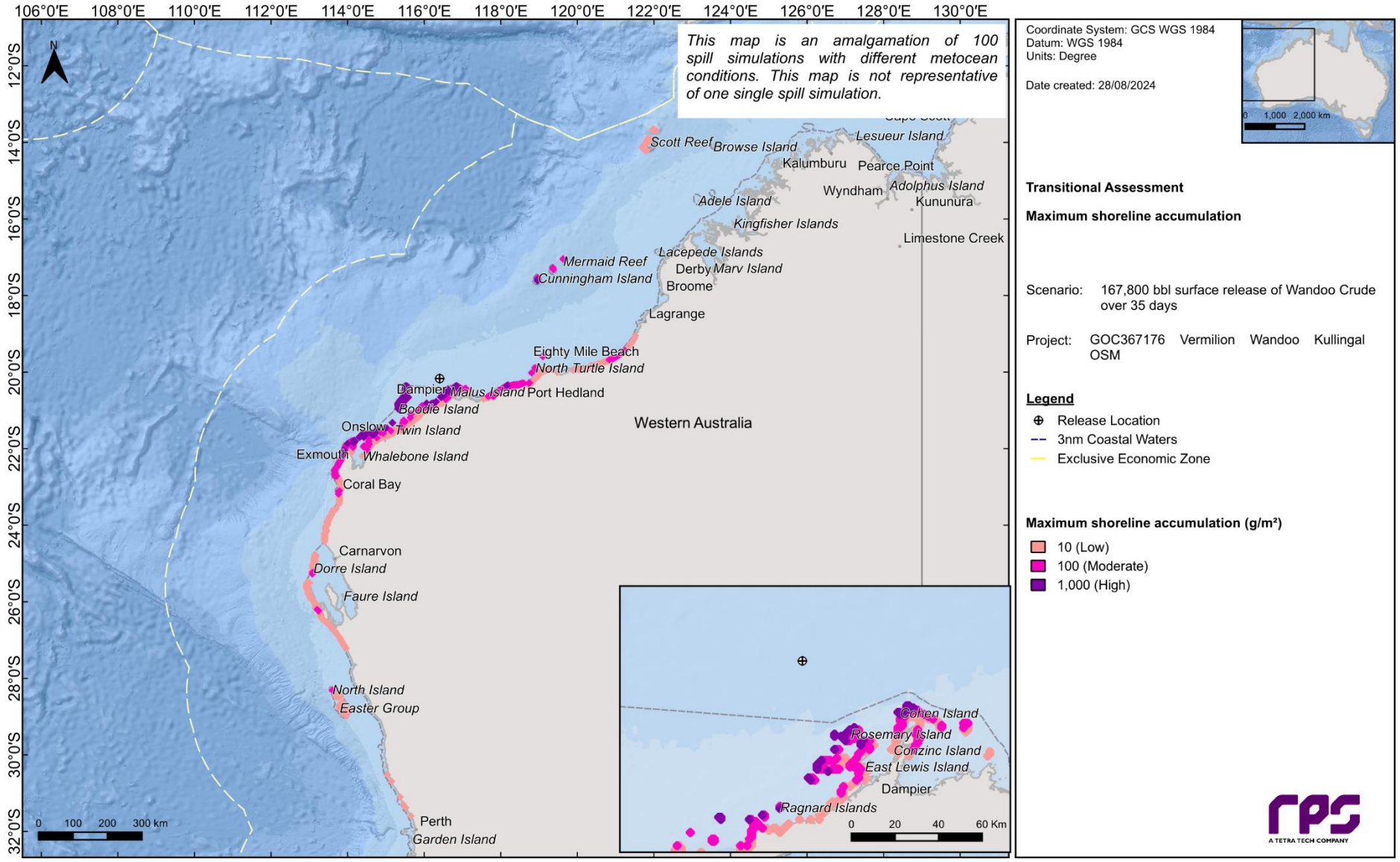


Figure 13.24 Maximum potential shoreline oil accumulation following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

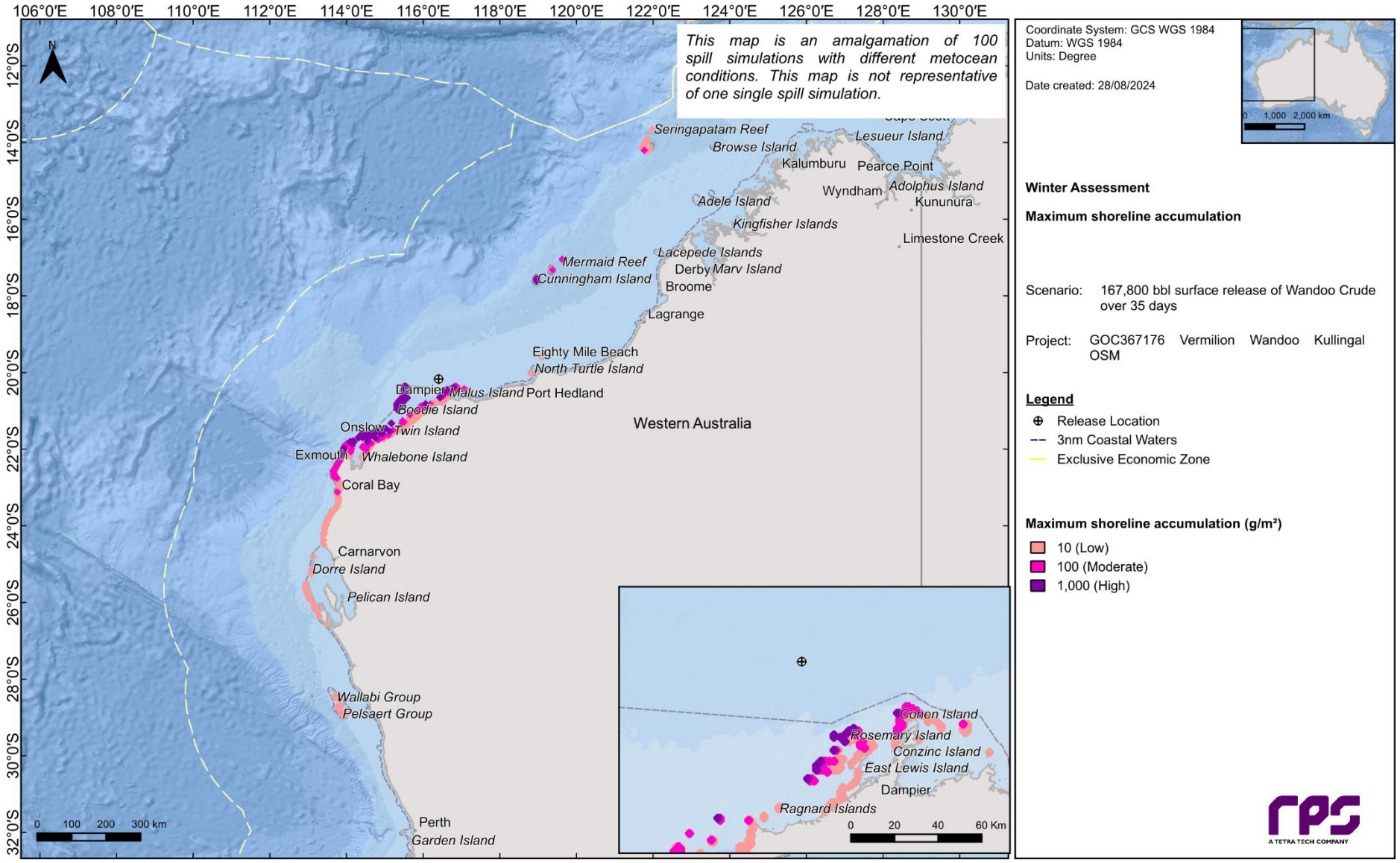


Figure 13.25 Maximum potential shoreline oil accumulation following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

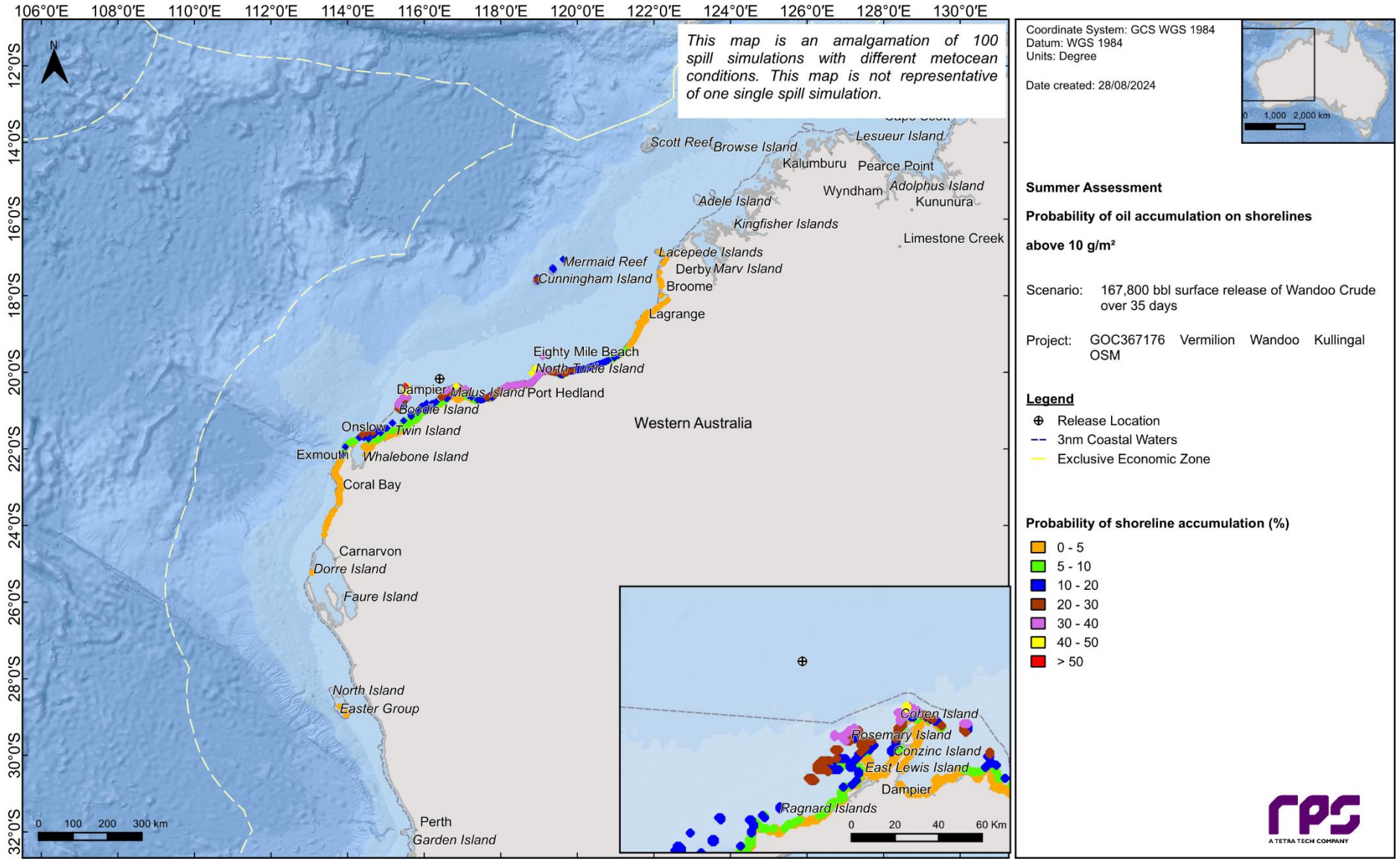


Figure 13.26 Predicted probability of shoreline oil accumulation at, or above, 10 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

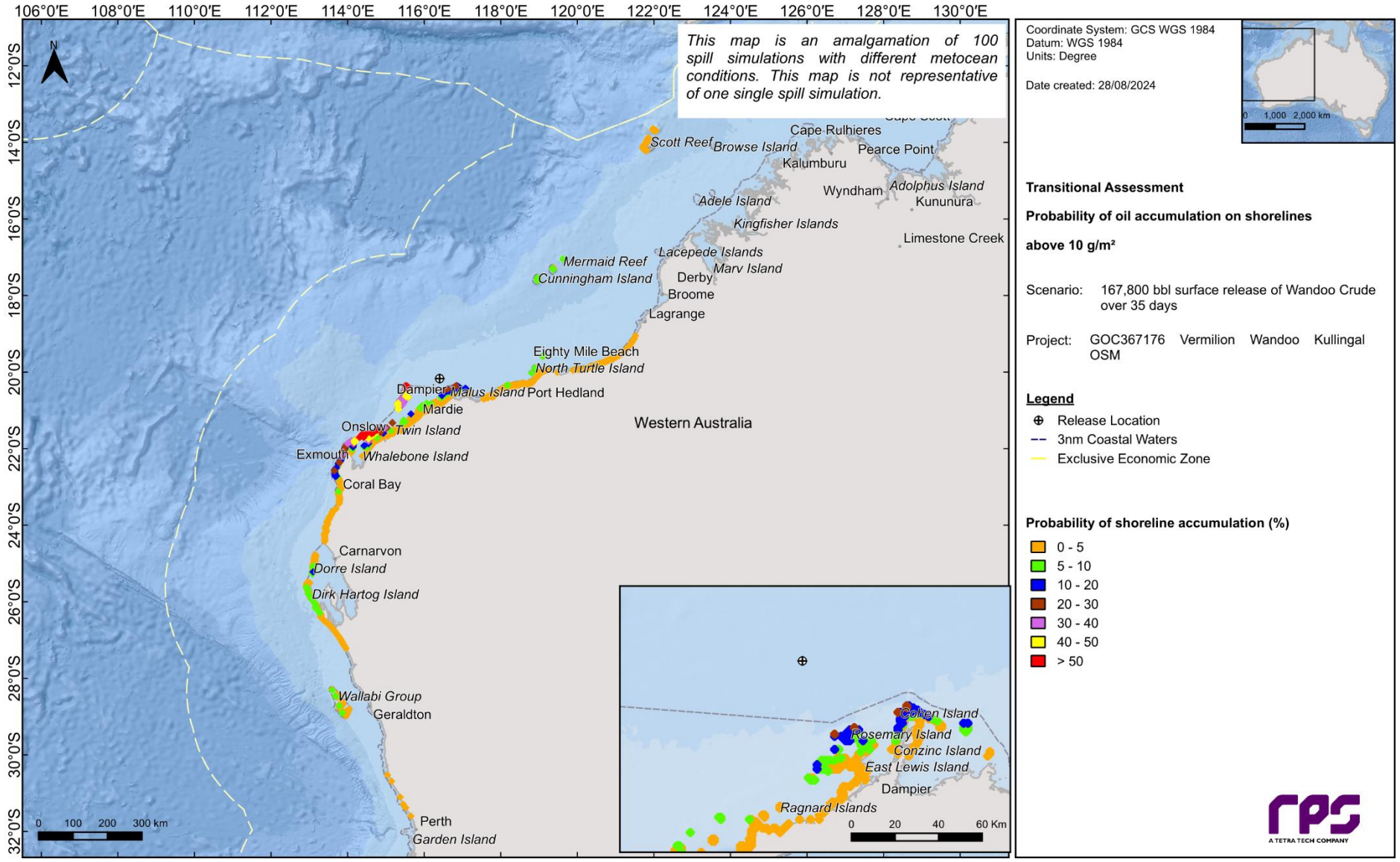


Figure 13.27 Predicted probability of shoreline oil accumulation at, or above, 10 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

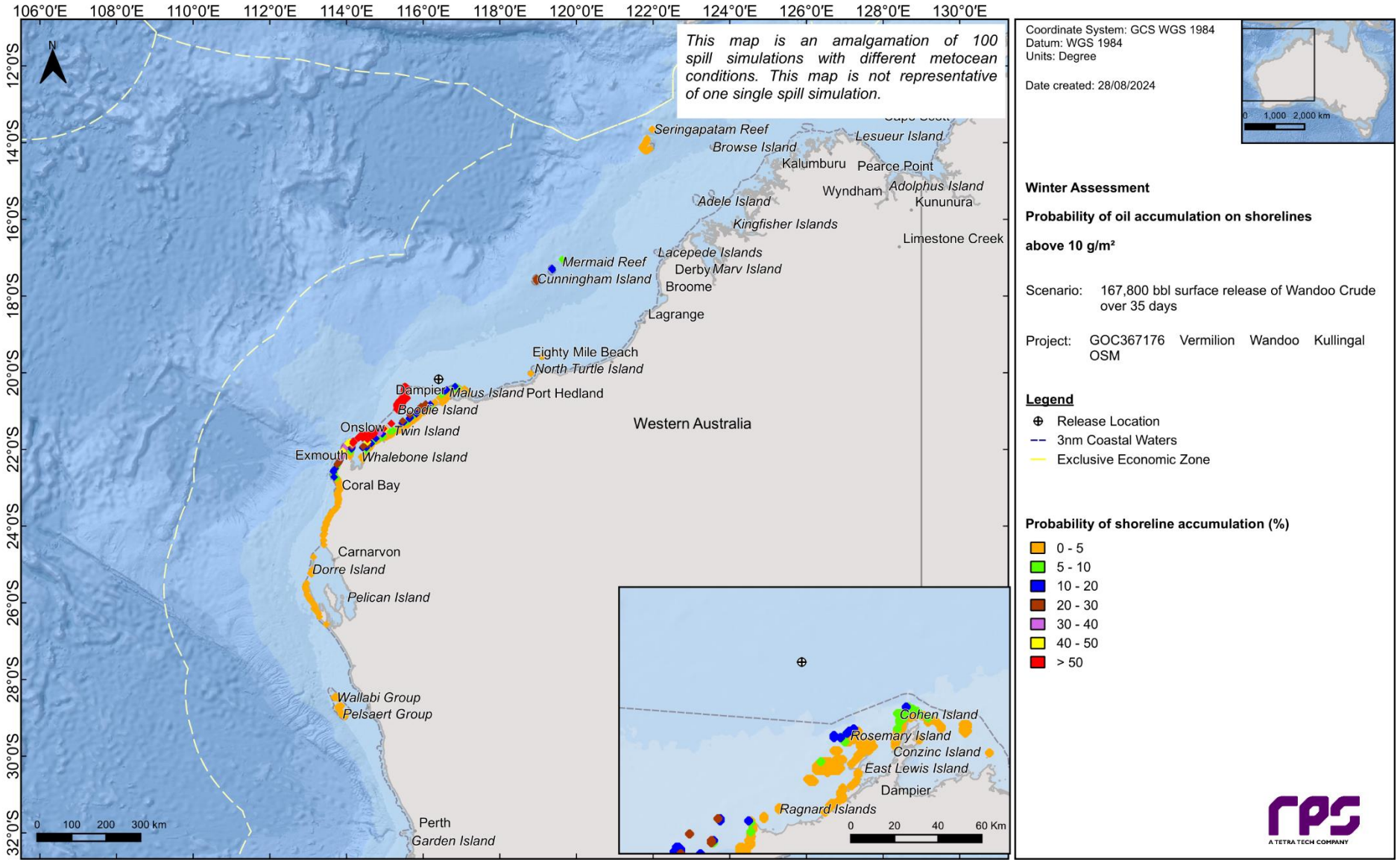


Figure 13.28 Predicted probability of shoreline oil accumulation at, or above, 10 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

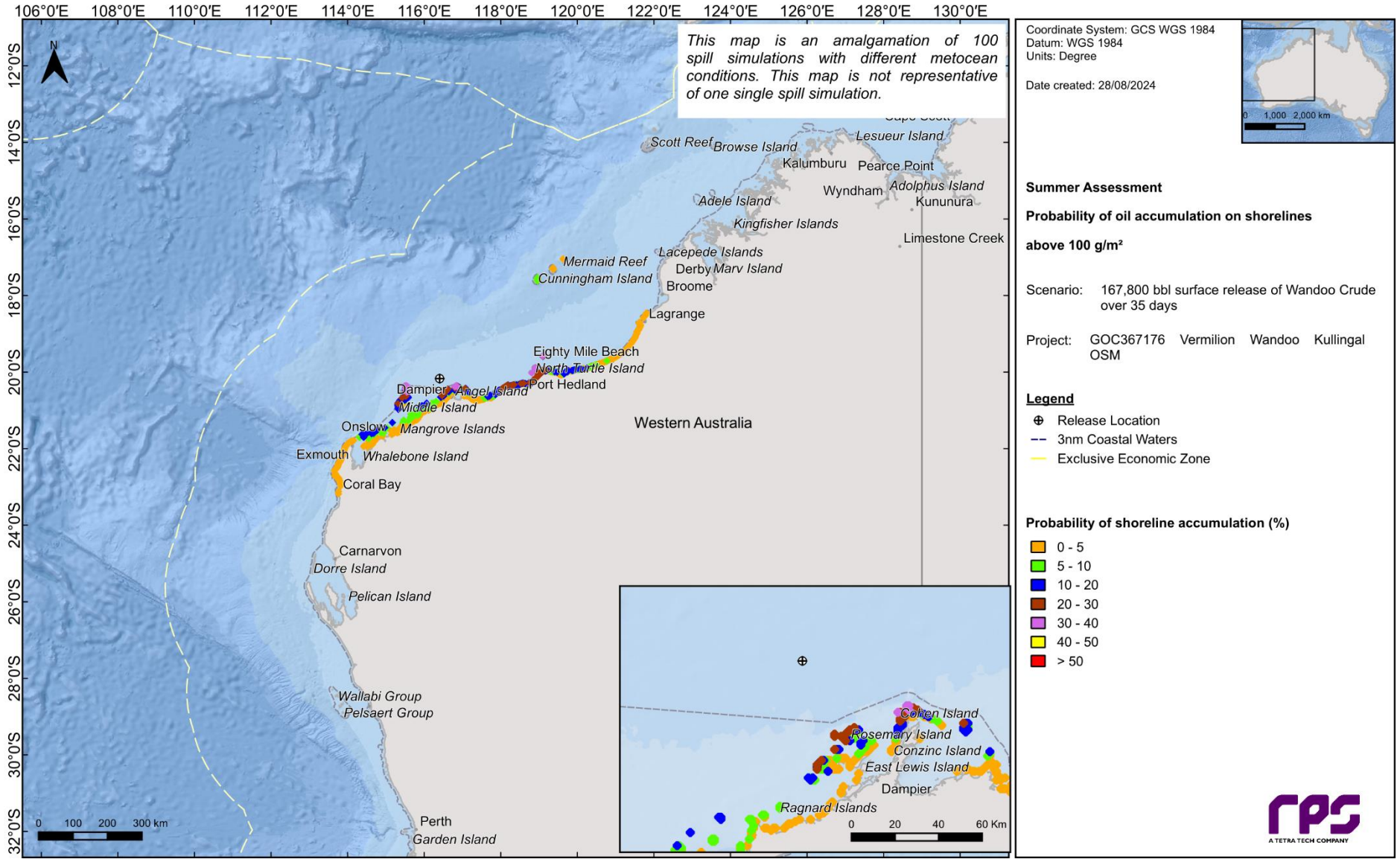


Figure 13.29 Predicted probability of shoreline oil accumulation at, or above, 100 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

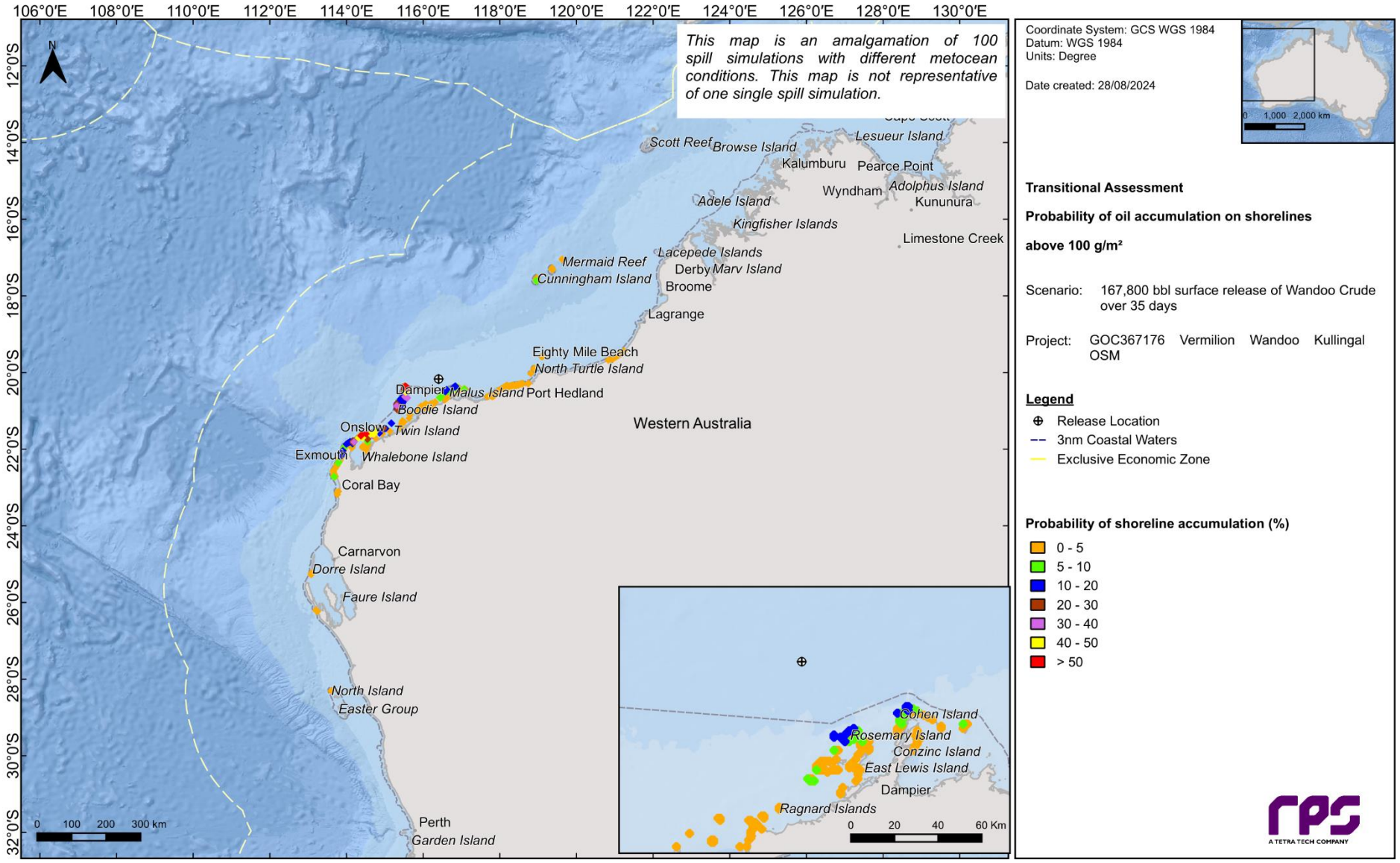


Figure 13.30 Predicted probability of shoreline oil accumulation at, or above, 100 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

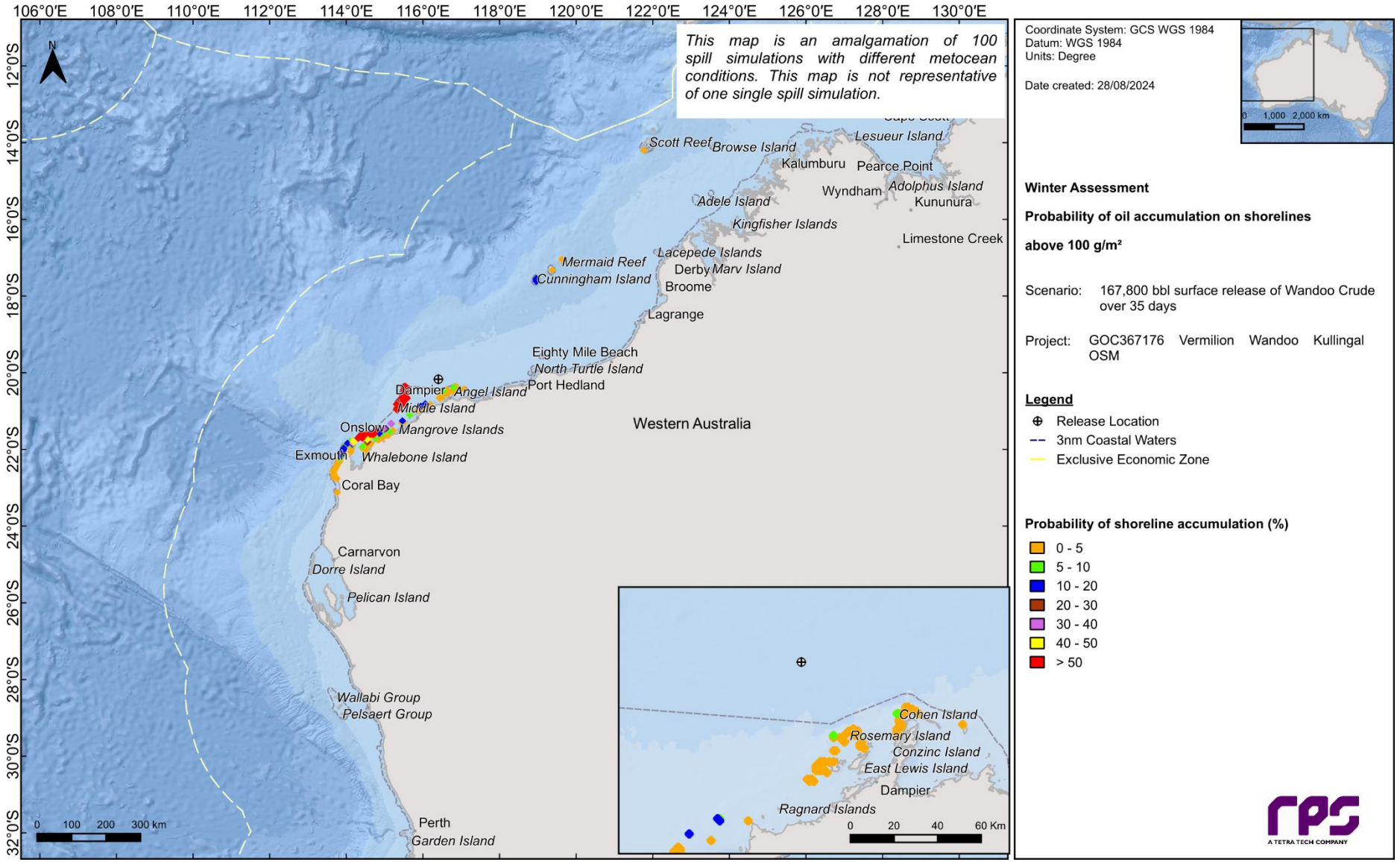


Figure 13.31 Predicted probability of shoreline oil accumulation at, or above, 100 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

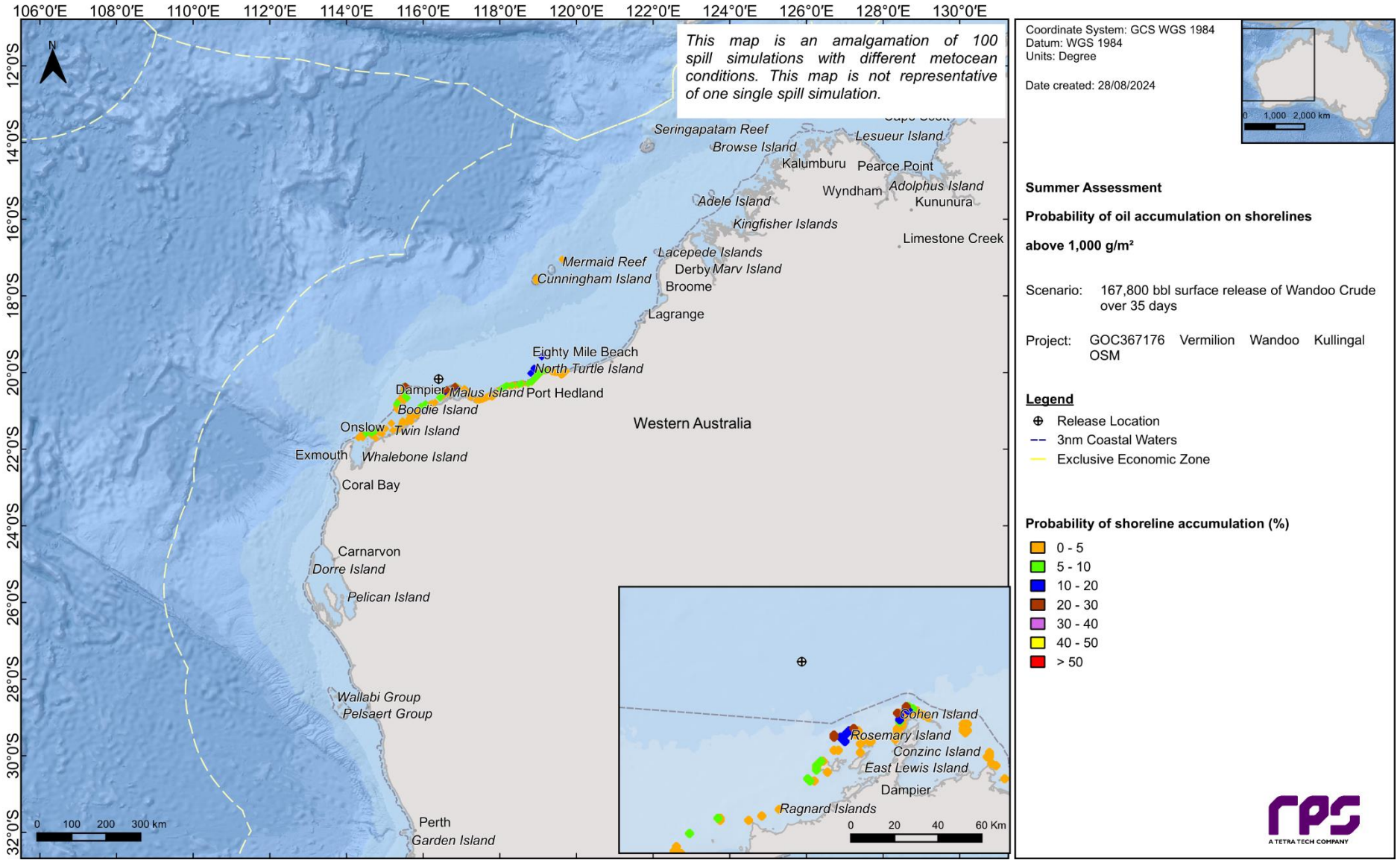


Figure 13.32 Predicted probability of shoreline oil accumulation at, or above, 1,000 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

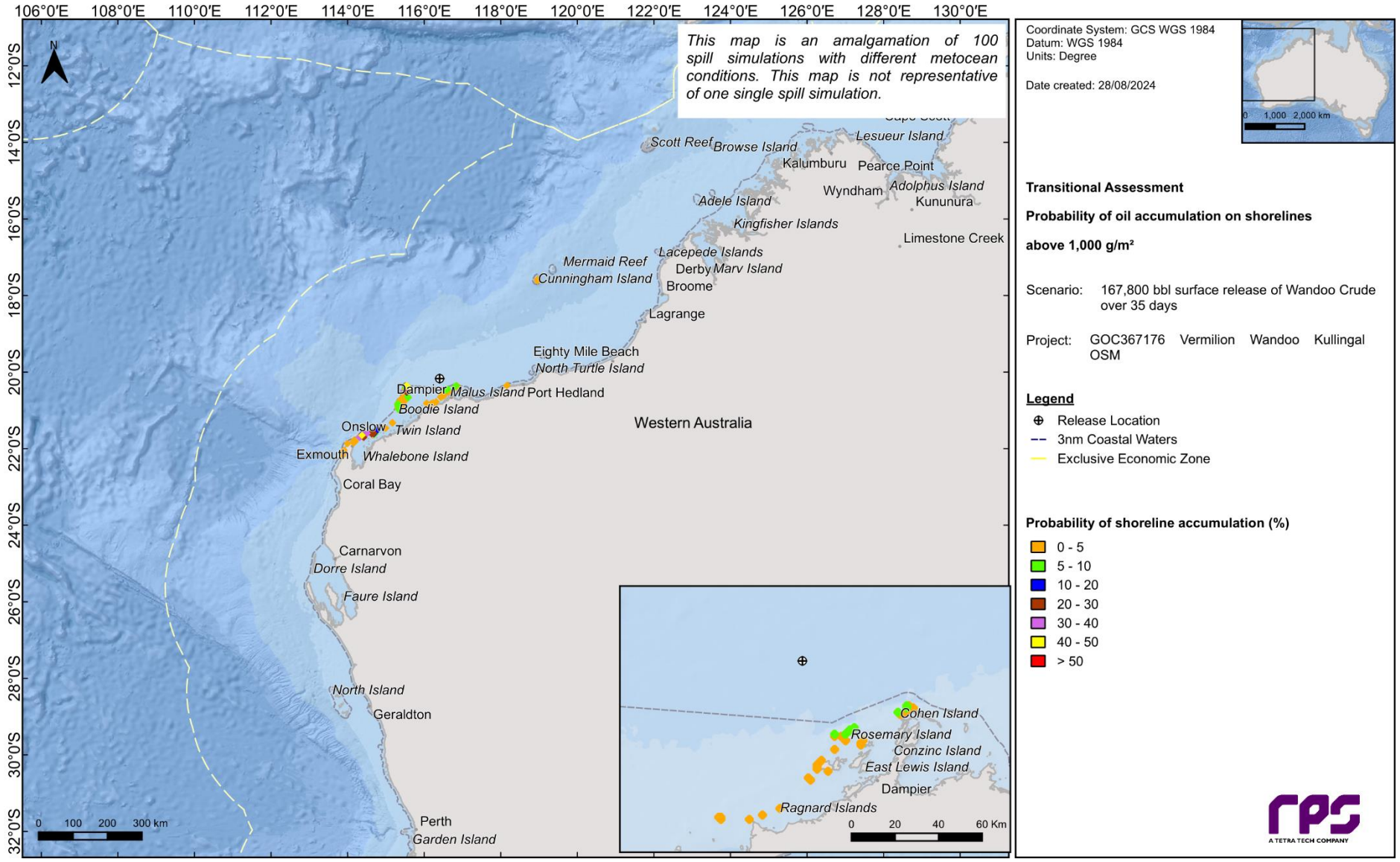


Figure 13.33 Predicted probability of shoreline oil accumulation at, or above, 1,000 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

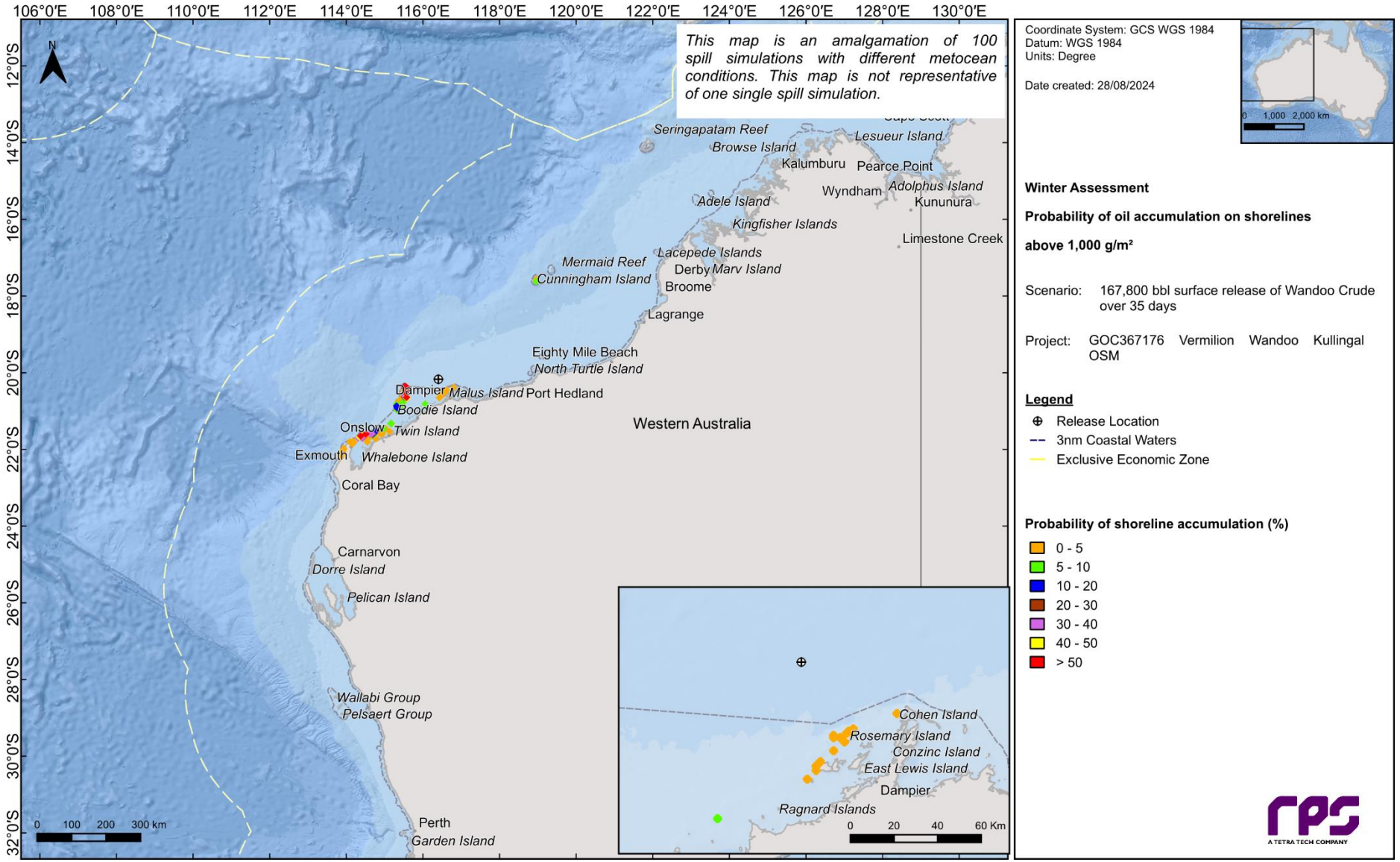


Figure 13.34 Predicted probability of shoreline oil accumulation at, or above, 1,000 g/m² following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

13.1.4 In-water exposure

13.1.4.1 Dissolved Hydrocarbons

Table 13.7 summarises the maximum distances from the release location to the dissolved hydrocarbon exposure thresholds for each season. Concentrations exceeding 10 ppb may potentially extend up to 790 km from the release location. As the threshold increases to 50 ppb, the maximum distance decreases to 425 km. No exposure was predicted above 400 ppb.

Table 13.8 summarises the predicted dissolved hydrocarbon exposure to receptors (either at, or above, receptors in the water column).

The Montebello AMP recorded the highest probabilities of exposure at, or above, 10 ppb during summer (50%), transitional (82%) and winter (89%) conditions. Additionally, the quickest time to exposure was recorded for Montebello AMP at, or above, 10 ppb during summer (26 hours), transitional (29 hours) and winter (27 hours) conditions. The Montebello AMP also recorded the highest concentration at 153 ppb during summer conditions.

Figure 13.35 to Figure 13.37 illustrate the dissolved hydrocarbon exposure zones for the three seasons, whilst Figure 13.38 to Figure 13.49 show the minimum times before exposure and probabilities of exposure at or above, 10 ppb and 50 ppb.

Seasonal cross-sectional transects (north-south and east-west) of the maximum dissolved hydrocarbons in the vicinity of the release site are presented in Figure 13.50 to Figure 13.55.

Table 13.7 Maximum distances from the release location to dissolved hydrocarbon exposure thresholds following a surface LOWC at Kullingal. Results were calculated from 100 spill simulations per season.

Season	Distance and direction travelled	Dissolved hydrocarbon exposure thresholds		
		10 ppb	50 ppb	400 ppb
Summer	Maximum distance (km) from release location	487	253	-
	Direction	West	Southwest	-
Transitional	Maximum distance (km) from release location	790	382	-
	Direction	Southwest	Southwest	-
Winter	Maximum distance (km) from release location	575	425	-
	Direction	Southwest	Southwest	-

Table 13.8 Receptors predicted to be exposed by dissolved hydrocarbons following a surface LOWC at Kullingal. Results were calculated from100 spill simulations per season.

Category	Name	Summer								Transitional								Winter							
		Probability (%) of dissolved concentration			Minimum time to receptor waters (hours) at			Maximum dissolved hydrocarbon concentration (ppb)		Probability (%) of dissolved concentration			Minimum time to receptor waters (hours) at			Maximum dissolved hydrocarbon concentration (ppb)		Probability (%) of dissolved concentration			Minimum time to receptor waters (hours) at			Maximum dissolved hydrocarbon concentration (ppb)	
		≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	averaged over all replicate spills	in the worst replicate	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	averaged over all replicate spills	in the worst replicate	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	averaged over all replicate spills	in the worst replicate
AMP	Dampier	4	NC	NC	225	NC	NC	2	43	1	NC	NC	1,076	NC	NC	<1	11	11	1	NC	266	544	NC	4	59
	Gascoyne	1	NC	NC	639	NC	NC	<1	50	11	1	NC	341	364	NC	4	77	NC	NC	NC	NC	NC	NC	NC	NC
	Montebello	50	3	NC	26	67	NC	11	153	82	7	NC	29	58	NC	22	133	89	7	NC	27	38	NC	25	120
KEF	Ancient coastline at 125 m depth contour	7	1	NC	200	307	NC	3	98	20	2	NC	217	263	NC	6	86	21	2	NC	183	408	NC	6	93
	Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	2	NC	NC	541	NC	NC	<1	43	17	1	NC	277	321	NC	5	95	16	1	NC	195	419	NC	5	111
	Commonwealth waters adjacent to Ningaloo Reef	2	NC	NC	588	NC	NC	<1	43	16	2	NC	346	356	NC	5	69	20	1	NC	231	502	NC	5	58
	Continental Slope Demersal Fish Communities	4	NC	NC	309	NC	NC	2	50	11	1	NC	263	392	NC	4	72	13	1	NC	260	502	NC	4	73
	Exmouth Plateau	1	NC	NC	951	NC	NC	<1	11	2	NC	NC	574	NC	NC	<1	21	1	NC	NC	558	NC	NC	<1	20
	Glomar Shoals	19	3	NC	143	279	NC	6	86	23	1	NC	119	197	NC	6	82	11	NC	NC	77	NC	NC	4	47
MP	Barrow Island	3	1	NC	141	956	NC	2	76	17	NC	NC	140	NC	NC	5	43	26	1	NC	121	414	NC	8	103

	Montebello Islands	21	1	NC	97	111	NC	6	69	48	2	NC	80	118	NC	11	90	69	12	NC	71	73	NC	20	116
	Ningaloo	2	NC	NC	588	NC	NC	<1	43	16	2	NC	346	356	NC	5	69	20	1	NC	231	502	NC	5	58
NR	Lowendal Islands	1	NC	NC	874	NC	NC	<1	11	1	NC	NC	1,084	NC	NC	2	12	7	NC	NC	271	NC	NC	3	22
	Thevenard Island	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	878	NC	NC	<1	11	NC	NC	NC	NC	NC	NC	NC	NC
RSB	Barrow Island Reefs and Shoals	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	793	NC	NC	<1	12
	Combe Reef	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	1,042	NC	NC	<1	13	2	NC	NC	482	NC	NC	<1	27
	Dailey Shoal	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	442	NC	NC	2	34	5	NC	NC	321	NC	NC	2	16
	Exmouth Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	502	NC	NC	<1	26
	Fairway Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	372	NC	NC	<1	27
	Glomar Shoal	7	NC	NC	243	NC	NC	3	25	5	NC	NC	183	NC	NC	2	46	6	NC	NC	175	NC	NC	2	32
	Hammersley Shoal	2	NC	NC	776	NC	NC	<1	14	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Hood Reef	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	982	NC	NC	2	14	4	NC	NC	365	NC	NC	2	45
	Madeleine Shoals	3	NC	NC	203	NC	NC	2	20	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Montebello Shoals	8	NC	NC	123	NC	NC	3	47	21	NC	NC	124	NC	NC	6	37	44	1	NC	129	433	NC	11	57
	Ningaloo Reef	NC	NC	NC	NC	NC	NC	NC	NC	3	NC	NC	397	NC	NC	2	23	6	NC	NC	532	NC	NC	2	34
	North West Reef	NC	NC	NC	NC	NC	NC	NC	NC	5	NC	NC	694	NC	NC	3	23	3	NC	NC	644	NC	NC	2	24
	Otway Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	468	NC	NC	<1	19
	Outtrim Patches	1	NC	NC	746	NC	NC	<1	14	11	1	NC	434	486	NC	5	64	14	NC	NC	212	NC	NC	5	38
	Penguin Bank	NC	NC	NC	NC	NC	NC	NC	NC	11	NC	NC	472	NC	NC	4	29	17	NC	NC	186	NC	NC	6	48
	Poivre Reef	2	NC	NC	932	NC	NC	<1	22	4	NC	NC	598	NC	NC	2	18	4	NC	NC	217	NC	NC	3	21
	Rankin Bank	2	NC	NC	357	NC	NC	<1	27	3	NC	NC	363	NC	NC	2	20	2	NC	NC	694	NC	NC	2	15
	Ripple Shoals	1	NC	NC	933	NC	NC	<1	19	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	439	NC	NC	<1	11
	Rosily Shoals	NC	NC	NC	NC	NC	NC	NC	NC	4	1	NC	494	918	NC	3	61	8	1	NC	283	470	NC	4	55
	Spider Reef	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	765	NC	NC	<1	11	1	NC	NC	378	NC	NC	<1	19
	Trap Reef	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	594	NC	NC	2	13	1	NC	NC	510	NC	NC	<1	16
	Tryal Rocks	22	1	NC	181	488	NC	7	54	52	7	NC	95	201	NC	17	96	54	3	NC	65	169	NC	16	74
	Web Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	387	NC	NC	<1	15

State and Territory Waters	WA	41	2	NC	27	86	NC	9	93	NC	NC	NC	NC	NC	NC	NC	NC	85	12	NC	44	54	NC	20	135

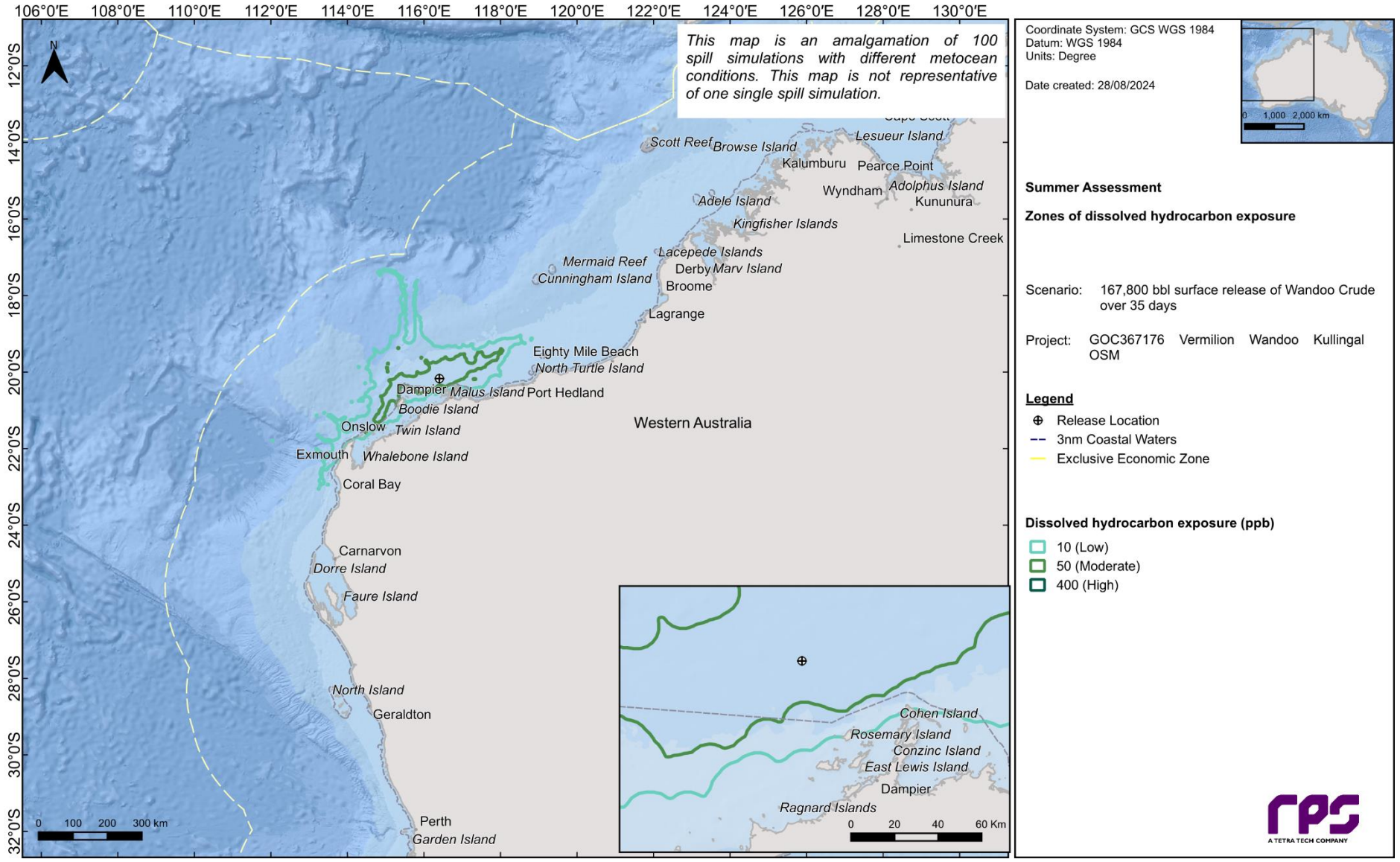


Figure 13.35 Predicted zones of dissolved hydrocarbon exposure following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

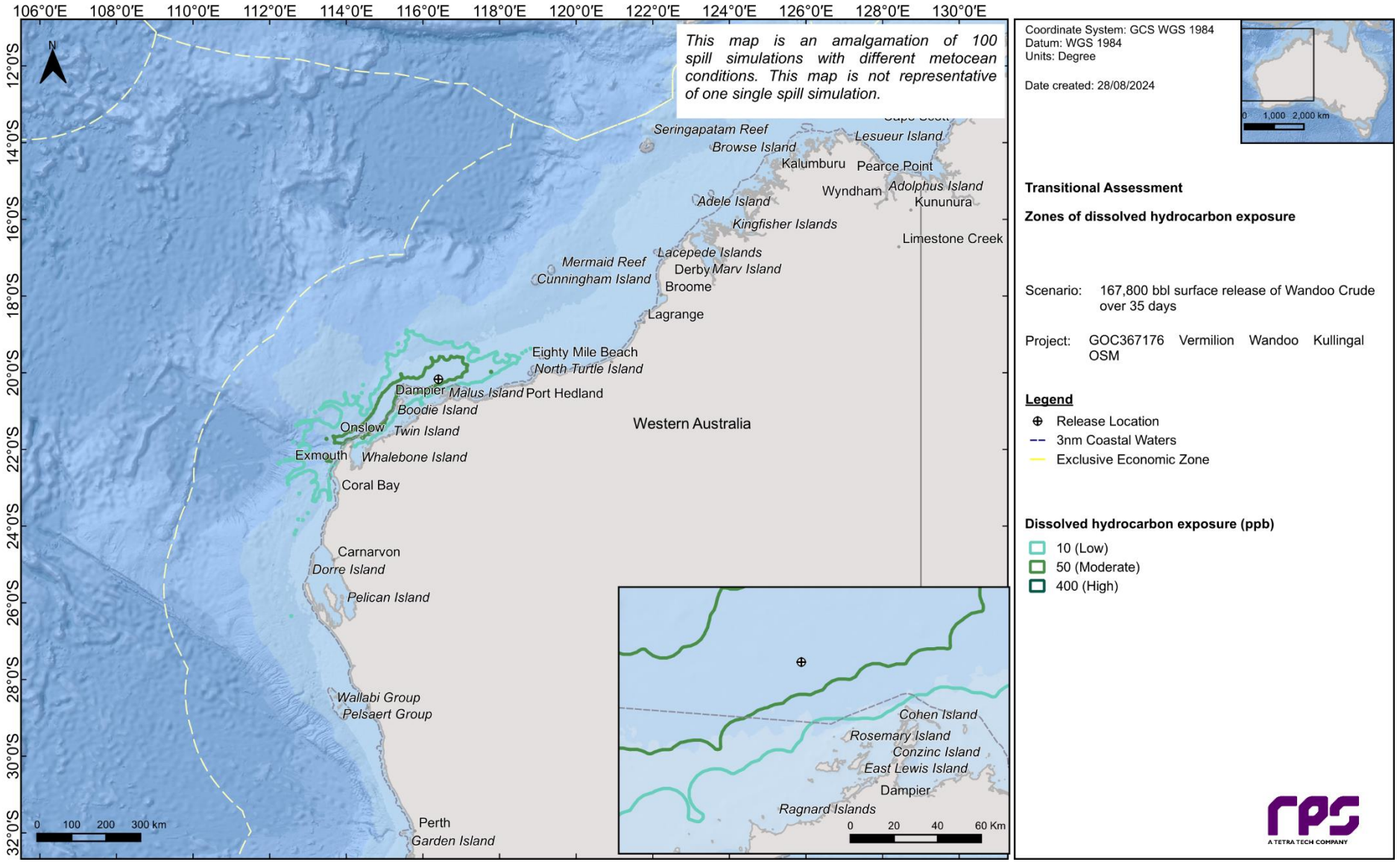


Figure 13.36 Predicted zones of dissolved hydrocarbon exposure following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

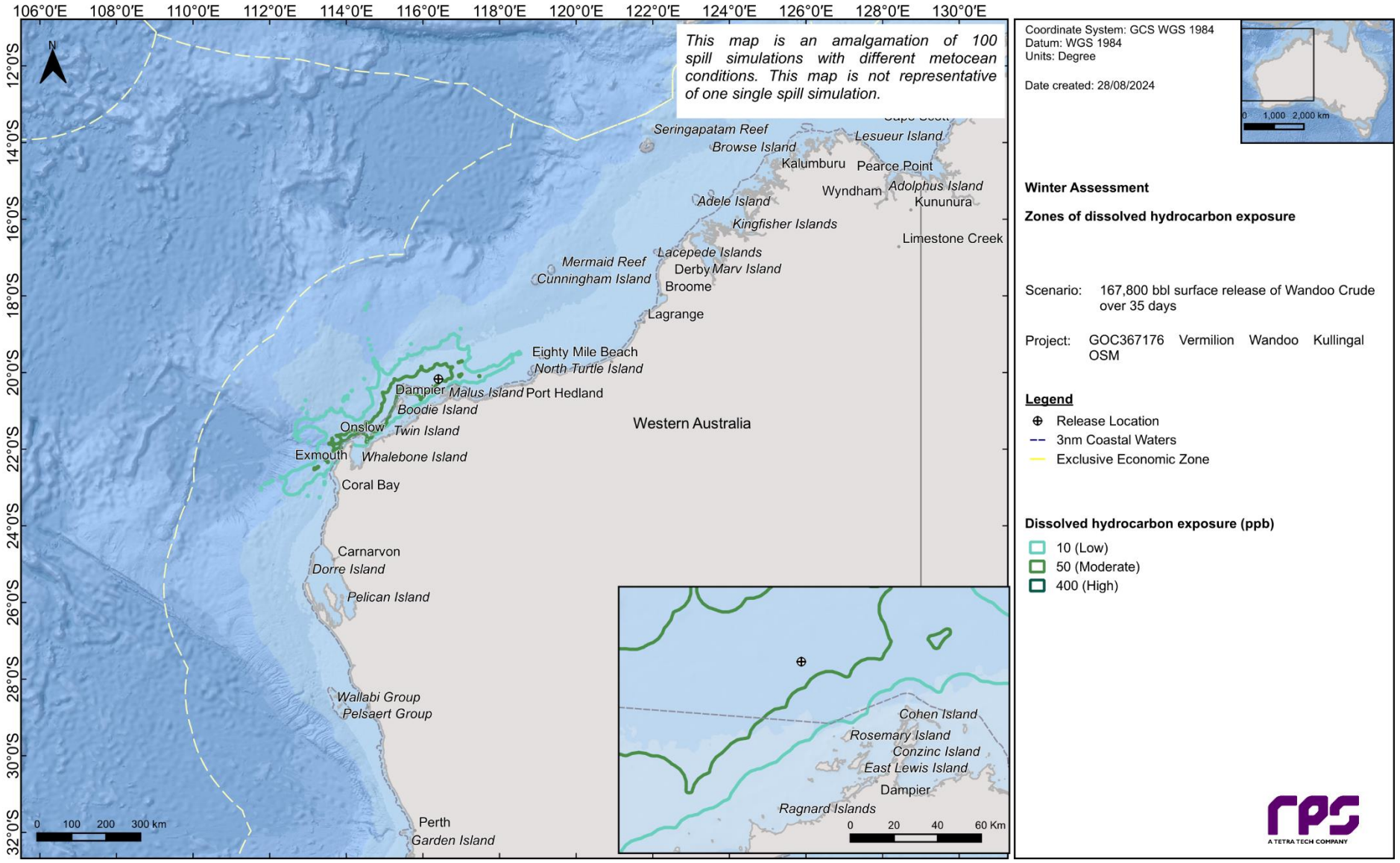


Figure 13.37 Predicted zones of dissolved hydrocarbon exposure following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

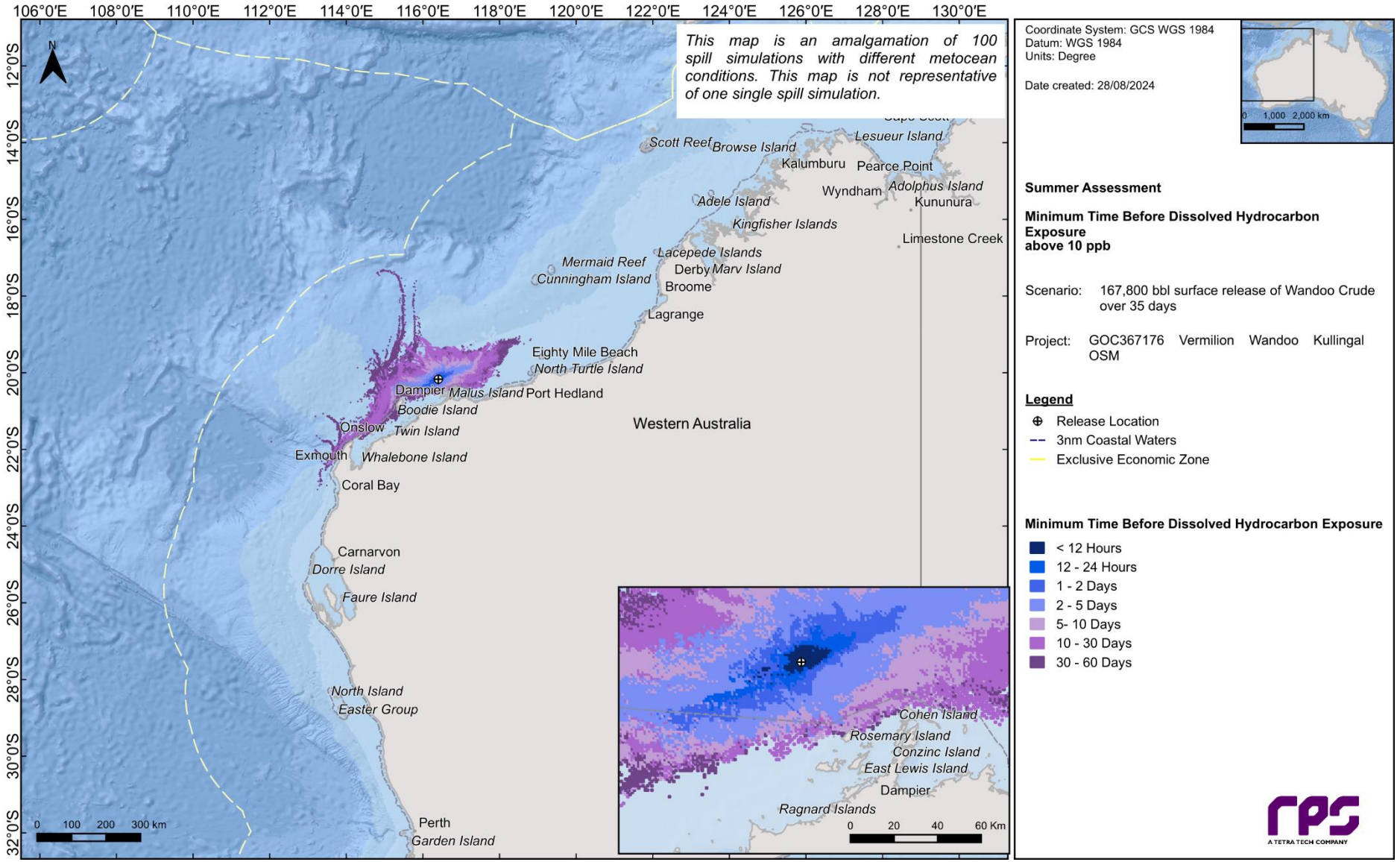


Figure 13.38 Minimum time before dissolved hydrocarbon exposure at, or above, 10 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

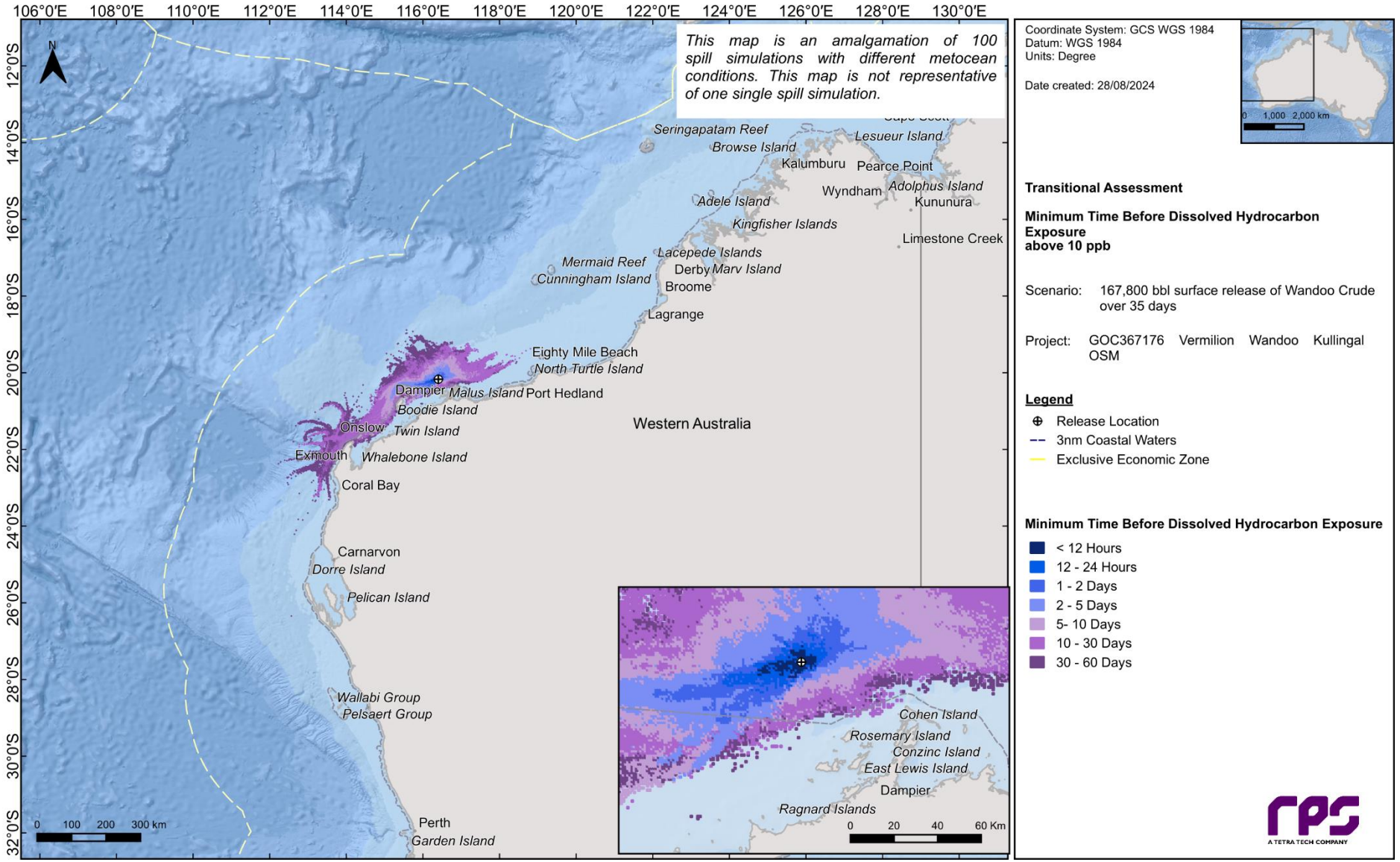


Figure 13.39 Minimum time before dissolved hydrocarbon exposure at, or above, 10 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

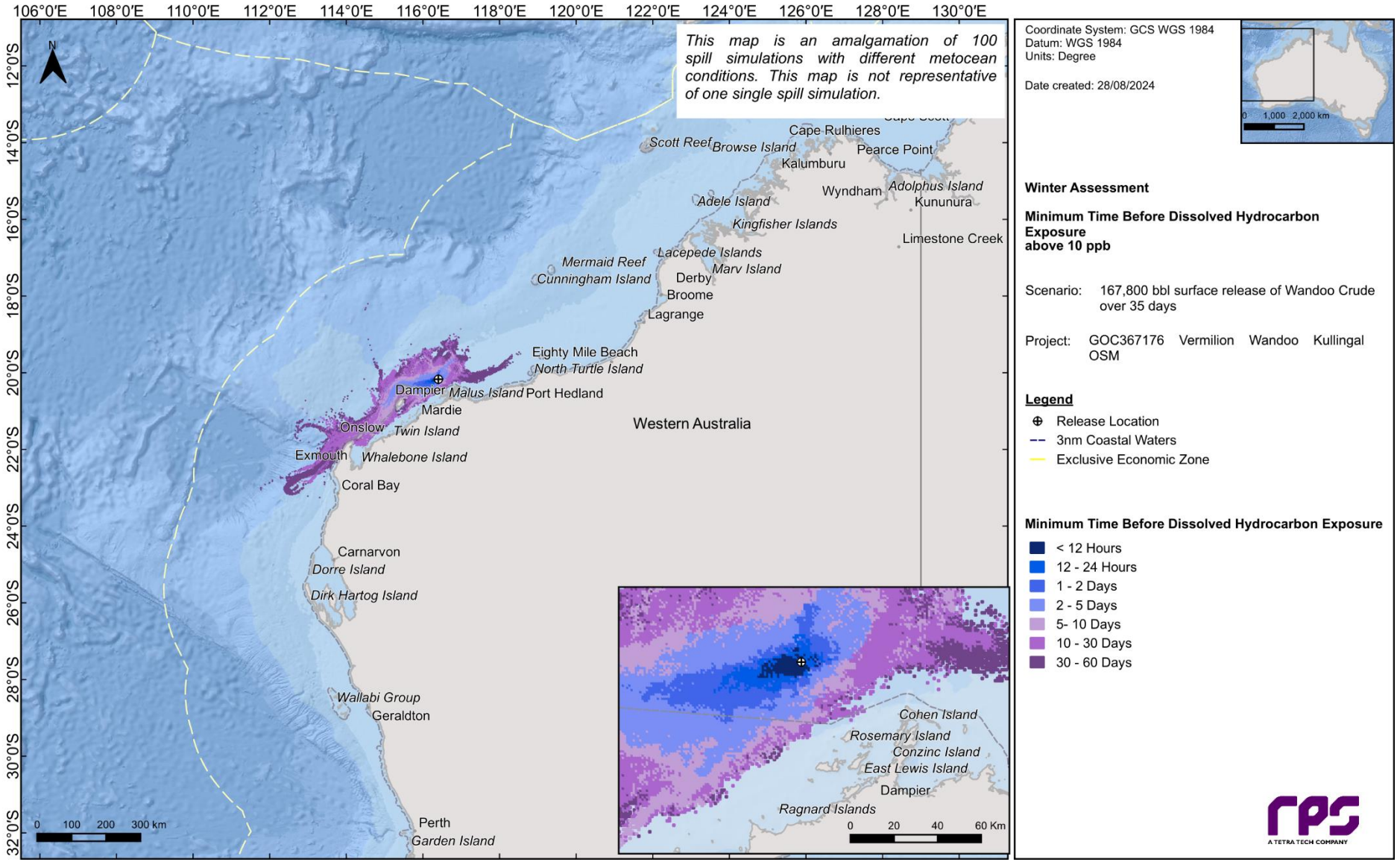


Figure 13.40 Minimum time before dissolved hydrocarbon exposure at, or above, 10 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

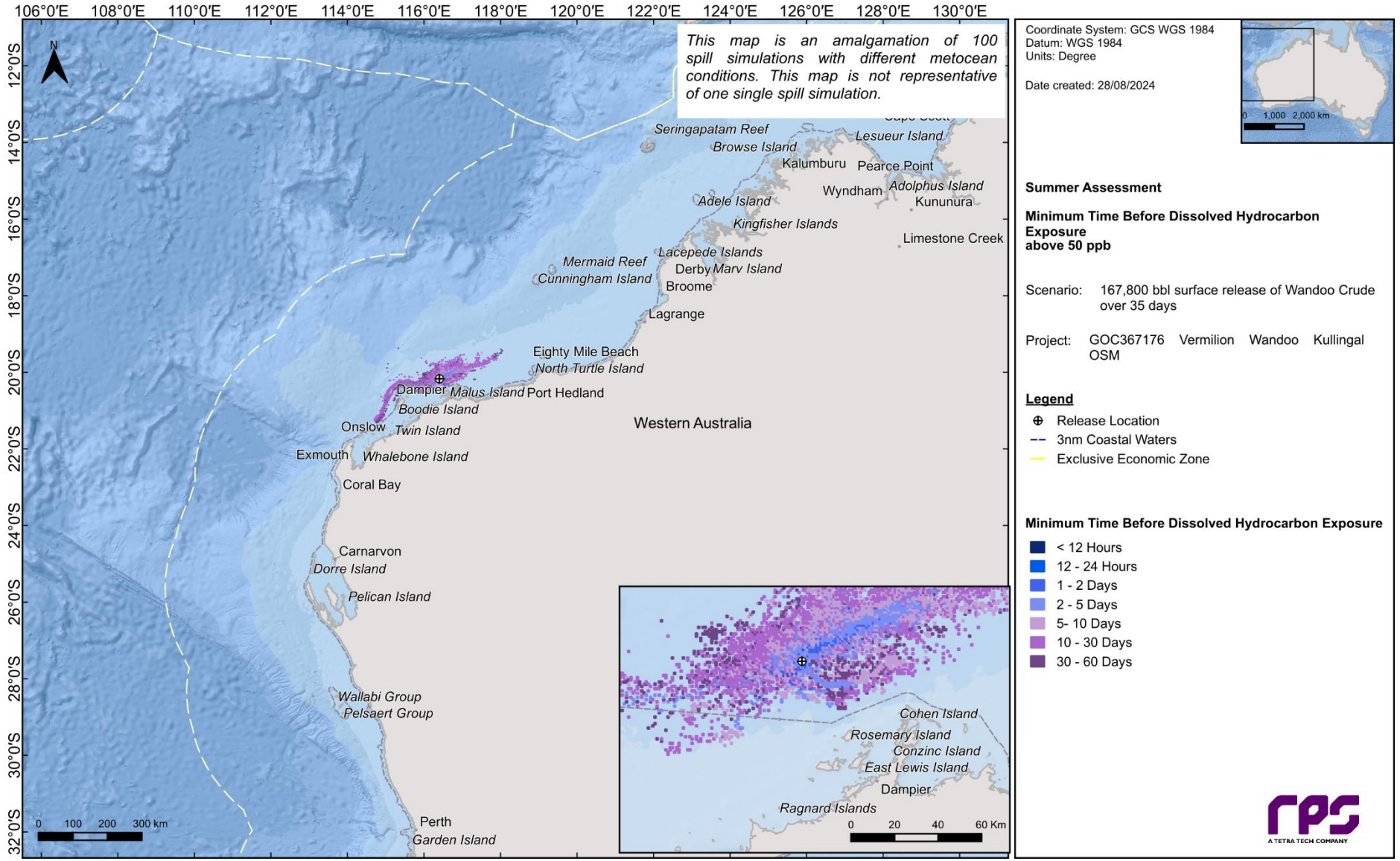


Figure 13.41 Minimum time before dissolved hydrocarbon exposure at, or above, 50 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

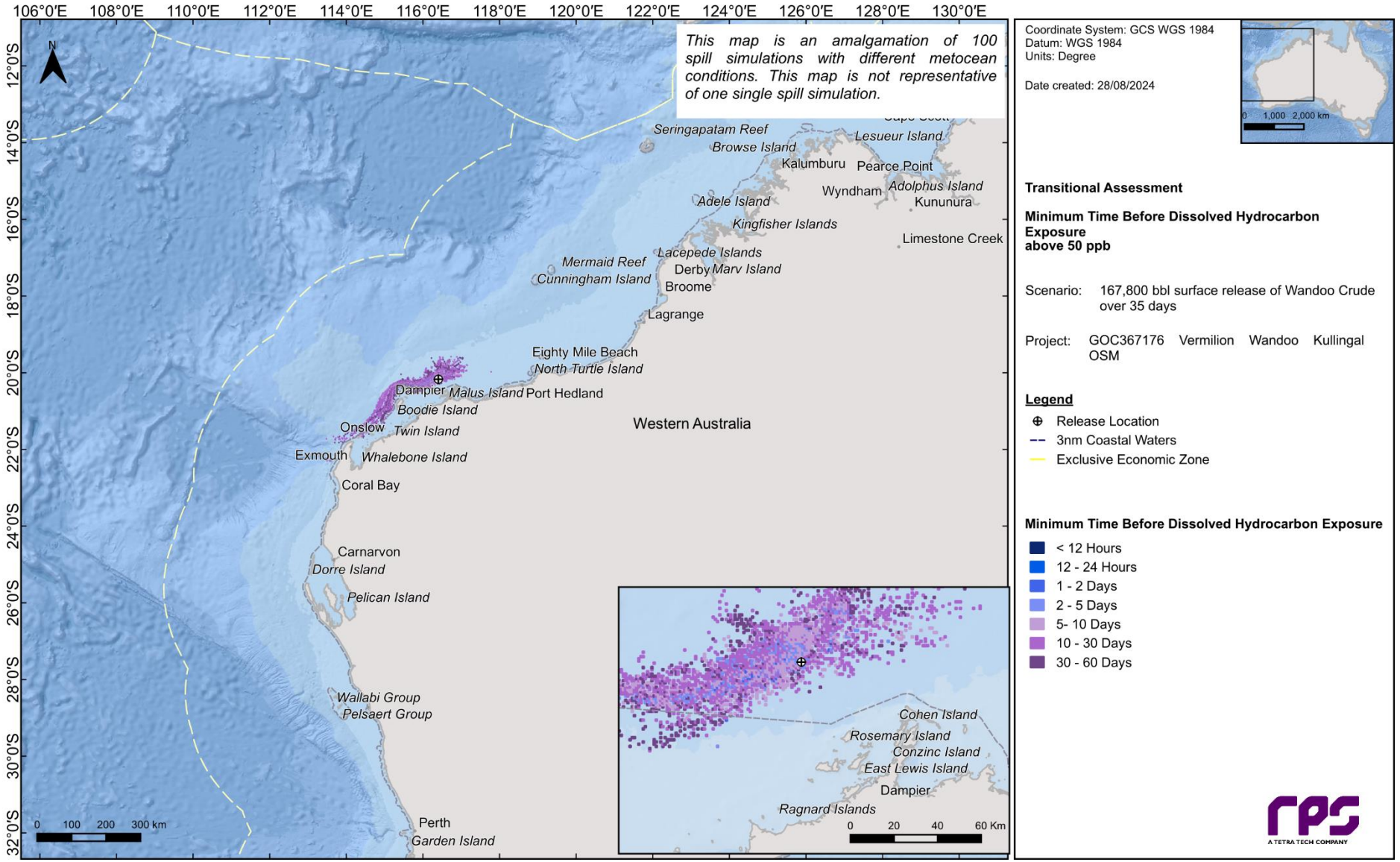


Figure 13.42 Minimum time before dissolved hydrocarbon exposure at, or above, 50 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

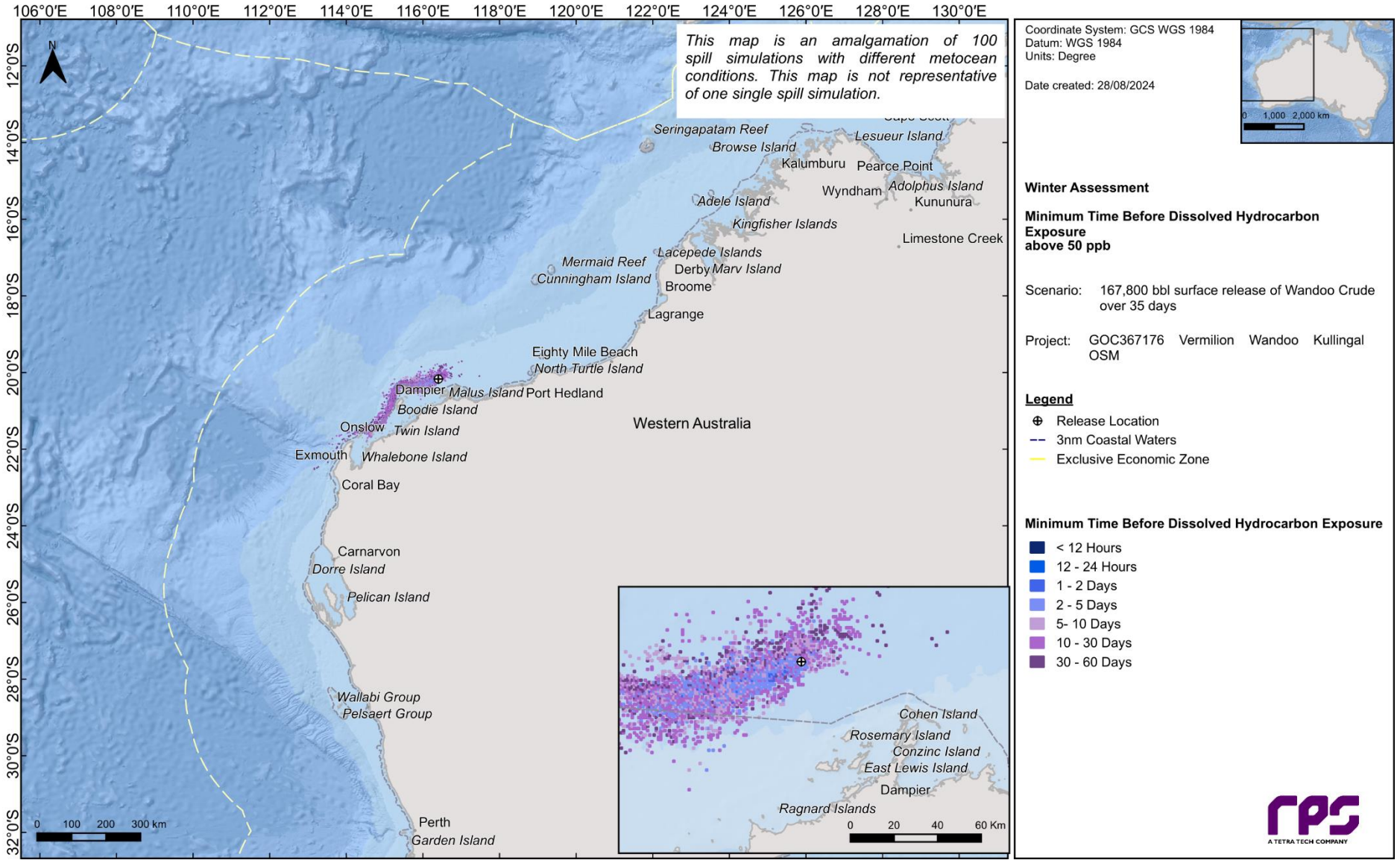


Figure 13.43 Minimum time before dissolved hydrocarbon exposure at, or above, 50 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

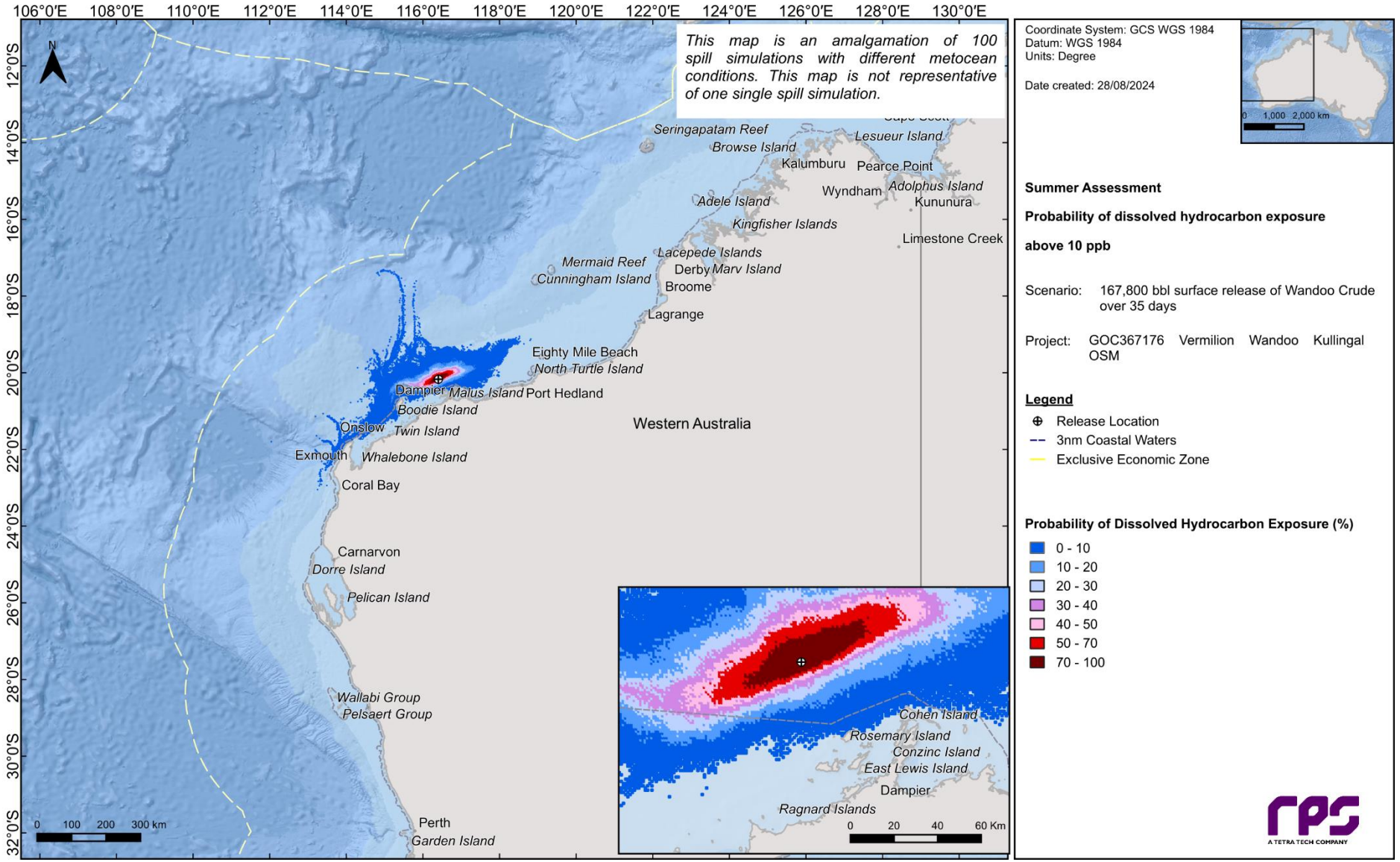


Figure 13.44 Probability of dissolved hydrocarbon exposure at, or above, 10 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

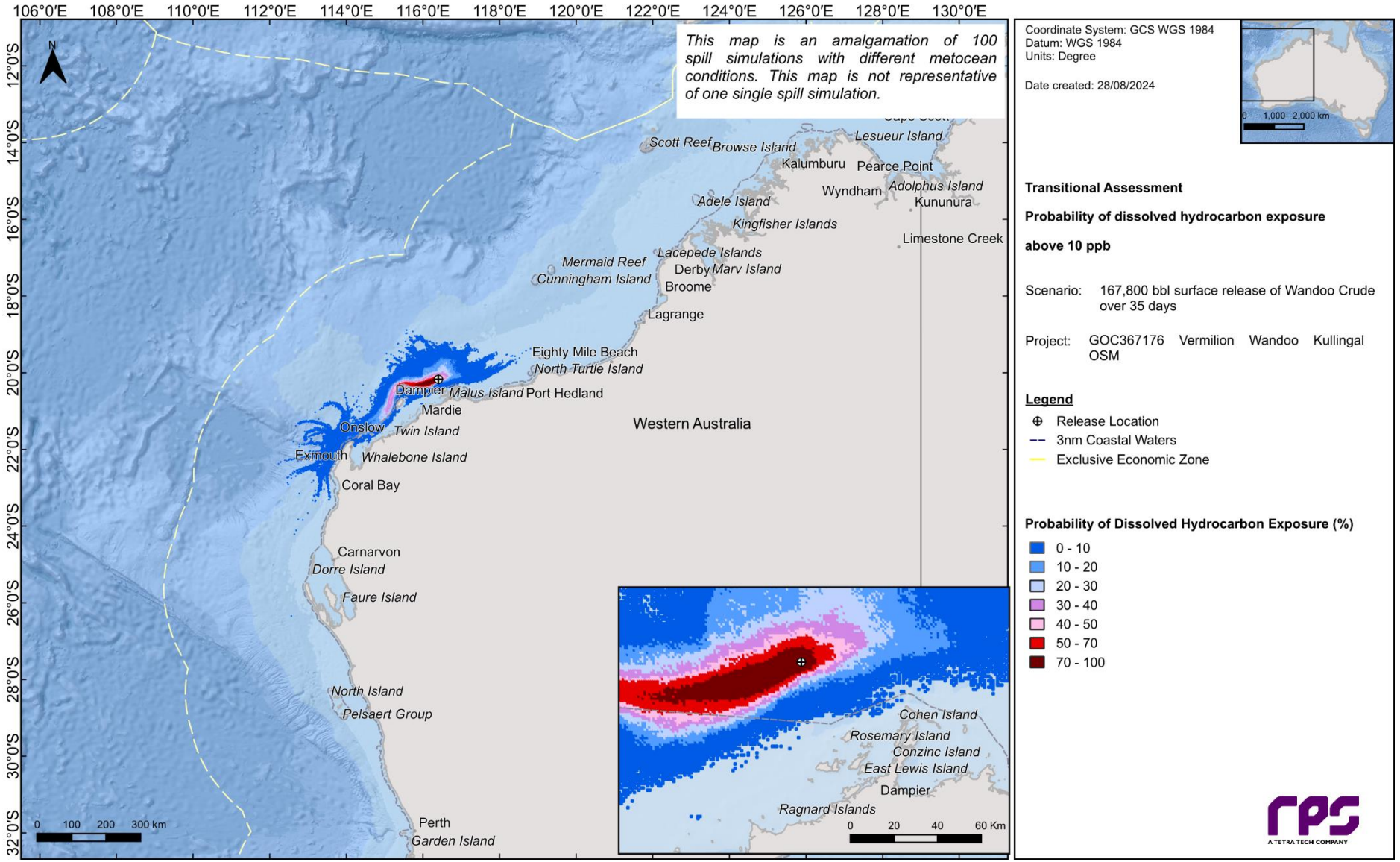


Figure 13.45 Probability of dissolved hydrocarbon exposure at, or above, 10 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

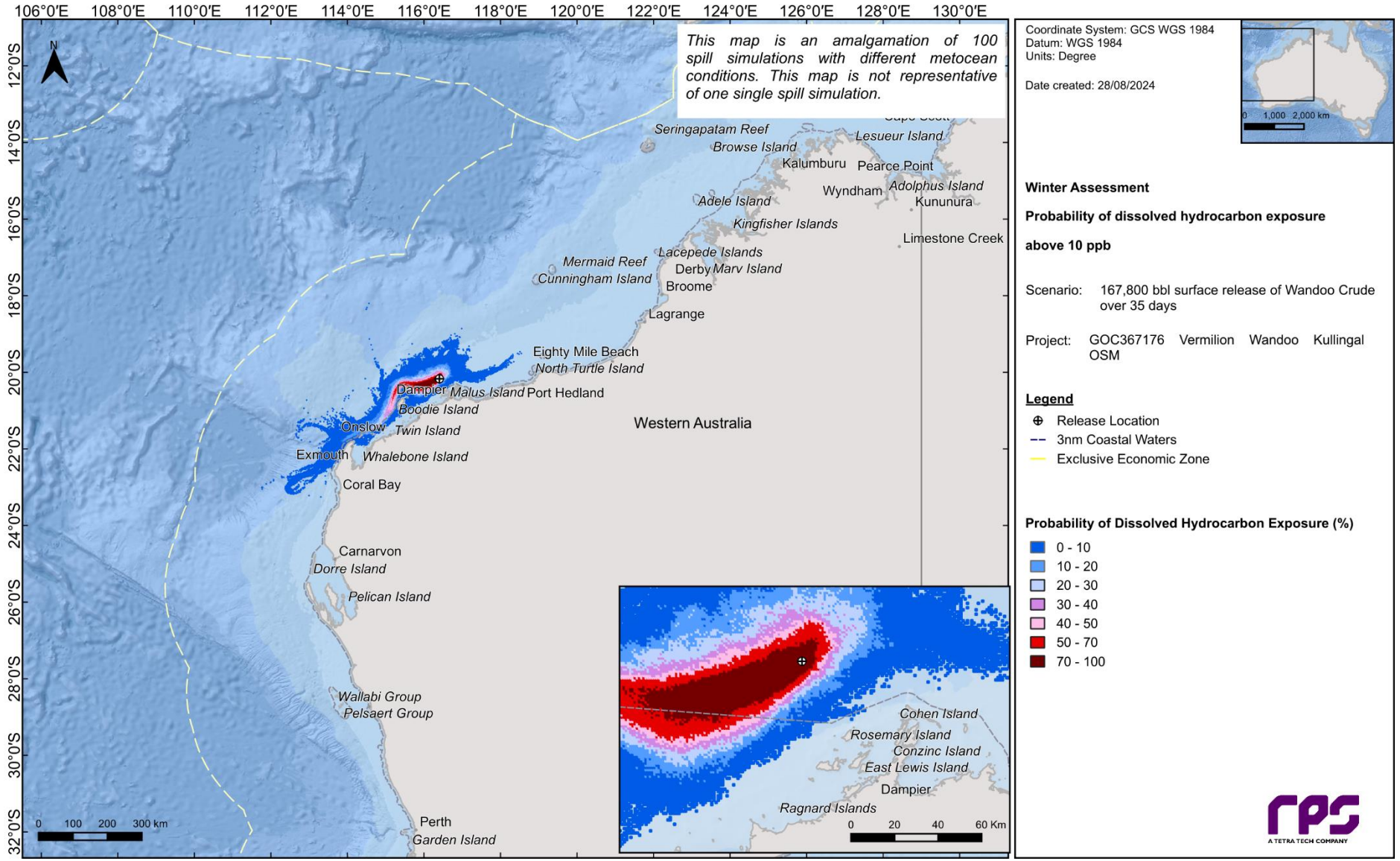


Figure 13.46 Probability of dissolved hydrocarbon exposure at, or above, 10 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

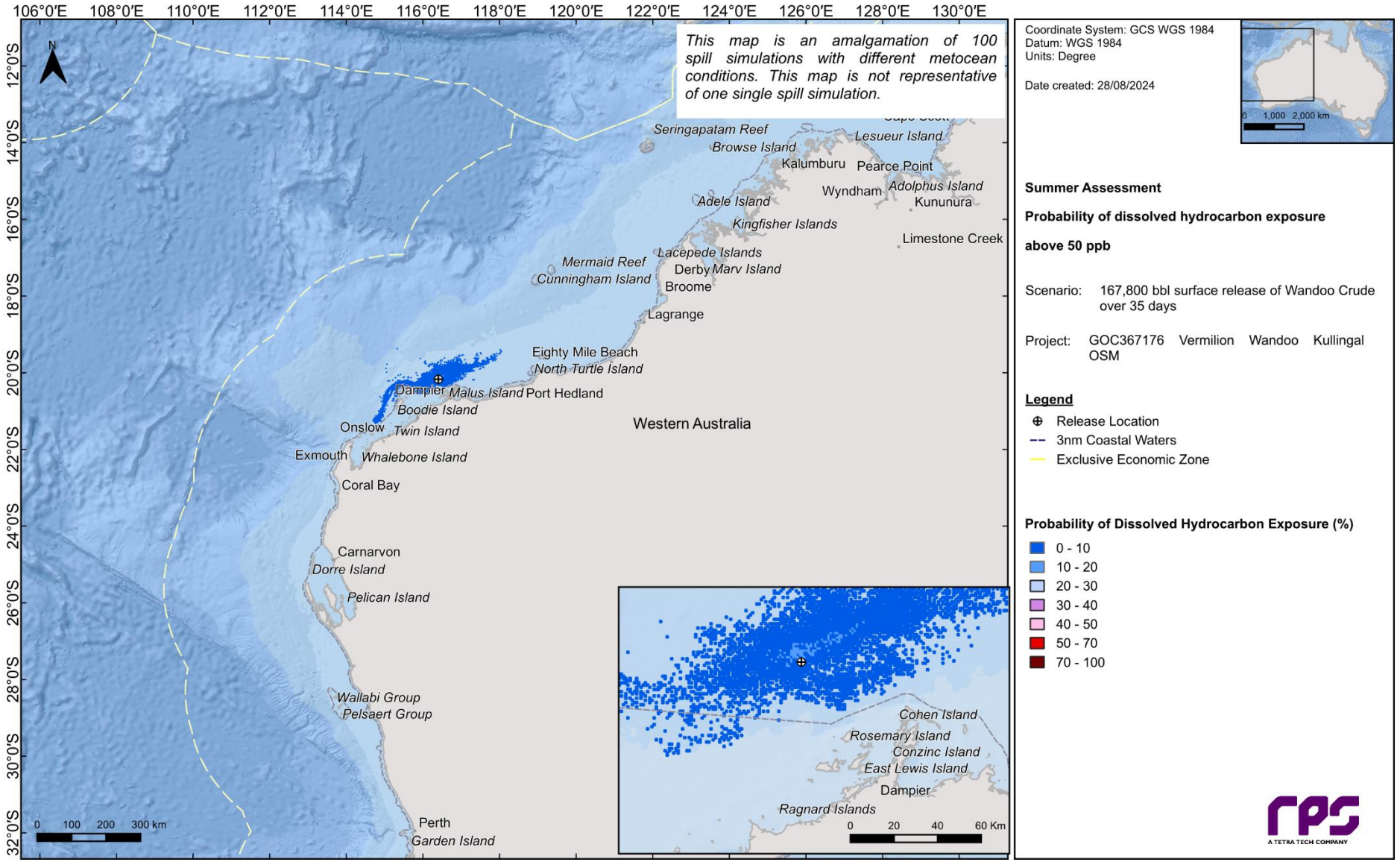


Figure 13.47 Probability of dissolved hydrocarbon exposure at, or above, 50 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

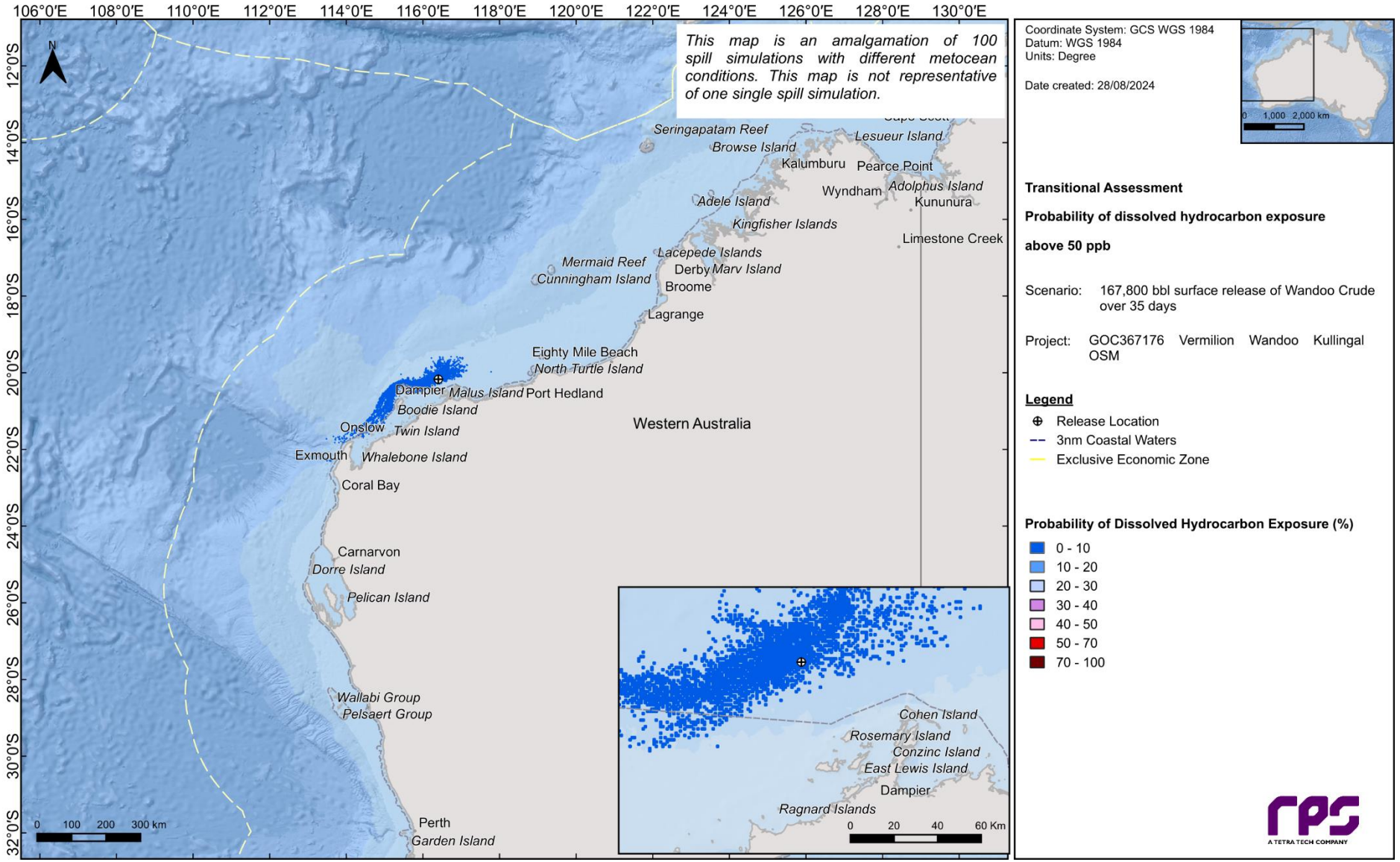


Figure 13.48 Probability of dissolved hydrocarbon exposure at, or above, 50 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

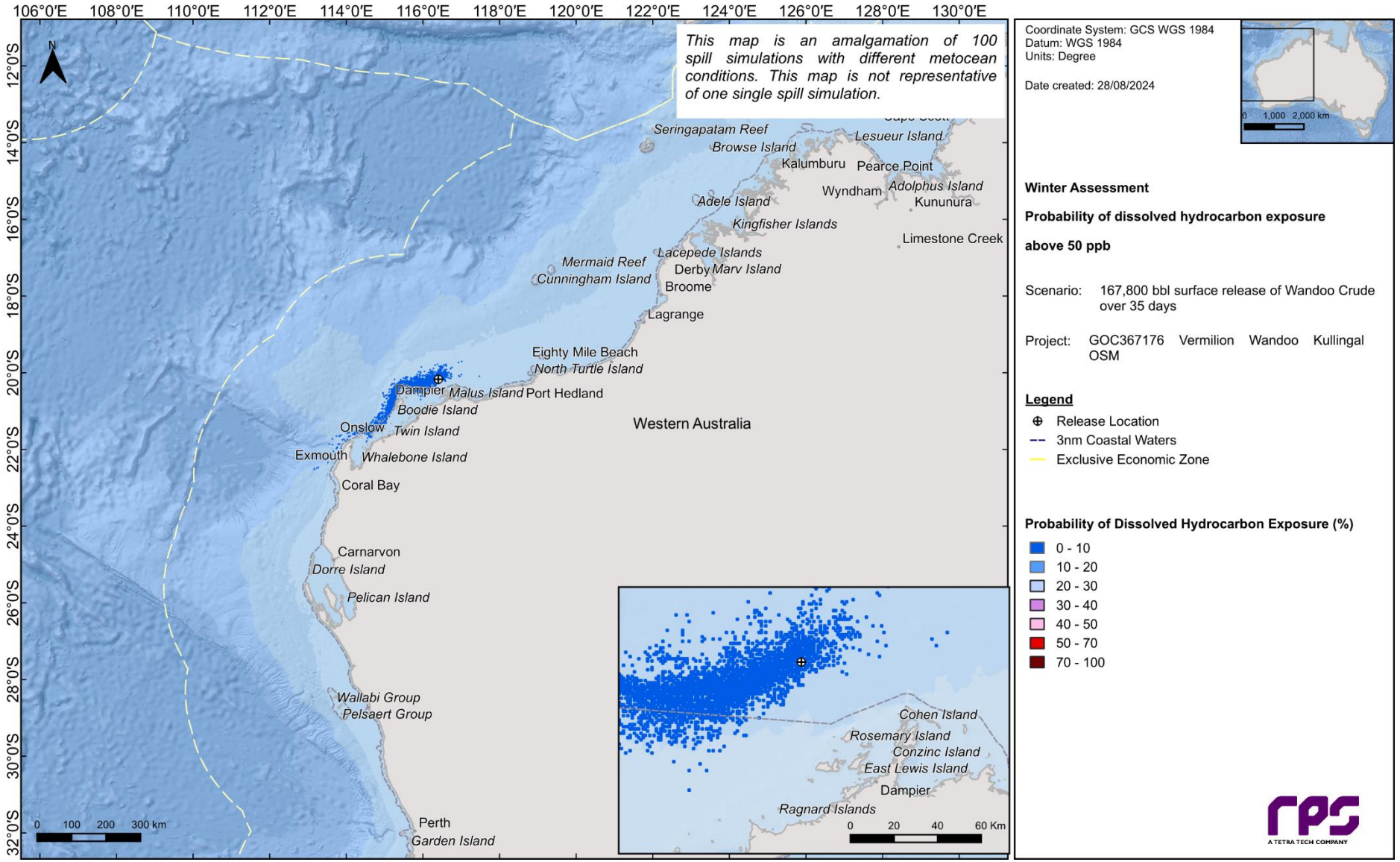


Figure 13.49 Probability of dissolved hydrocarbon exposure at, or above, 50 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

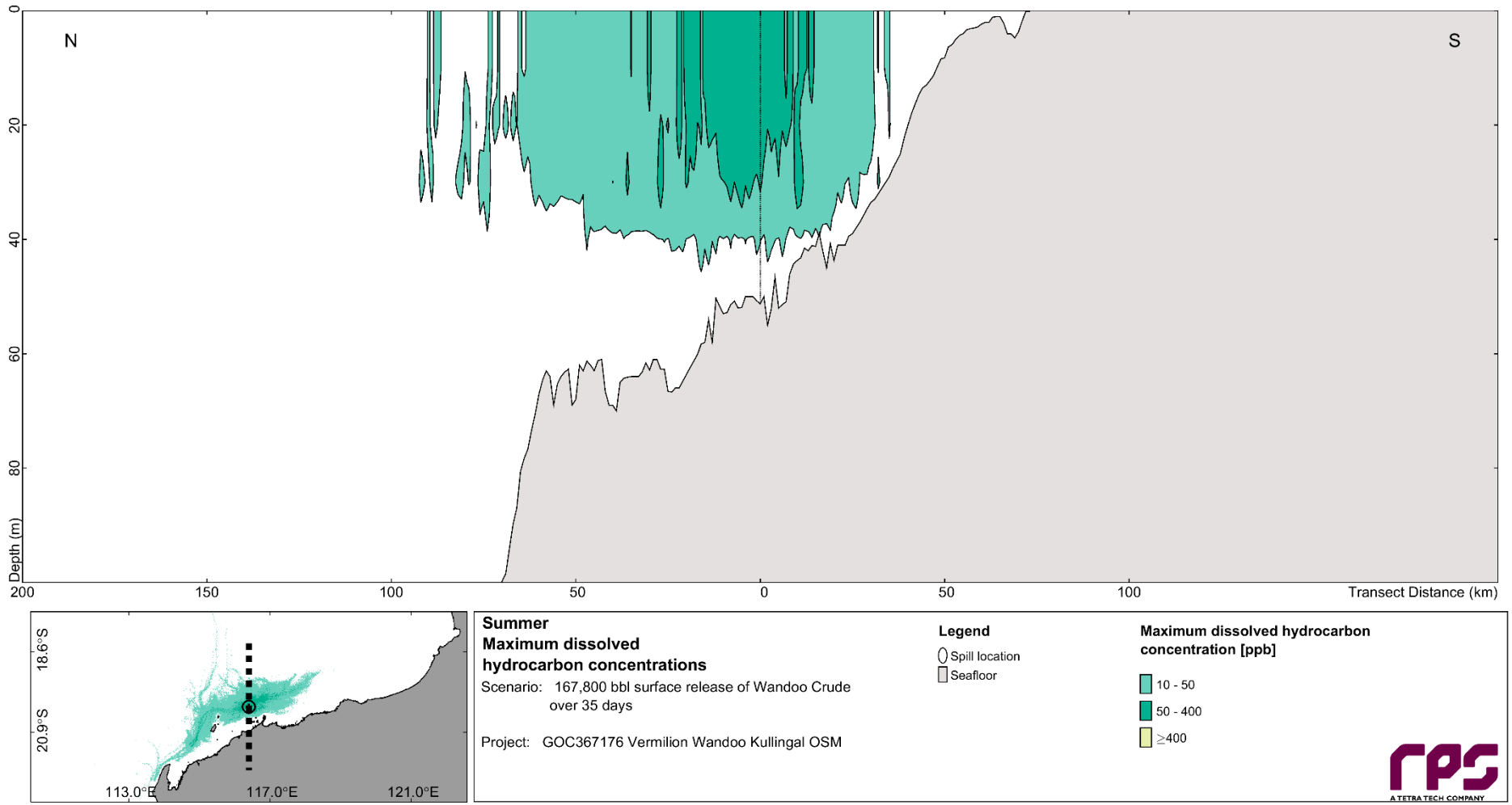


Figure 13.50 North-south cross-section transect of dissolved hydrocarbon concentrations exposure following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

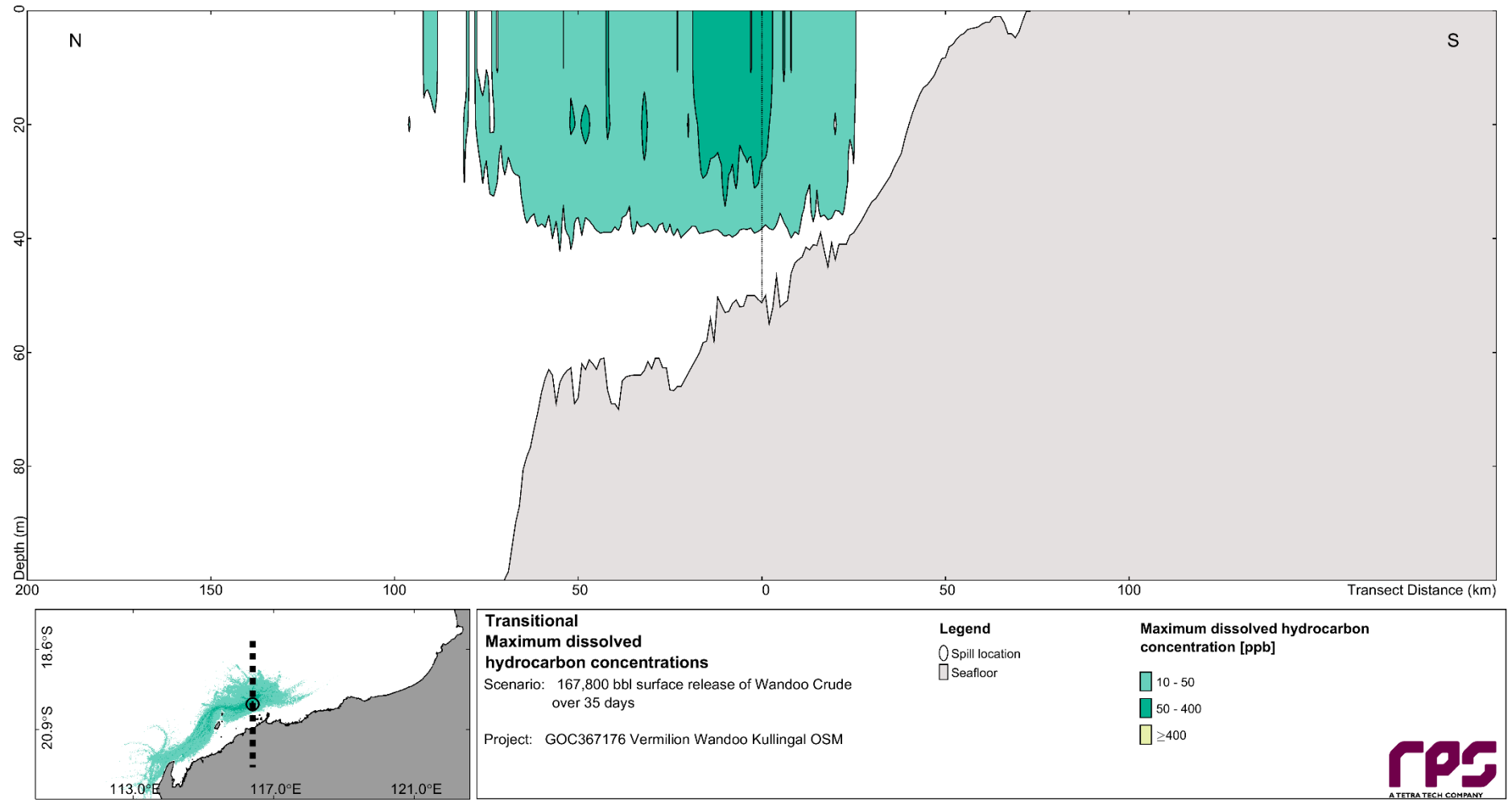


Figure 13.51 North-south cross-section transect of dissolved hydrocarbon concentrations exposure following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

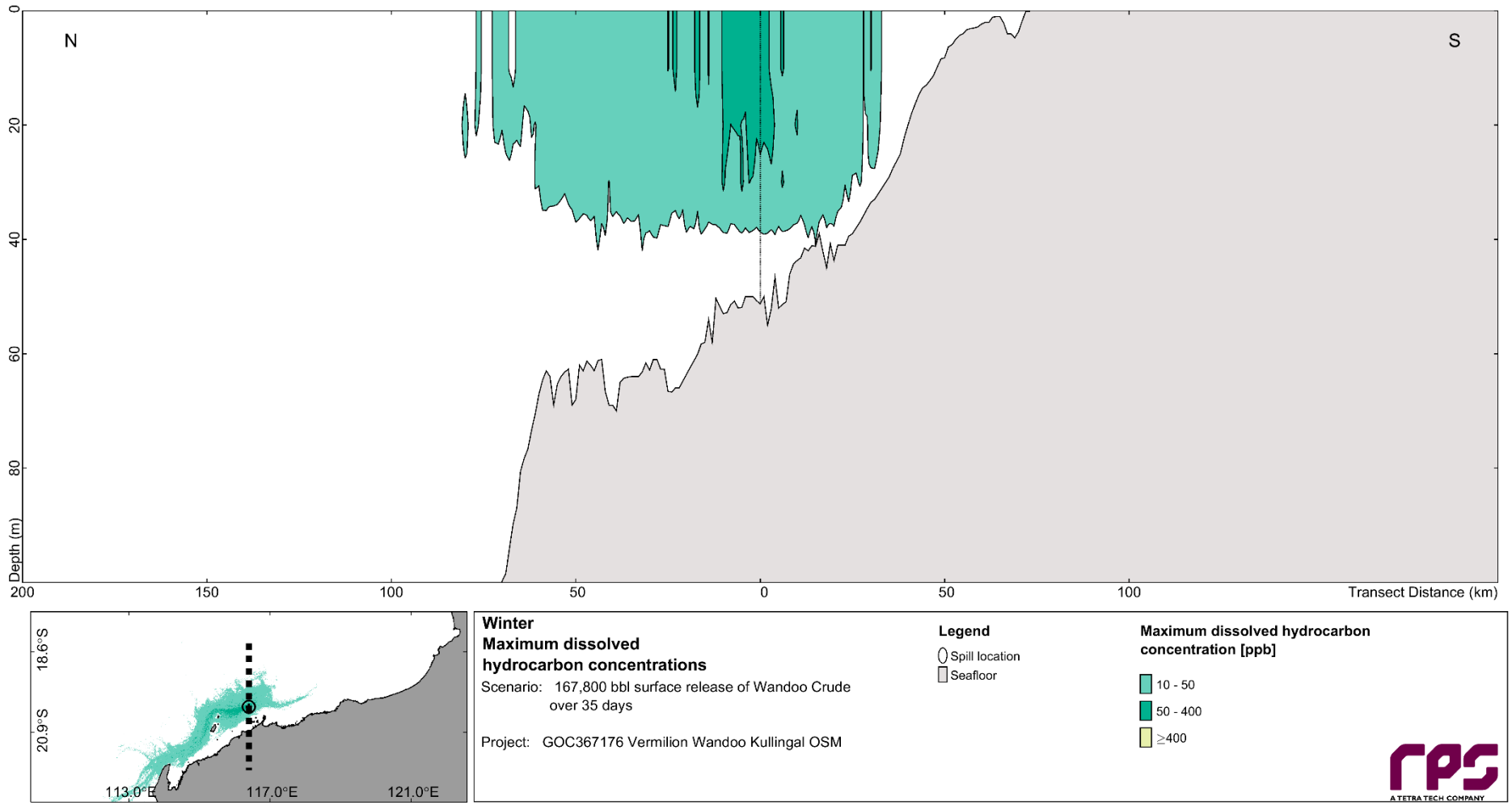


Figure 13.52 North-south cross-section transect of dissolved hydrocarbon concentrations exposure following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

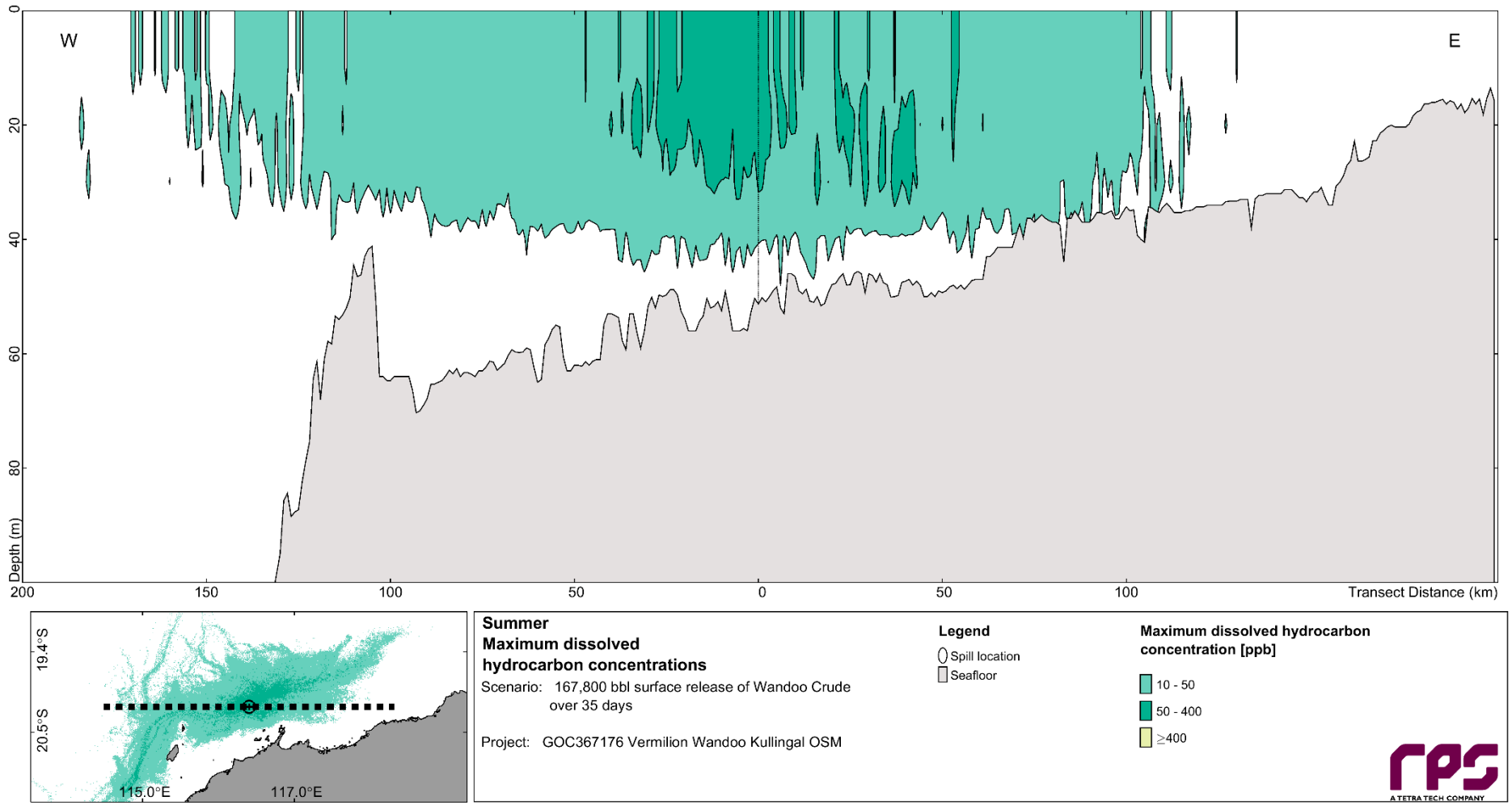


Figure 13.53 East-west cross-section transect of dissolved hydrocarbon concentrations exposure following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

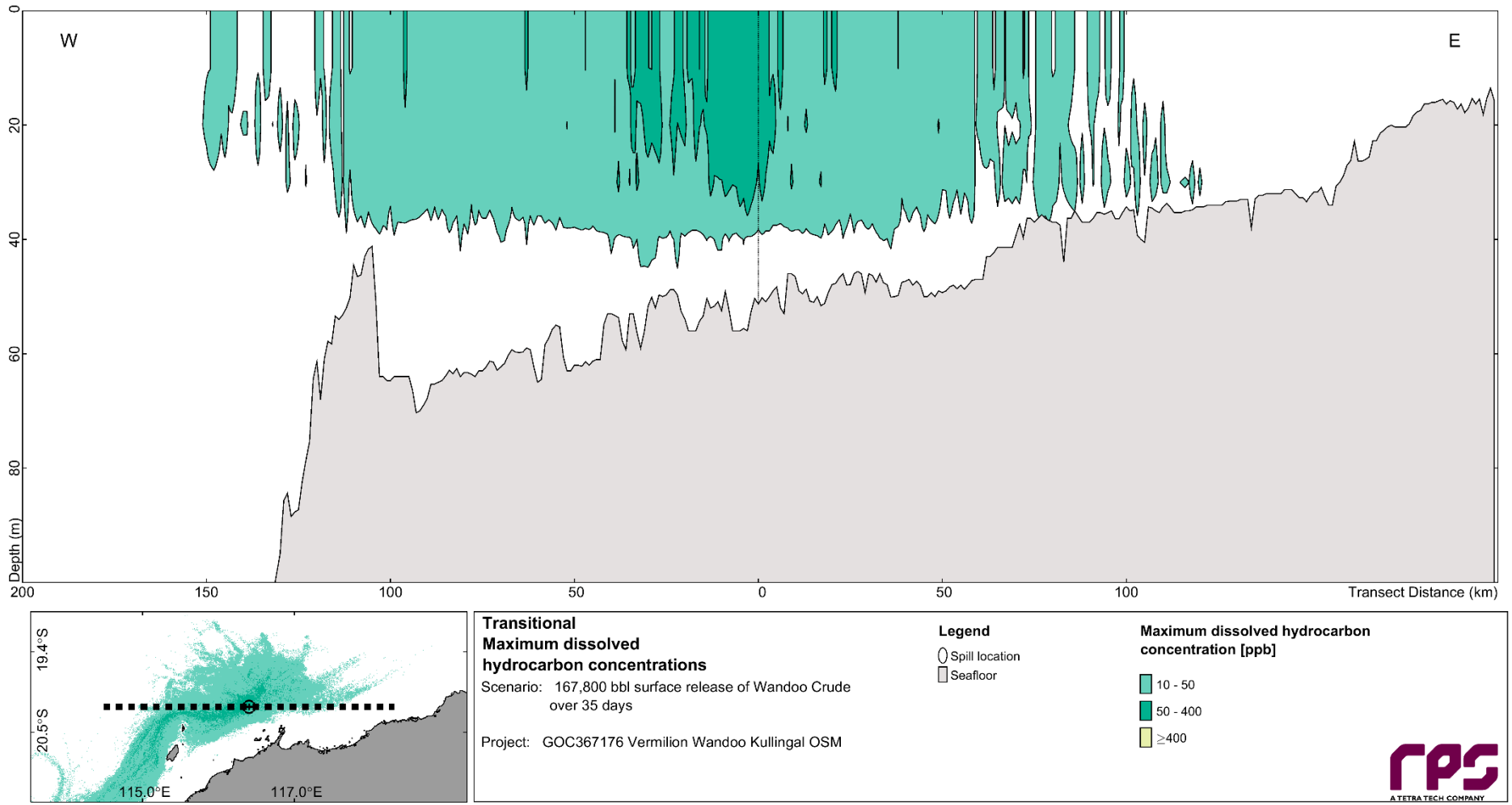


Figure 13.54 East-west cross-section transect of dissolved hydrocarbon concentrations exposure following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

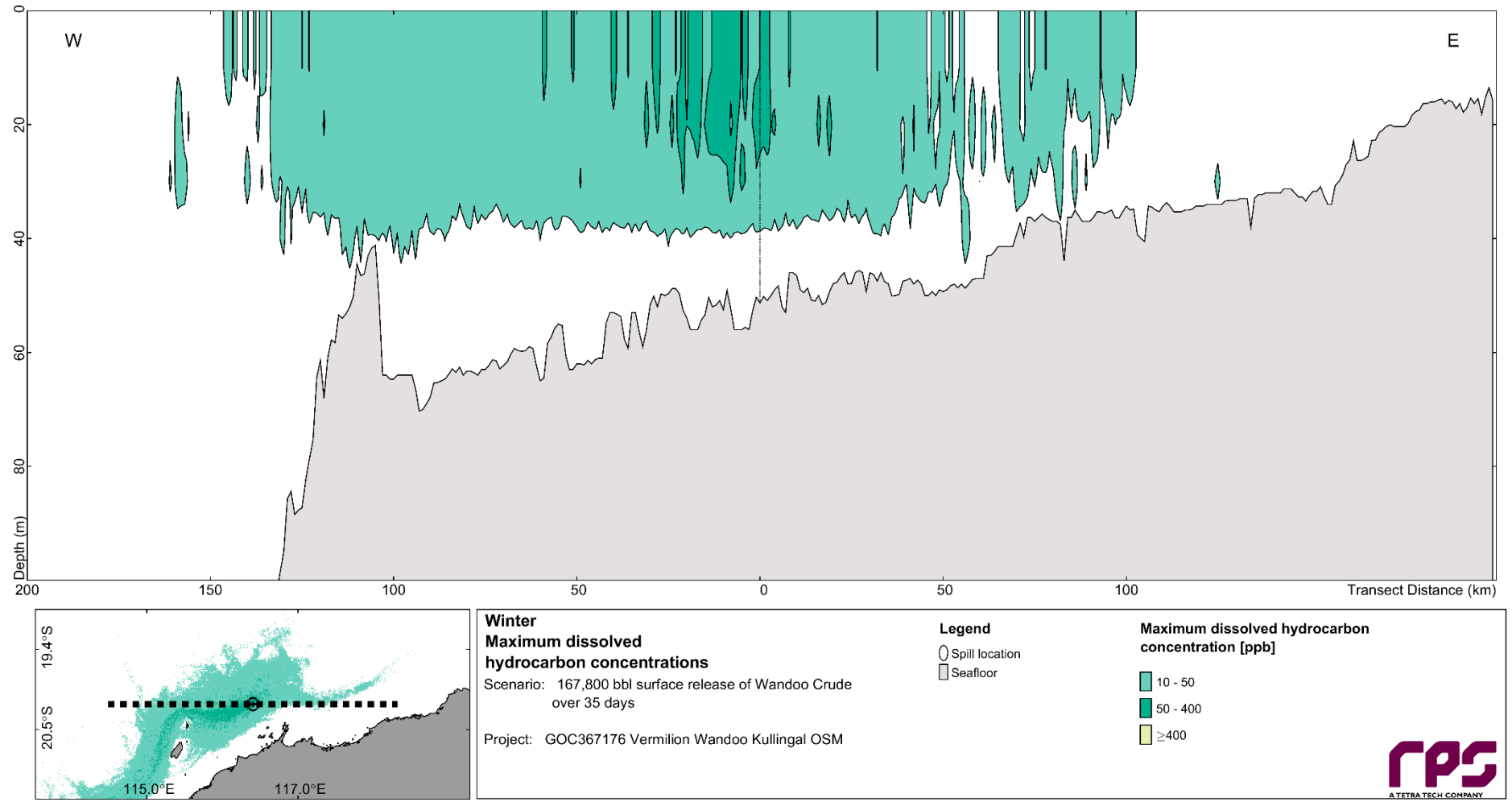


Figure 13.55 East-west cross-section transect of dissolved hydrocarbon concentrations exposure following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

13.1.4.2 Entrained Hydrocarbons

Table 13.9 summarises the maximum distances from the release location to entrained hydrocarbon thresholds for each season. Concentrations exceeding 10 ppb may potentially extend up to 1,302 km from the release location. As the threshold increases to 100 ppb, the maximum distance decreases to 1,037 km.

Table 13.10 summarises the receptors exposed to entrained hydrocarbons per season (either at, or above, receptors in the water column).

For spills commencing during the summer months, the Glomar Shoals KEF recorded the highest probability (94%) of exposure to concentrations at, or above, 10 ppb, while the Montebello AMP recorded the highest probability of exposure for transitional (91%) and winter (99%) conditions. The shortest time to exposure at, or above, 10 ppb was recorded for the Montebello AMP with times of 21 hours during summer, 23 hours during transitional conditions, and 21 hours during winter. The highest recorded concentration, 3,007 ppb, occurred at Montebello AMP during winter.

Figure 13.56 to Figure 13.58 illustrate the zones of exposure to entrained hydrocarbons for each season, whilst Figure 13.59 to Figure 13.70 display the minimum exposure times and the probability of exposure to these hydrocarbons.

Seasonal cross-sectional transects (north-south and east-west) of the maximum entrained hydrocarbons in the vicinity of the release site, are presented in Figure 13.71 to Figure 13.76.

Table 13.9 Maximum distances from the release location to entrained hydrocarbon exposure thresholds following a surface LOWC at Kullingal. Results were calculated from 100 spill simulations per season.

Season	Distance and direction travelled	Entrained hydrocarbon exposure thresholds	
		10 ppb	100 ppb
Summer	Maximum distance (km) from release location	1,176	527
	Direction	Southwest	Southwest
Transitional	Maximum distance (km) from release location	1,302	1,037
	Direction	Southwest	Southwest
Winter	Maximum distance (km) from release location	1,224	574
	Direction	Southwest	Southwest

Table 13.10 Receptors predicted to be exposed by entrained hydrocarbons following a surface LOWC at Kullingal. Results were calculated from100 spill simulations per season.

Category	Name	Summer						Transitional						Winter					
		Probability (%) of entrained hydrocarbon concentration		Minimum time to receptor waters (hours) at		Maximum entrained hydrocarbon concentration (ppb)		Probability (%) of entrained hydrocarbon concentration		Minimum time to receptor waters (hours) at		Maximum entrained hydrocarbon concentration (ppb)		Probability (%) of entrained hydrocarbon concentration		Minimum time to receptor waters (hours) at		Maximum entrained hydrocarbon concentration (ppb)	
		≥ 10 ppb	≥ 100 ppb	≥ 10 ppb	≥ 100 ppb	averaged over all replicate spills	in the worst replicate	≥ 10 ppb	≥ 100 ppb	≥ 10 ppb	≥ 100 ppb	averaged over all replicate spills	in the worst replicate	≥ 10 ppb	≥ 100 ppb	≥ 10 ppb	≥ 100 ppb	averaged over all replicate spills	in the worst replicate
AMP	Abrolhos	1	NC	1,081	NC	<1	28	6	1	831	1,043	3	156	3	NC	986	NC	<1	17
	Argo-Rowley Terrace	7	NC	678	NC	2	46	18	NC	624	NC	4	38	15	NC	410	NC	5	59
	Carnarvon Canyon	3	NC	617	NC	<1	18	8	NC	740	NC	3	39	10	NC	762	NC	4	83
	Dampier	47	15	77	166	38	281	22	3	203	274	14	162	19	NC	314	NC	5	51
	Gascoyne	32	2	310	616	13	448	66	35	246	328	120	906	68	43	234	238	166	1,153
	Mermaid Reef	3	NC	1,010	NC	<1	23	NC	NC	NC	NC	NC	NC	1	NC	1,261	NC	<1	13
	Montebello	80	64	21	21	305	1,521	91	82	23	26	519	1,418	99	96	21	24	637	3,007
EEZ	Indonesia	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	1,018	NC	<1	16
IPA	Nyangumarta Warrarn	4	NC	722	NC	2	27	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
KEF	Ancient coastline at 125 m depth contour	68	20	161	186	76	1,133	76	46	138	205	163	1,557	90	54	110	125	291	2,369

	Canyons linking the Argo Abyssal Plain with the Scott Plateau	38	7	266	395	27	445	62	44	209	272	126	1,592	1	NC	1,294	NC	<1	11
	Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	77	50	172	175	237	1,633
	Commonwealth waters adjacent to Ningaloo Reef	26	4	319	619	12	392	58	46	257	339	112	752	72	47	219	229	178	1,304
	Continental Slope Demersal Fish Communities	67	13	203	484	59	1,349	76	36	145	226	129	1,416	80	46	142	233	166	1,864
	Exmouth Plateau	24	NC	413	NC	6	84	50	6	381	555	22	207	57	12	350	367	32	382
	Glomar Shoals	94	61	73	94	164	732	67	42	80	105	125	608	68	42	63	72	219	1,149
	Mermaid Reef and Commonwealth waters surrounding Rowley Shoals	5	NC	678	NC	2	46	4	NC	749	NC	2	41	8	NC	648	NC	3	53
	Wallaby Saddle	NC	NC	NC	NC	NC	NC	1	NC	1,263	NC	<1	21	2	NC	990	NC	<1	17

	Western demersal slope and associated fish communities	2	NC	778	NC	<1	39	15	1	666	953	4	187	5	NC	879	NC	2	35
MP	Barrow Island	46	11	104	115	30	474	69	42	114	123	91	415	86	46	85	121	126	537
	Eighty Mile Beach	26	NC	410	NC	8	65	5	NC	502	NC	2	28	2	NC	1,185	NC	<1	14
	Montebello Islands	58	35	79	83	208	1,942	76	58	60	66	294	2,062	93	78	57	60	622	2,586
	Ningaloo	26	4	319	619	12	392	58	46	257	339	112	752	72	47	219	229	178	1,304
	Rowley Shoals	3	NC	679	NC	2	33	3	NC	792	NC	<1	31	8	NC	670	NC	3	53
NR	Barrow Island	12	NC	338	NC	4	66	24	NC	196	NC	8	64	51	NC	262	NC	15	61
	Great Sandy Island	11	3	227	855	7	139	11	NC	585	NC	4	42	55	NC	257	NC	18	95
	Lowendal Islands	22	9	149	484	33	588	37	21	134	147	48	314	79	37	153	188	91	351
	Thevenard Island	10	NC	498	NC	4	73	43	9	217	493	22	144	57	2	188	408	21	160
RAM SAR	Eighty-mile Beach	8	NC	646	NC	2	29	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
RSB	Ashworth Shoal	2	NC	1,247	NC	<1	15	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Australind Shoal	8	NC	897	NC	2	34	2	NC	755	NC	2	21	8	NC	301	NC	5	36
	Barrow Island Reefs and Shoals	11	3	226	851	8	147	14	NC	360	NC	4	44	59	NC	256	NC	19	96
	Baylis Patches	4	NC	845	NC	<1	28	23	NC	680	NC	6	34	8	NC	495	NC	4	27
	Bennett Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	818	NC	2	13

	Beryl Reef	4	NC	909	NC	2	27	NC	NC	NC	NC	NC	NC	27	NC	263	NC	8	42
	Brewis Reef	10	NC	807	NC	4	46	43	NC	216	NC	14	81	56	3	175	421	23	114
	Camplin Shoal	NC	NC	NC	NC	NC	NC	2	NC	1,320	NC	<1	12	1	NC	757	NC	2	16
	Clerke Reef	2	NC	799	NC	<1	20	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Cod Bank	20	2	112	884	9	114	13	NC	470	NC	4	92	6	NC	620	NC	2	20
	Combe Reef	6	NC	794	NC	3	56	42	3	470	763	25	171	62	NC	235	NC	21	78
	Cooper Shoal	NC	NC	NC	NC	NC	NC	1	NC	1,344	NC	<1	12	1	NC	734	NC	2	18
	Courtenay Shoal	17	NC	153	NC	6	50	12	NC	462	NC	4	47	1	NC	1,193	NC	<1	11
	Dailey Shoal	17	1	485	721	9	106	53	28	292	421	64	346	67	30	208	210	75	365
	Dockrell Reef	5	NC	529	NC	2	32	1	NC	898	NC	<1	19	NC	NC	NC	NC	NC	NC
	Eliassen Rocks	3	NC	527	NC	<1	19	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Exmouth Reef	4	NC	896	NC	2	52	30	NC	508	NC	9	49	46	NC	260	NC	13	50
	Fairway Reef	9	NC	696	NC	3	43	43	3	422	719	20	110	58	NC	211	NC	21	88
	Flinders Shoal	5	1	266	1,091	4	108	5	NC	1,172	NC	2	25	12	NC	399	NC	4	20
	Fortescue Reef	6	NC	527	NC	2	24	NC	NC	NC	NC	NC	NC	8	NC	278	NC	3	24
	Glennie Patches	6	NC	890	NC	2	22	1	NC	756	NC	<1	13	4	NC	447	NC	3	41
	Glomar Shoal	77	33	152	222	84	450	51	25	140	154	54	330	45	22	108	148	72	699
	Gorgon Patch	3	NC	1,000	NC	<1	22	NC	NC	NC	NC	NC	NC	5	NC	393	NC	2	35
	Hammersley Shoal	31	11	154	177	24	236	17	NC	325	NC	8	79	3	NC	531	NC	2	30
	Hastings Shoal	3	NC	1,017	NC	<1	14	NC	NC	NC	NC	NC	NC	5	NC	393	NC	2	27
	Hayman Rock	4	NC	832	NC	2	25	11	NC	628	NC	4	16	15	NC	287	NC	6	43

	Hayward Rock	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	848	NC	<1	24
	Herald Reef	3	NC	904	NC	2	61	NC	NC	NC	NC	NC	NC	5	NC	408	NC	2	26
	Hood Reef	13	NC	660	NC	5	48	50	16	409	421	42	276	62	7	209	330	33	269
	Imperieuse Reef	3	NC	680	NC	2	22	3	NC	797	NC	<1	27	6	NC	695	NC	3	53
	Inner Northwest Patch	5	NC	994	NC	2	18	NC	NC	NC	NC	NC	NC	5	NC	414	NC	3	39
	Koolinda Patch	3	NC	1,014	NC	<1	19	NC	NC	NC	NC	NC	NC	5	NC	393	NC	2	32
	Lightfoot Reef	6	NC	280	NC	3	70	4	NC	1,184	NC	2	24	2	NC	941	NC	2	13
	Little Shoals	4	NC	282	NC	4	99	1	NC	1,244	NC	<1	14	5	NC	402	NC	3	25
	Locker Reef	4	NC	796	NC	2	23	14	NC	618	NC	4	18	15	NC	287	NC	7	53
	Madeleine Shoals	46	11	116	166	36	283	20	2	256	310	14	128	19	NC	324	NC	5	41
	Manicom Bank	2	NC	1,019	NC	<1	12	NC	NC	NC	NC	NC	NC	4	NC	528	NC	2	27
	Mardie Rock	3	NC	1,004	NC	<1	17	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	McLennan Bank	13	2	117	897	8	115	6	NC	507	NC	3	57	23	NC	155	NC	10	67
	Meda Reef	6	NC	514	NC	3	57	NC	NC	NC	NC	NC	NC	4	NC	798	NC	2	13
	Mermaid Reef	3	NC	1,010	NC	<1	17	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Miles Shoal	6	NC	901	NC	2	18	NC	NC	NC	NC	NC	NC	4	NC	536	NC	3	26
	Montebello Shoals	46	24	85	103	80	596	61	42	77	115	124	589	93	63	74	91	178	746
	Moresby Shoals	4	NC	319	NC	3	79	NC	NC	NC	NC	NC	NC	5	NC	400	NC	2	28
	Nares Rock	3	NC	893	NC	3	97	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Ningaloo Reef	10	2	586	687	5	144	49	18	384	398	46	372	58	8	257	470	31	372

	North West Reef	17	2	119	505	9	124	50	11	473	583	36	226	60	1	239	581	25	114
	O'Grady Shoal	9	NC	490	NC	3	38	1	NC	909	NC	<1	16	11	NC	399	NC	3	27
	Otway Reef	10	NC	541	NC	4	59	46	11	424	625	39	349	65	7	212	345	36	167
	Outtrim Patches	22	4	367	700	16	259	53	42	258	421	91	312	71	41	206	208	99	551
	Paroo Shoal	4	NC	900	NC	<1	17	NC	NC	NC	NC	NC	NC	4	NC	533	NC	2	20
	Pearl Reef	4	NC	919	NC	<1	16	14	NC	760	NC	4	27	21	NC	283	NC	6	41
	Penguin Bank	25	6	153	431	21	256	58	24	142	245	78	361	77	48	149	172	100	375
	Poivre Reef	19	7	153	166	18	278	55	10	161	524	38	273	75	26	138	219	55	217
	Rankin Bank	66	7	244	435	37	238	71	9	239	309	39	202	80	32	165	359	89	413
	Ripple Shoals	12	3	179	874	8	188	16	NC	306	NC	5	45	50	NC	299	NC	16	78
	Roller Shoal	3	NC	896	NC	<1	12	NC	NC	NC	NC	NC	NC	4	NC	534	NC	2	25
	Rosily Shoals	19	5	166	433	15	172	56	28	163	259	68	376	75	40	160	274	78	233
	Saladin Shoal	2	NC	1,015	NC	<1	13	NC	NC	NC	NC	NC	NC	4	NC	529	NC	2	21
	Santo Rock	7	NC	822	NC	2	33	25	NC	604	NC	7	35	24	NC	326	NC	10	90
	South East Reef	10	NC	526	NC	3	33	3	NC	718	NC	<1	18	NC	NC	NC	NC	NC	NC
	South West Reef	10	NC	505	NC	3	33	3	NC	532	NC	<1	15	4	NC	533	NC	<1	24
	Southwest Patch	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Spider Reef	6	NC	721	NC	2	30	36	NC	471	NC	10	52	48	NC	286	NC	12	64
	Sultan Reef	8	NC	869	NC	3	55	17	NC	305	NC	5	27	35	NC	189	NC	10	42
	Taunton Reef	10	2	205	998	6	151	21	NC	306	NC	5	30	42	NC	327	NC	13	59
	Tongue Shoals	6	NC	900	NC	2	25	NC	NC	NC	NC	NC	NC	5	NC	408	NC	4	43

	Trap Reef	14	NC	485	NC	7	98	44	13	204	484	44	291	66	2	175	383	30	155
	Tryal Rocks	58	36	81	88	109	782	82	61	70	78	173	791	93	80	51	56	310	2,012
	Vaughan Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	827	NC	2	24
	Ward Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	5	NC	394	NC	2	23
	Web Reef	4	NC	757	NC	2	27	30	NC	484	NC	9	51	50	NC	336	NC	12	46
	Weeks Shoal	3	NC	906	NC	2	25	NC	NC	NC	NC	NC	NC	4	NC	527	NC	2	36
	West Reef	4	NC	290	NC	3	100	1	NC	1,218	NC	<1	14	4	NC	399	NC	2	14
State and Territory Waters	WA	71	48	23	24	210	1,942	84	67	36	40	294	2,062	99	96	40	41	622	2,586

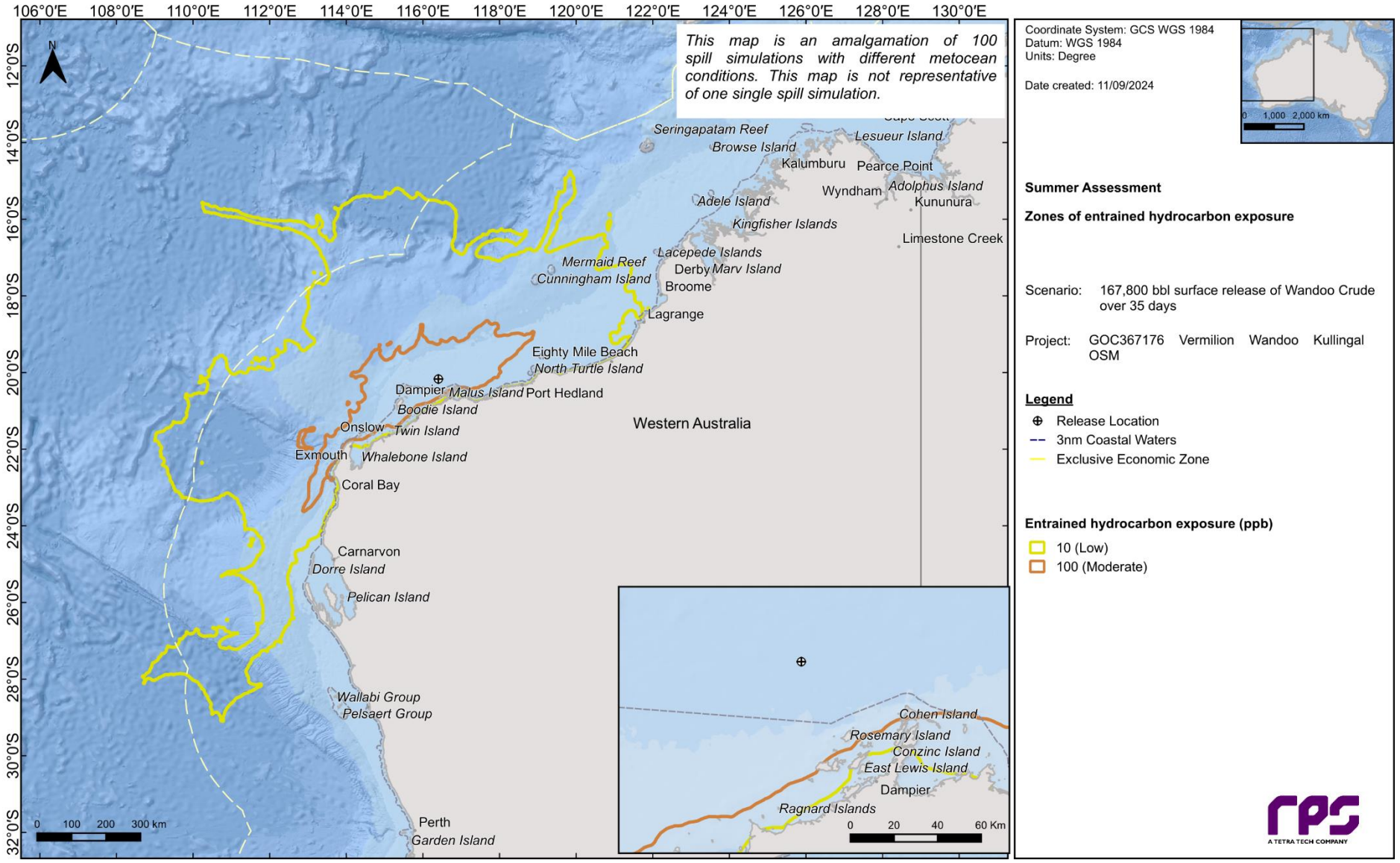


Figure 13.56 Predicted zones of entrained hydrocarbon exposure following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

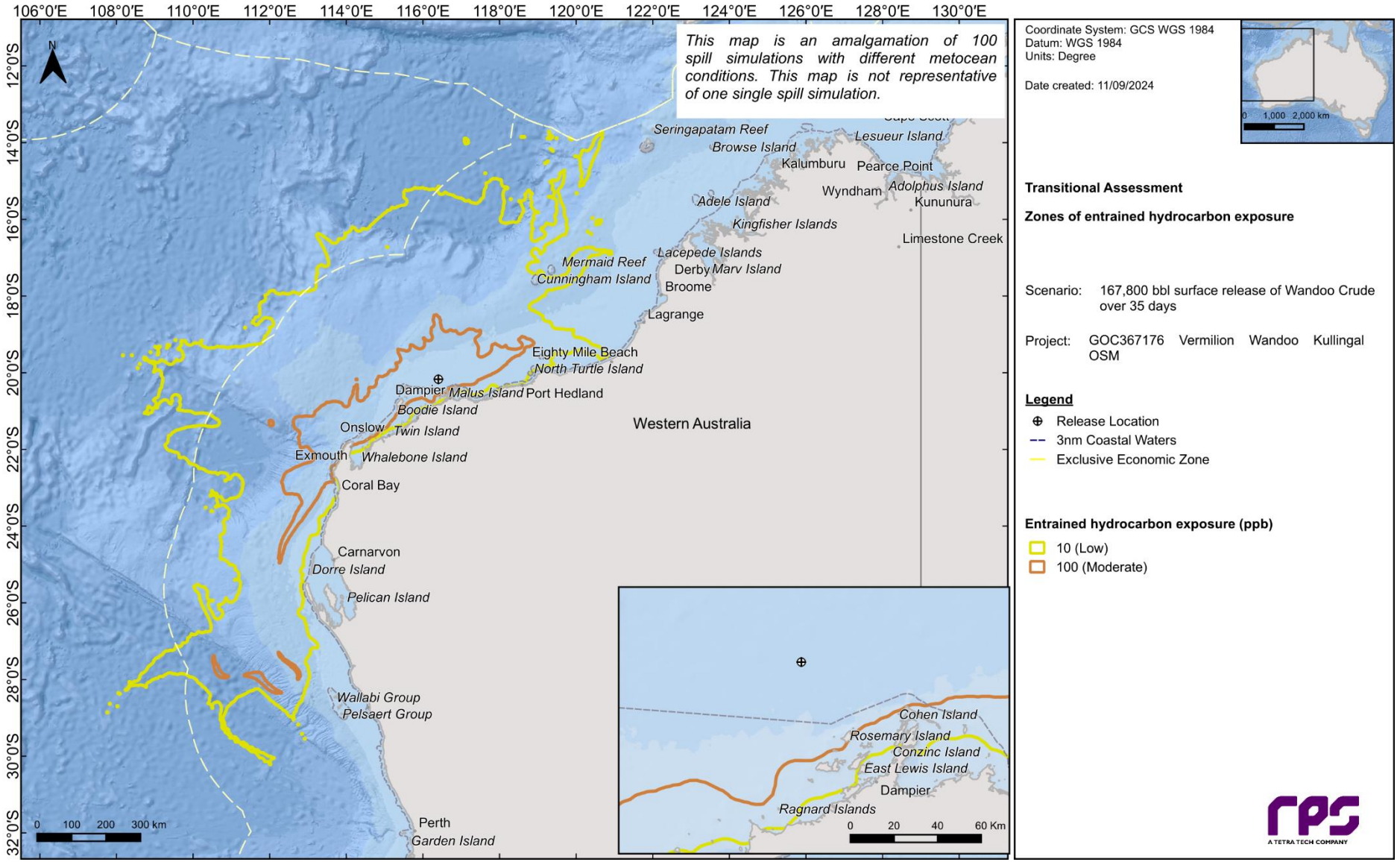


Figure 13.57 Predicted zones of entrained hydrocarbon exposure following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

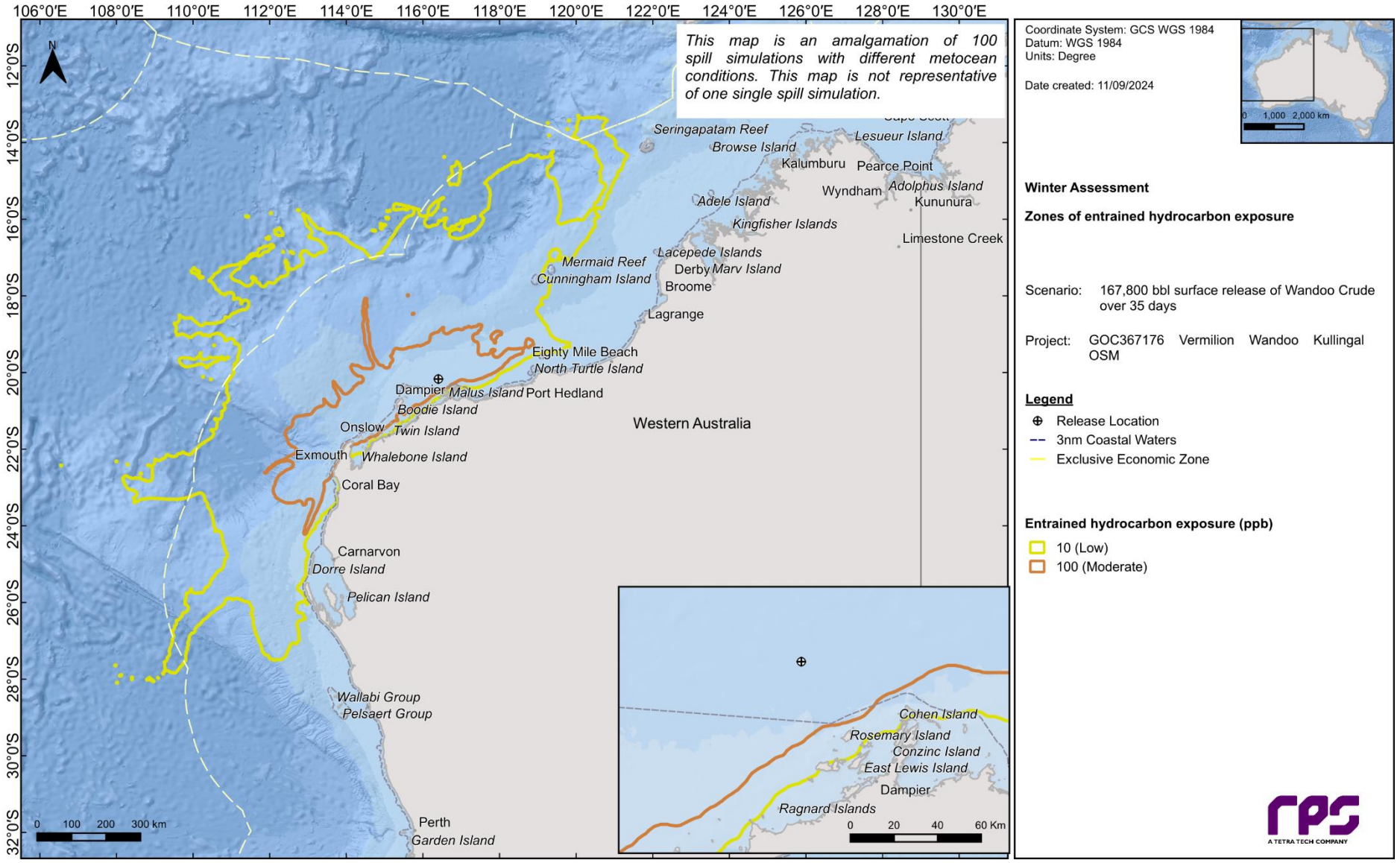


Figure 13.58 Predicted zones of entrained hydrocarbon exposure following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

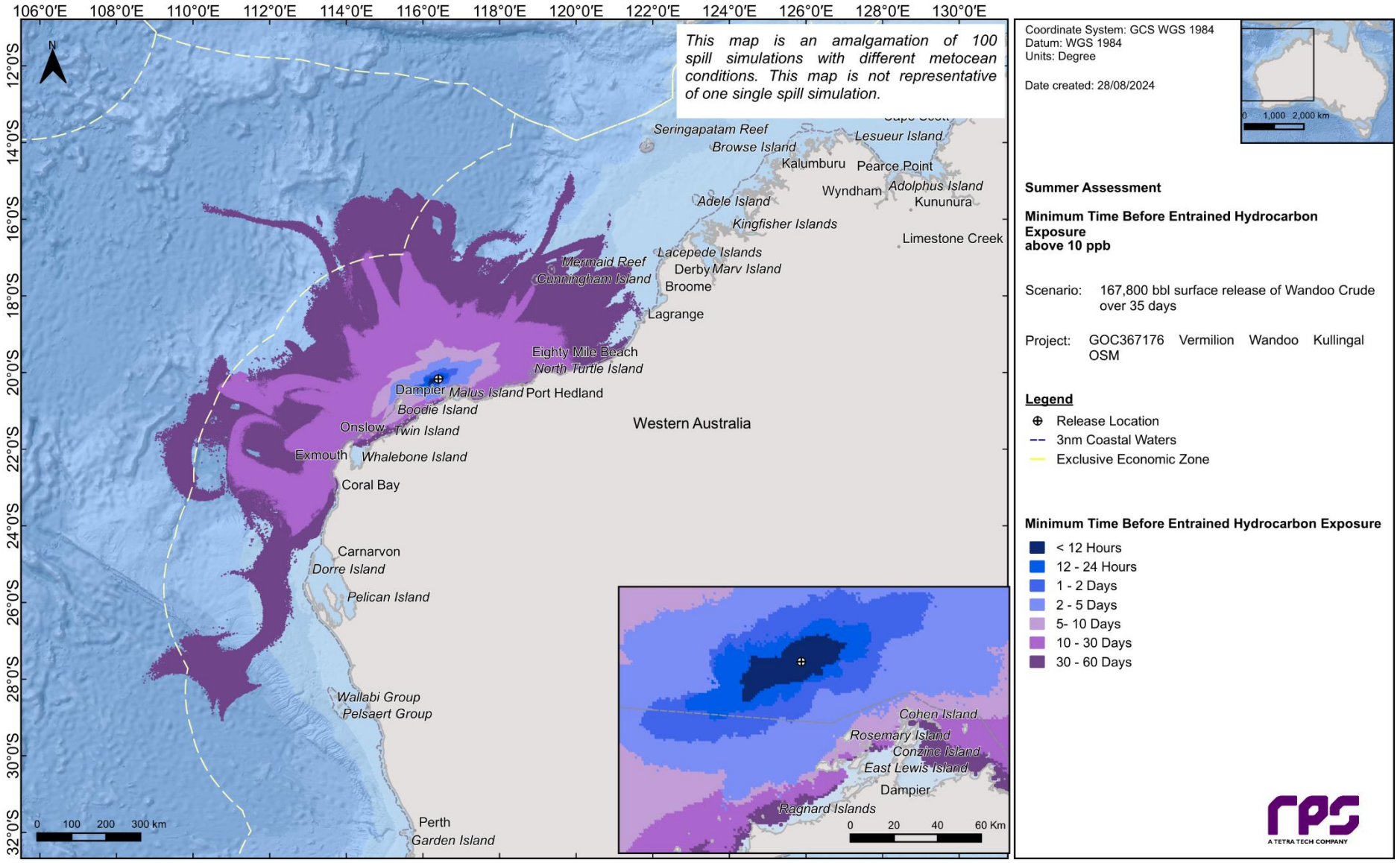


Figure 13.59 Minimum time before entrained hydrocarbon exposure at, or above, 10 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

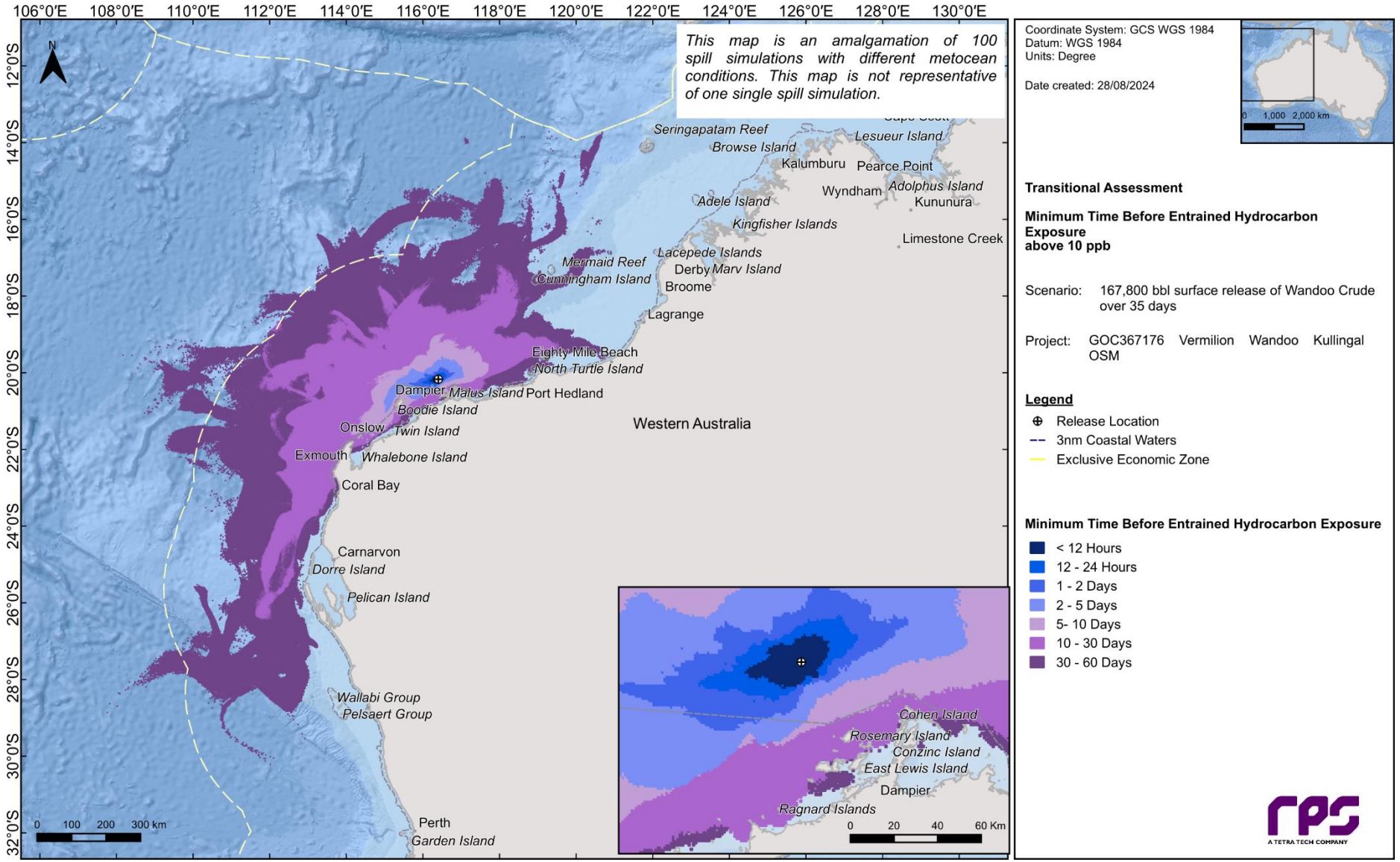


Figure 13.60 Minimum time before entrained hydrocarbon exposure at, or above, 10 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

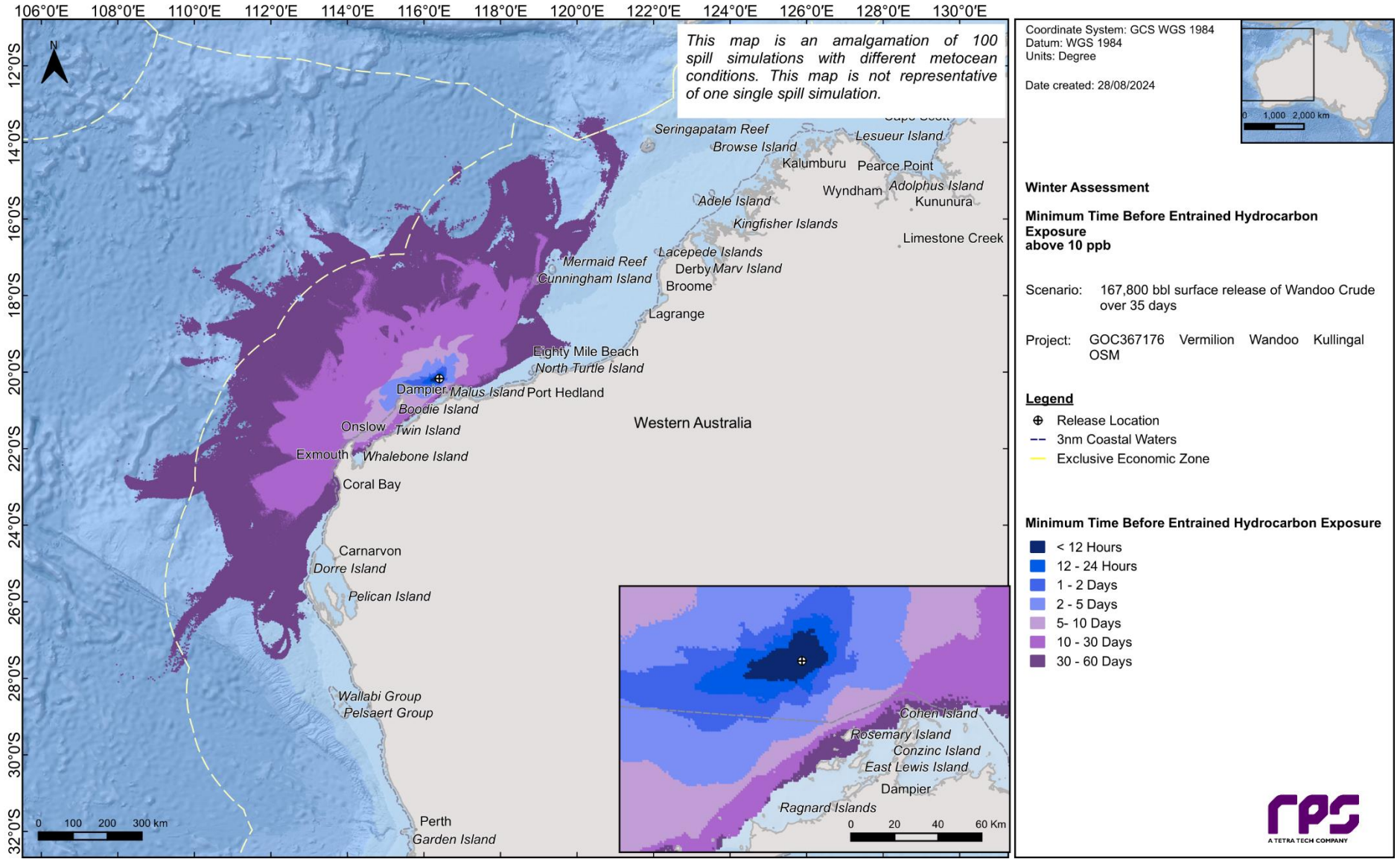


Figure 13.61 Minimum time before entrained hydrocarbon exposure at, or above, 10 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

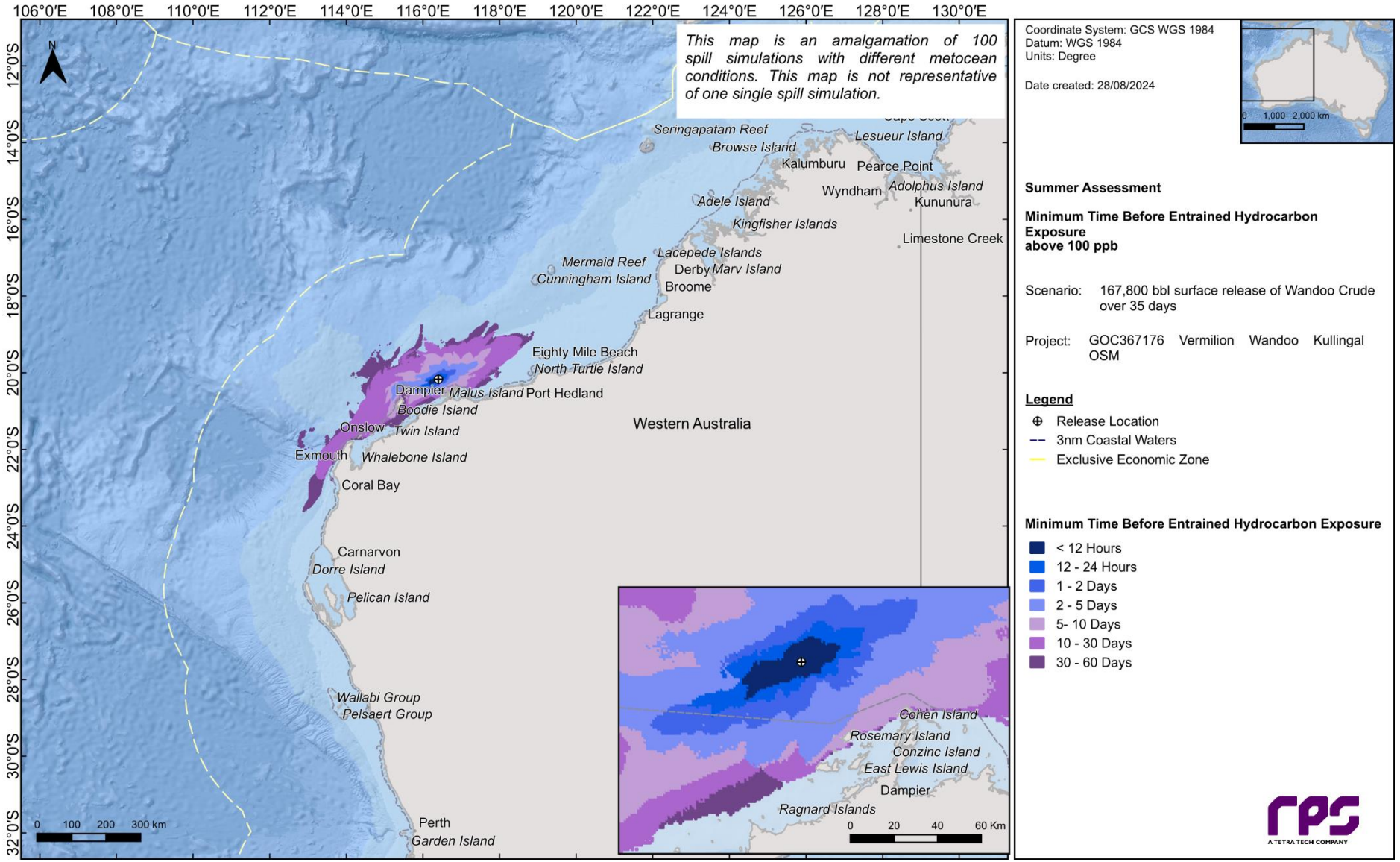


Figure 13.62 Minimum time before entrained hydrocarbon exposure at, or above, 100 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

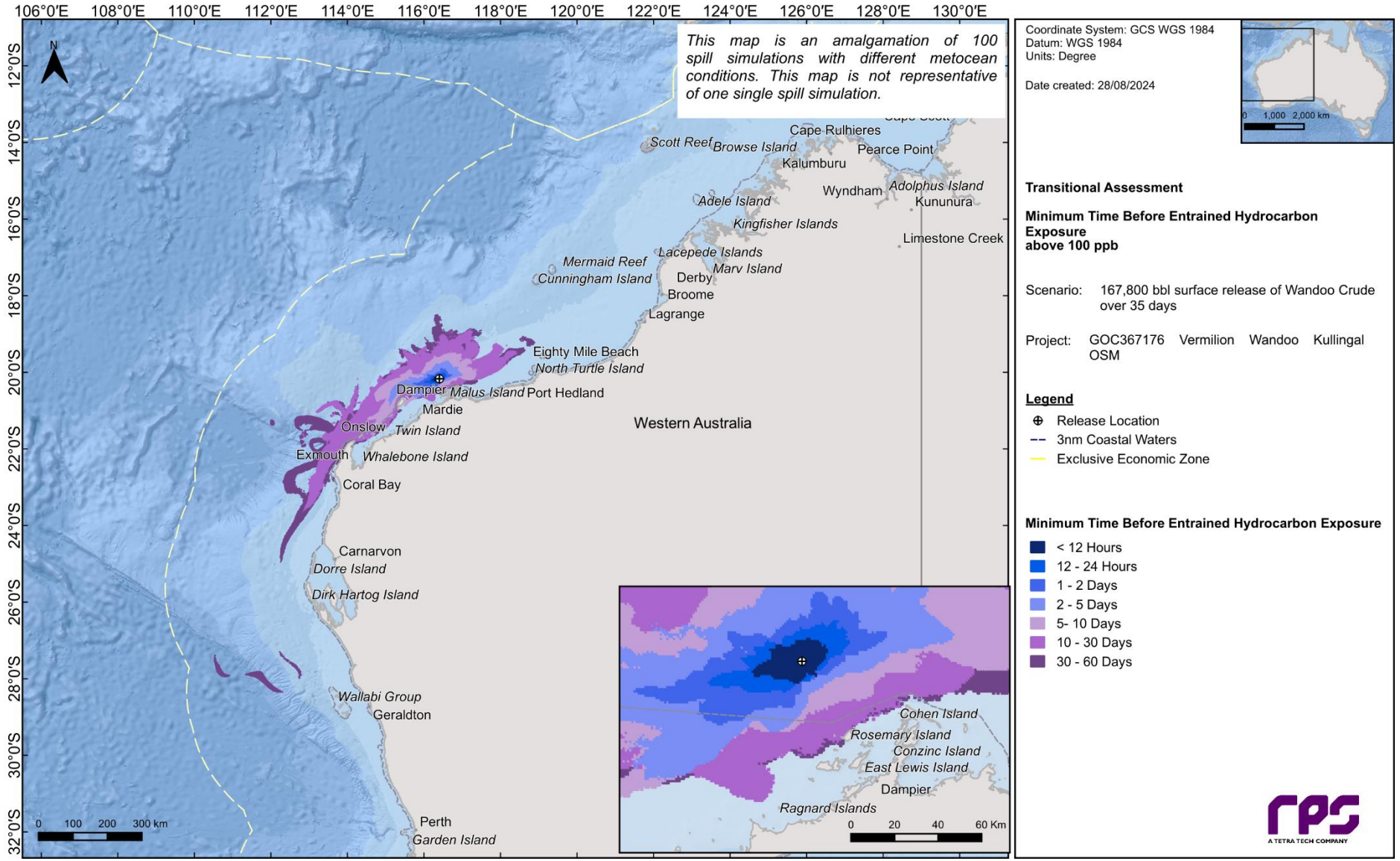


Figure 13.63 Minimum time before entrained hydrocarbon exposure at, or above, 100 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

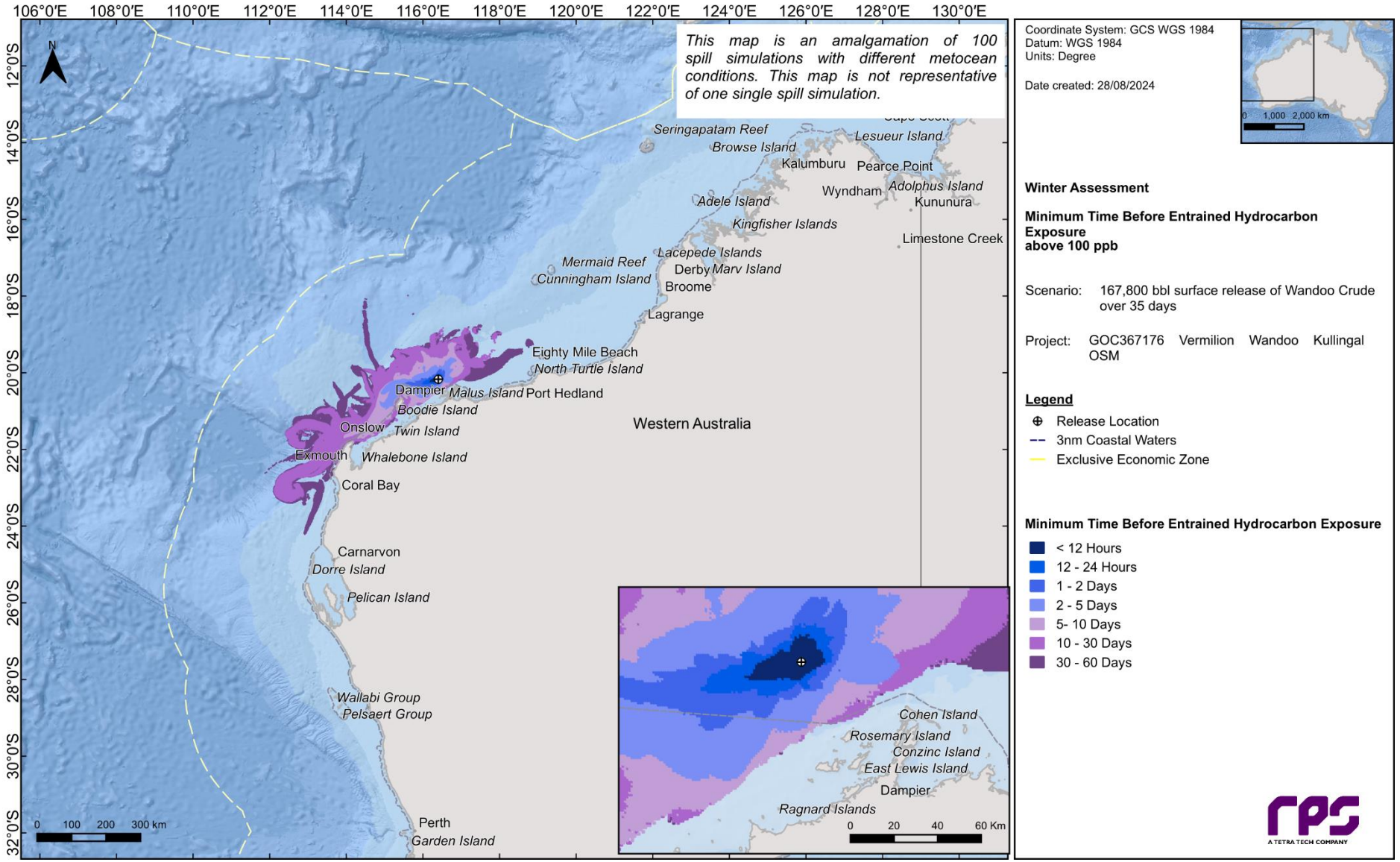


Figure 13.64 Minimum time before entrained hydrocarbon exposure at, or above, 100 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

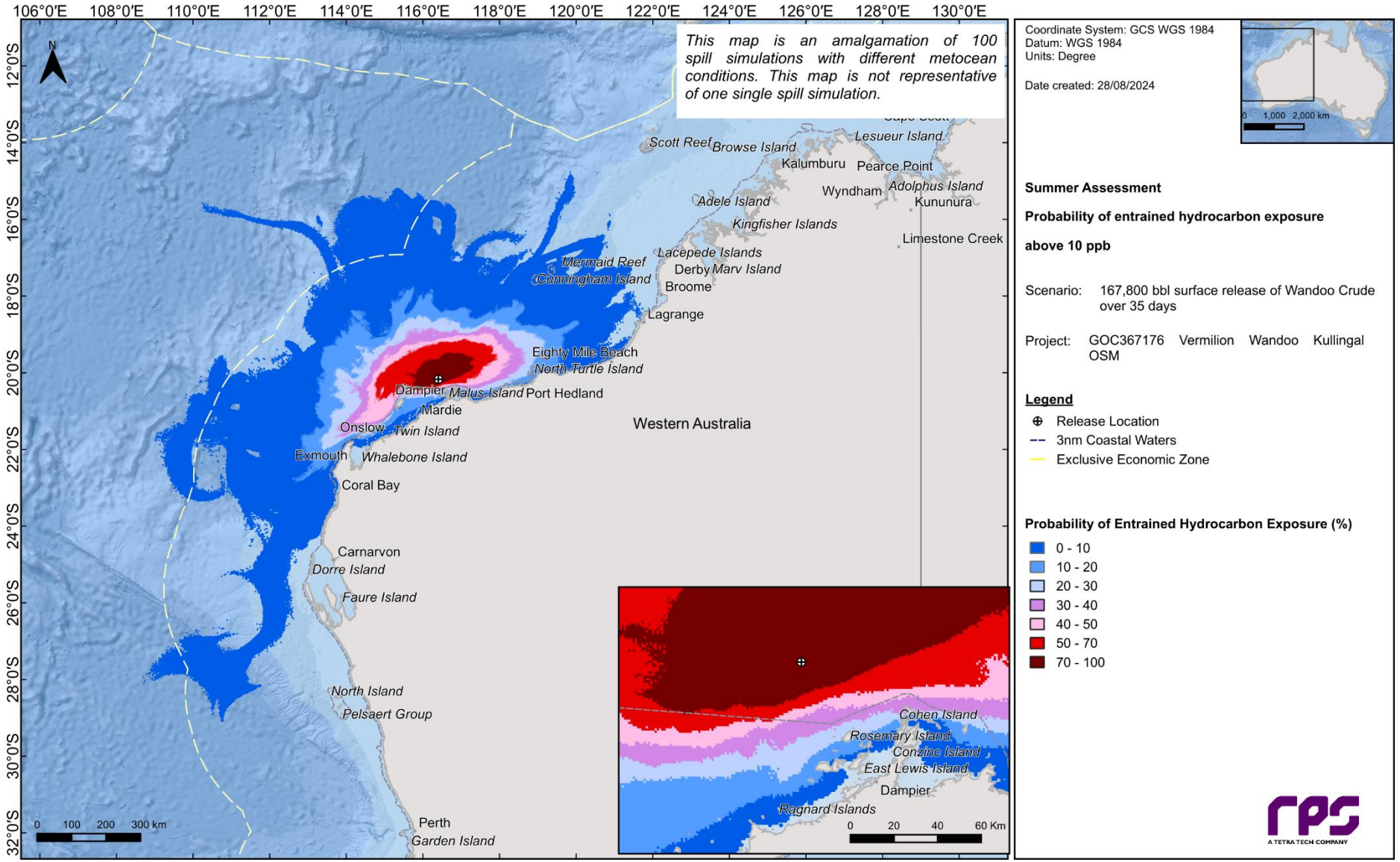


Figure 13.65 Probability of entrained hydrocarbon exposure at, or above, 10 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

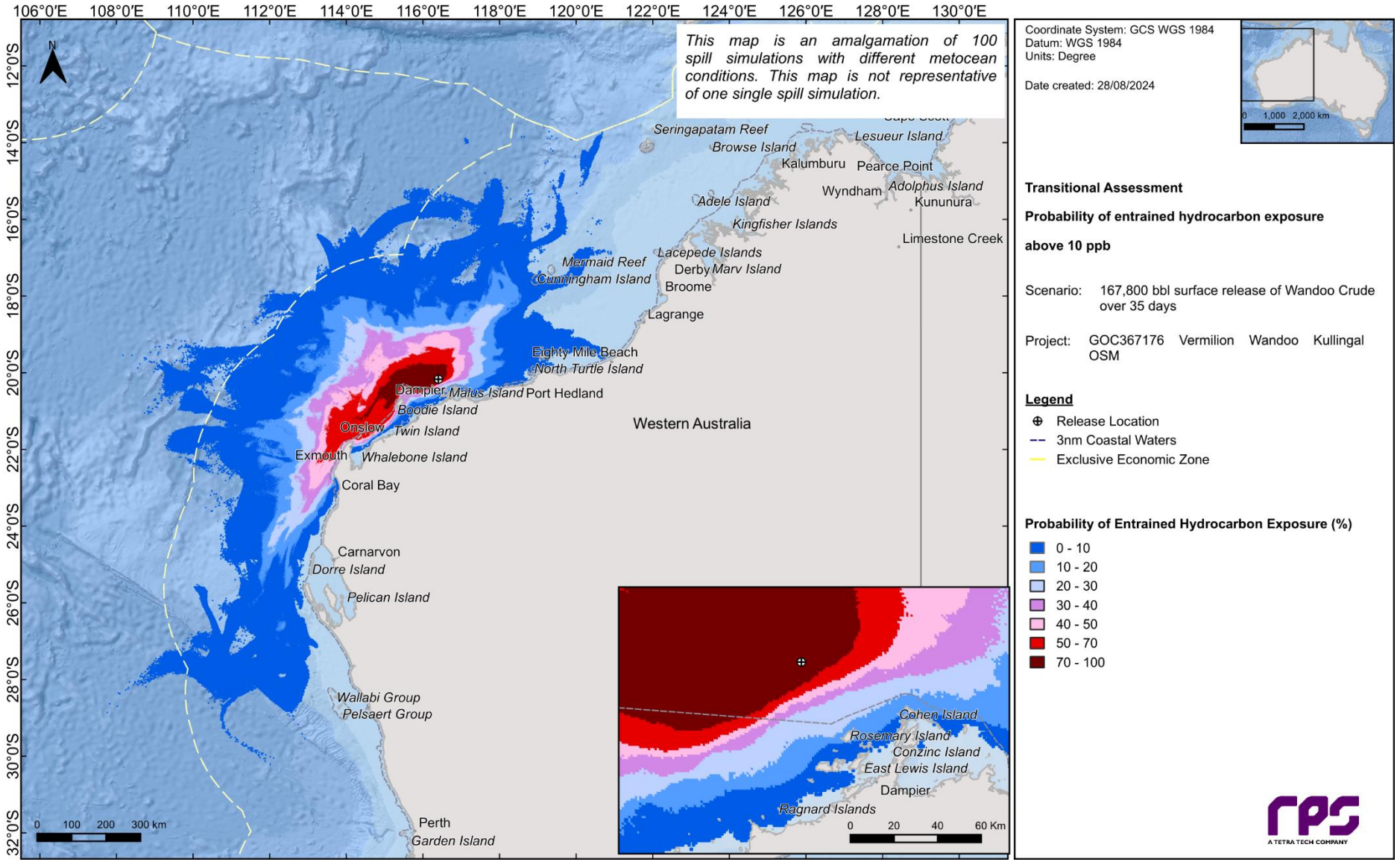


Figure 13.66 Probability of entrained hydrocarbon exposure at, or above, 10 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

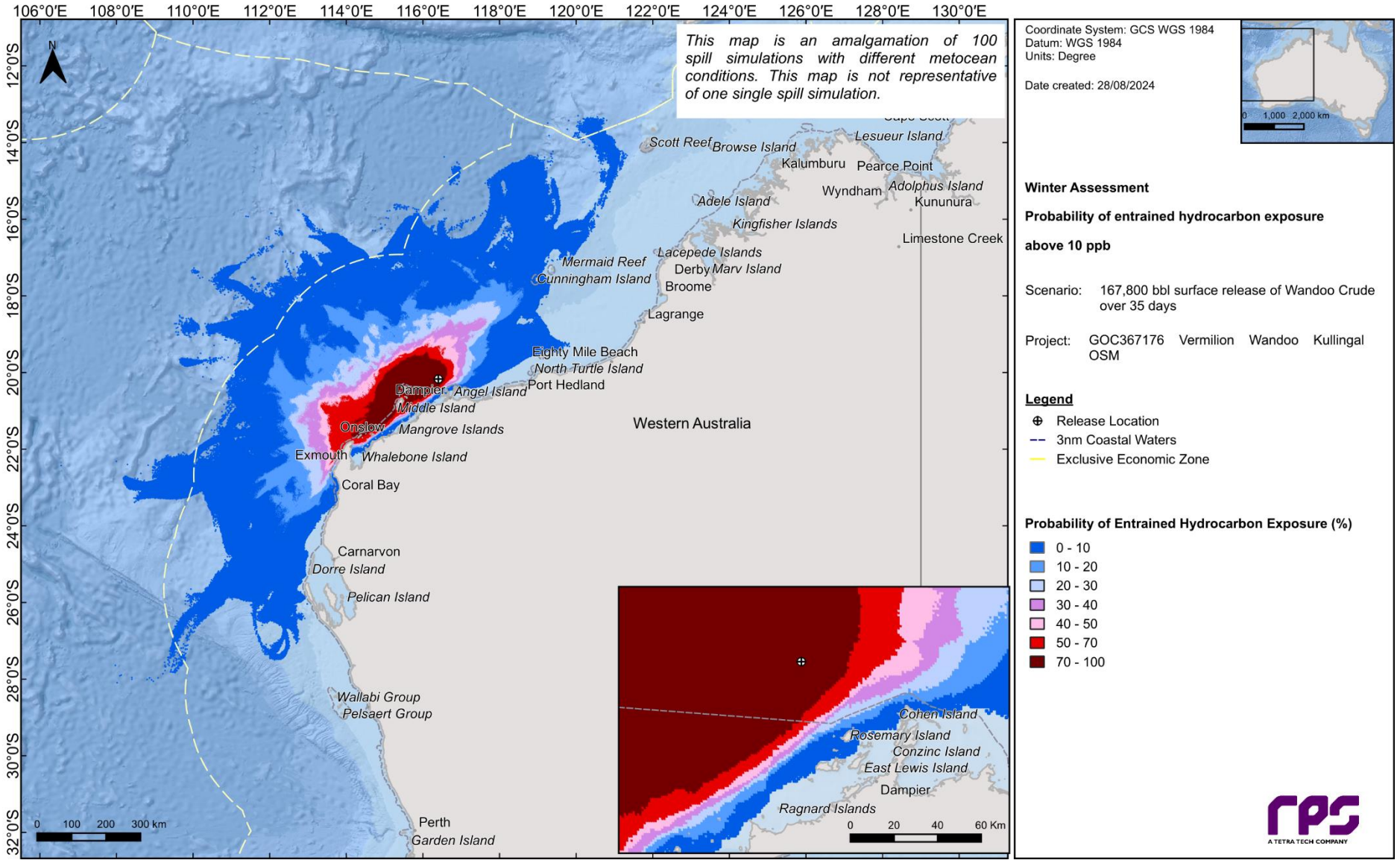


Figure 13.67 Probability of entrained hydrocarbon exposure at, or above, 10 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

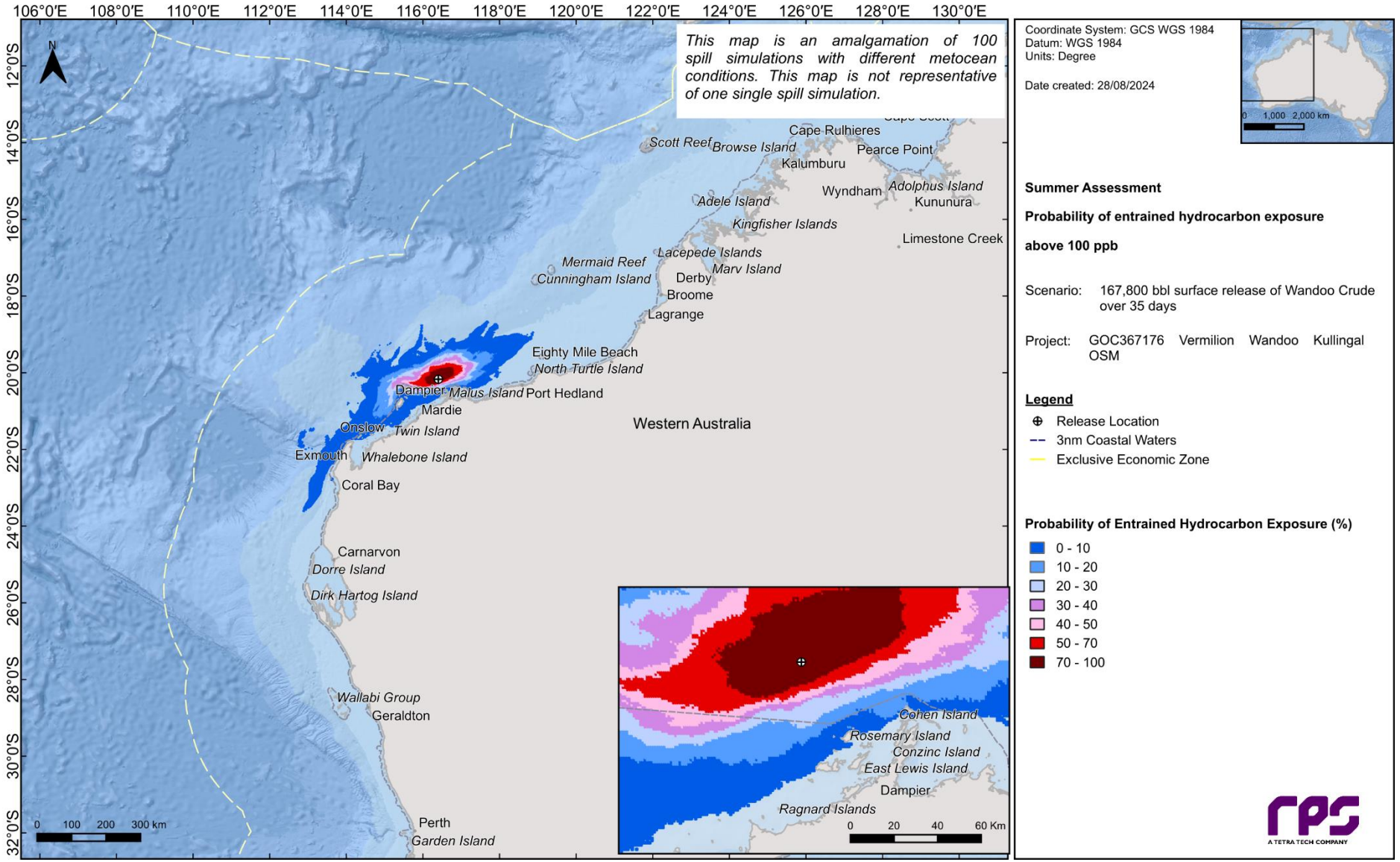


Figure 13.68 Probability of entrained hydrocarbon exposure at, or above, 100 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

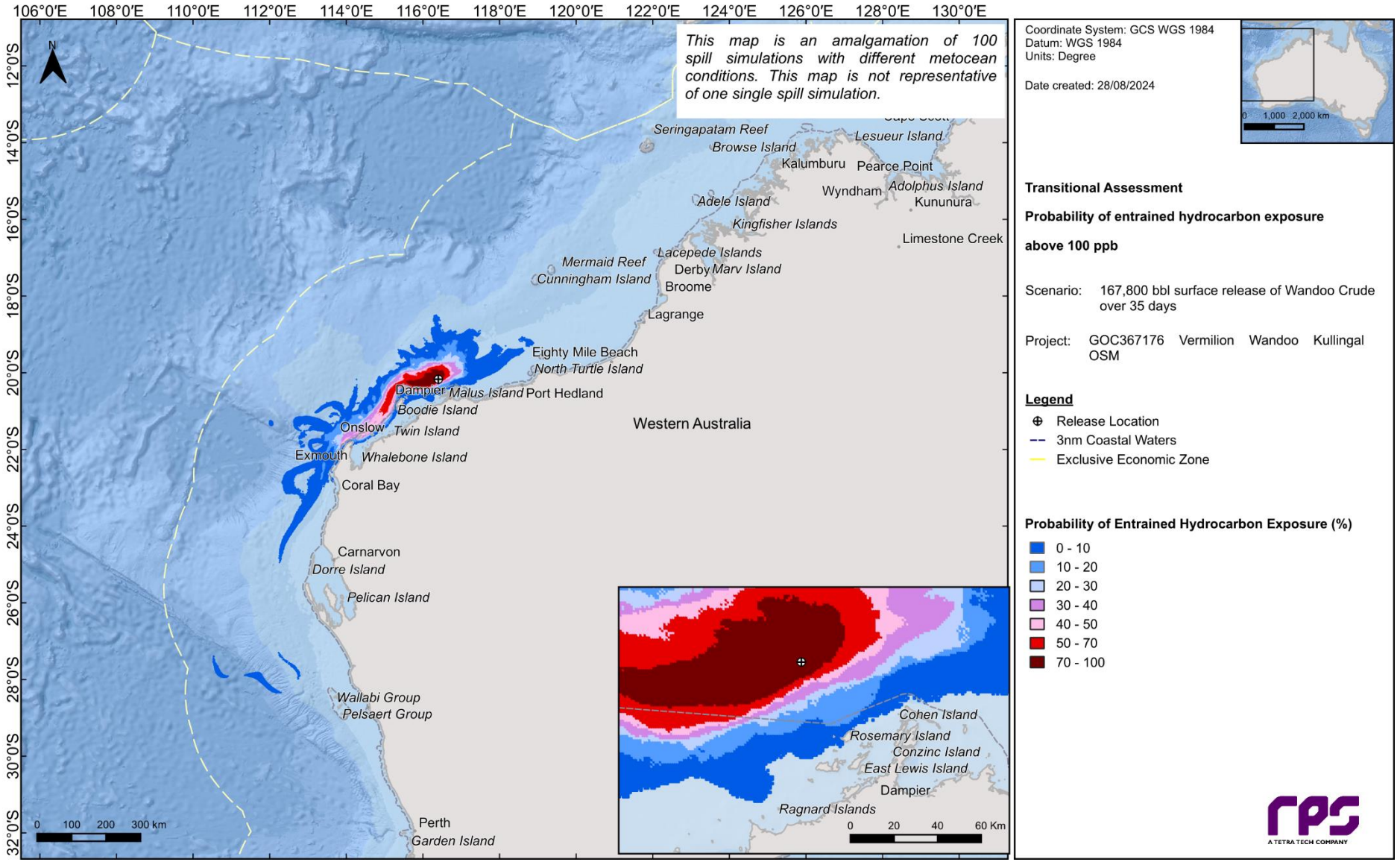


Figure 13.69 Probability of entrained hydrocarbon exposure at, or above, 100 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

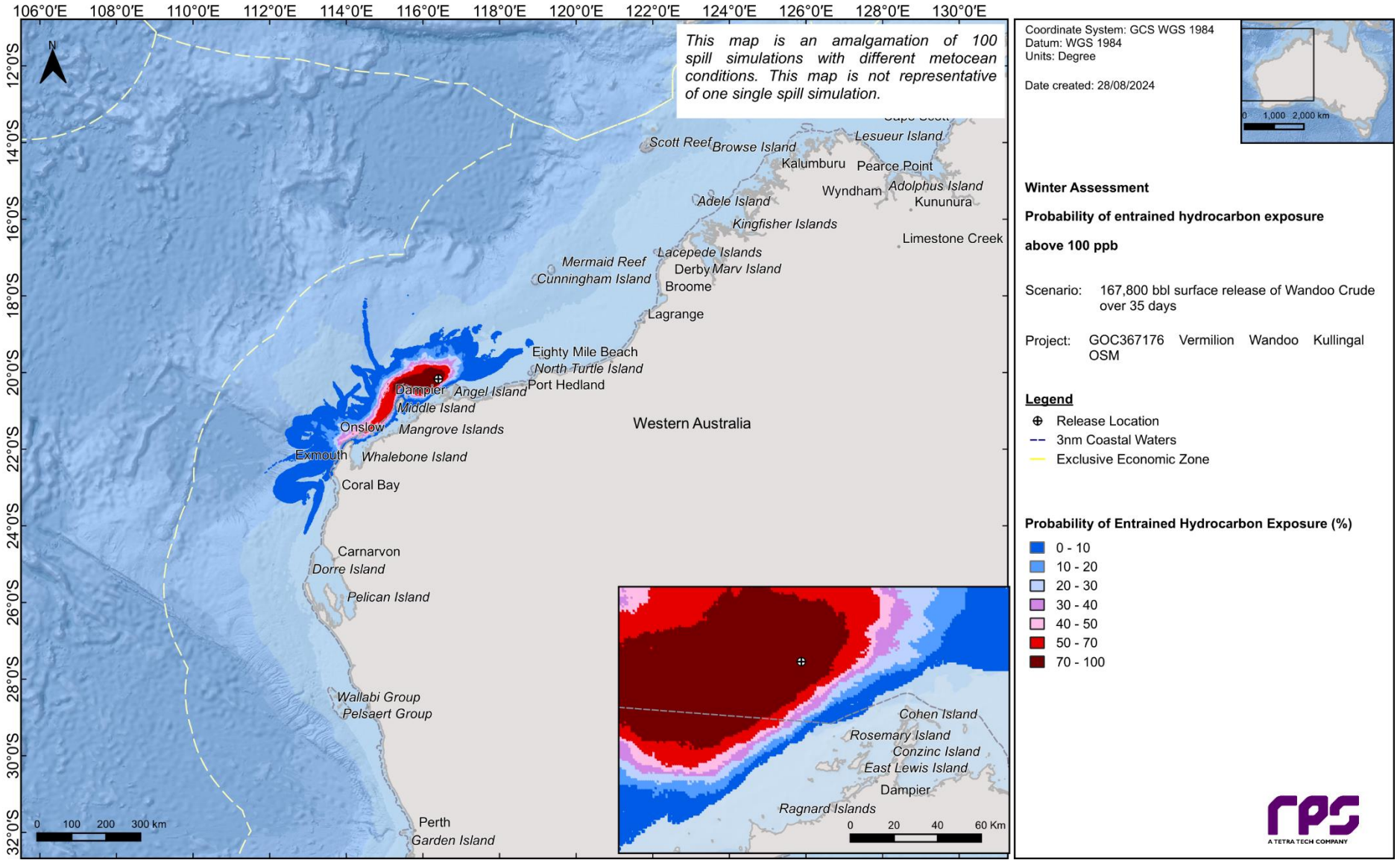


Figure 13.70 Probability of entrained hydrocarbon exposure at, or above, 100 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

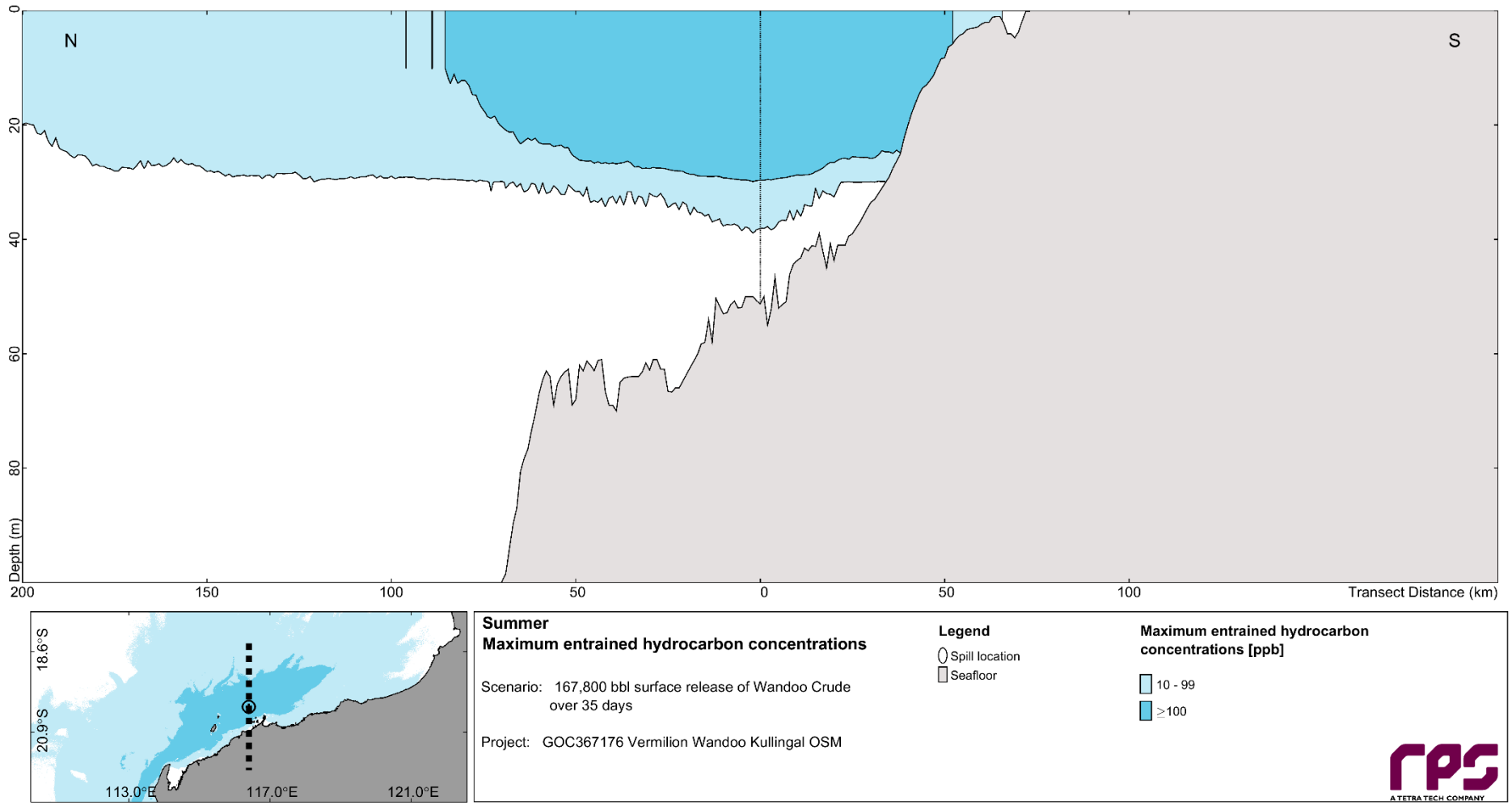


Figure 13.71 North-south cross-section transect of entrained hydrocarbon concentrations following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

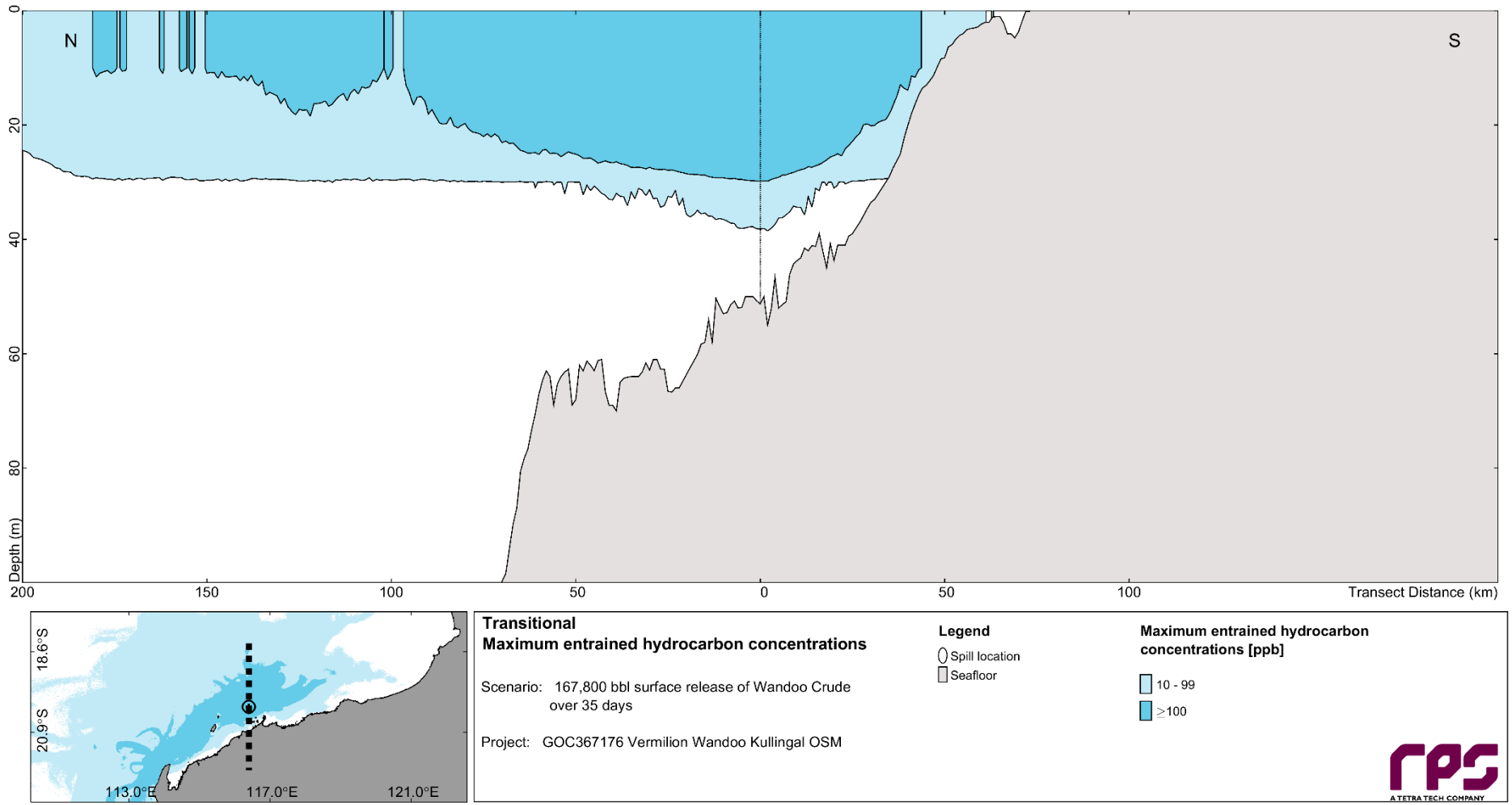


Figure 13.72 North-south cross-section transect of entrained hydrocarbon concentrations following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

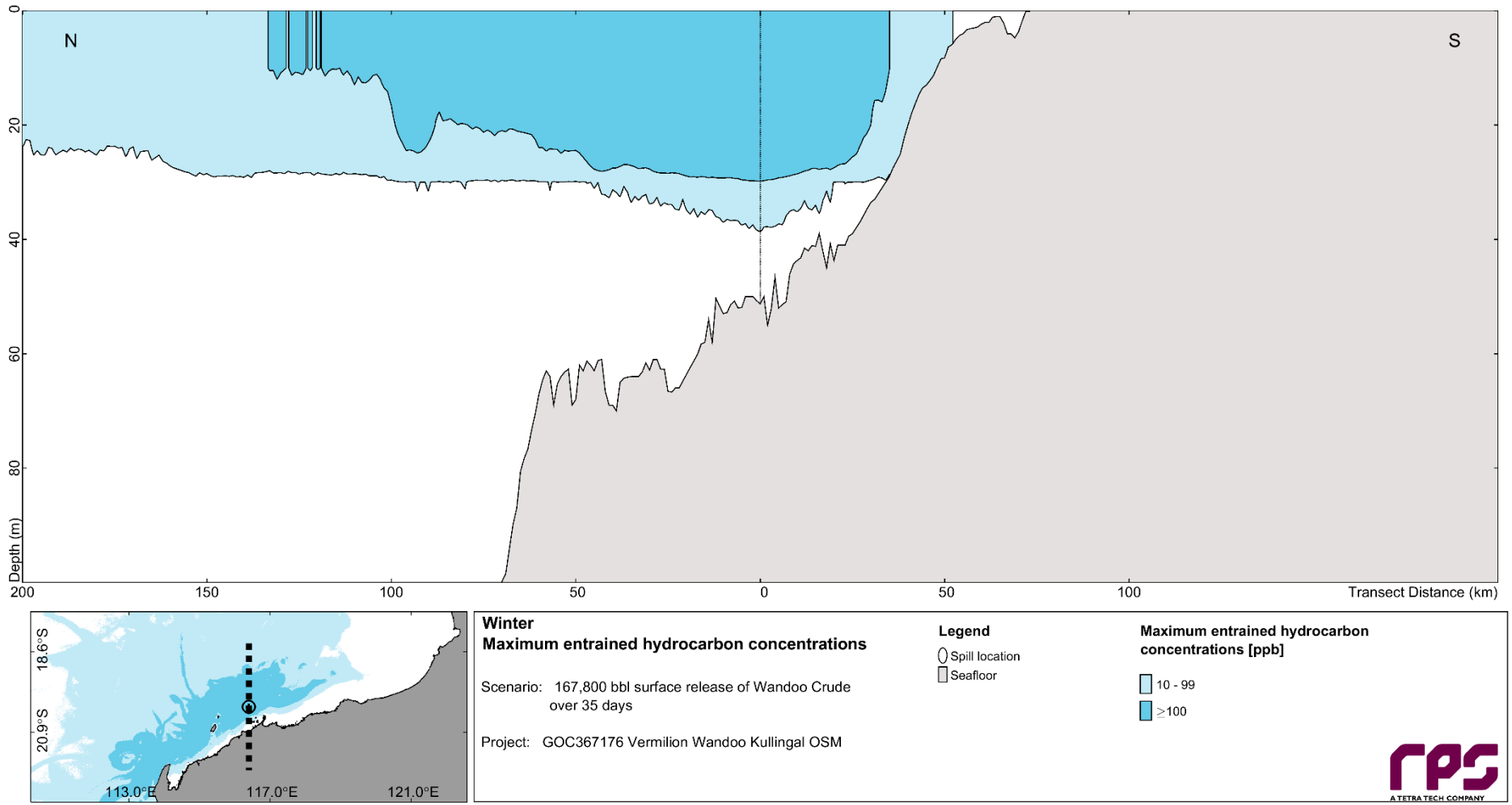


Figure 13.73 North-south cross-section transect of entrained hydrocarbon concentrations following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

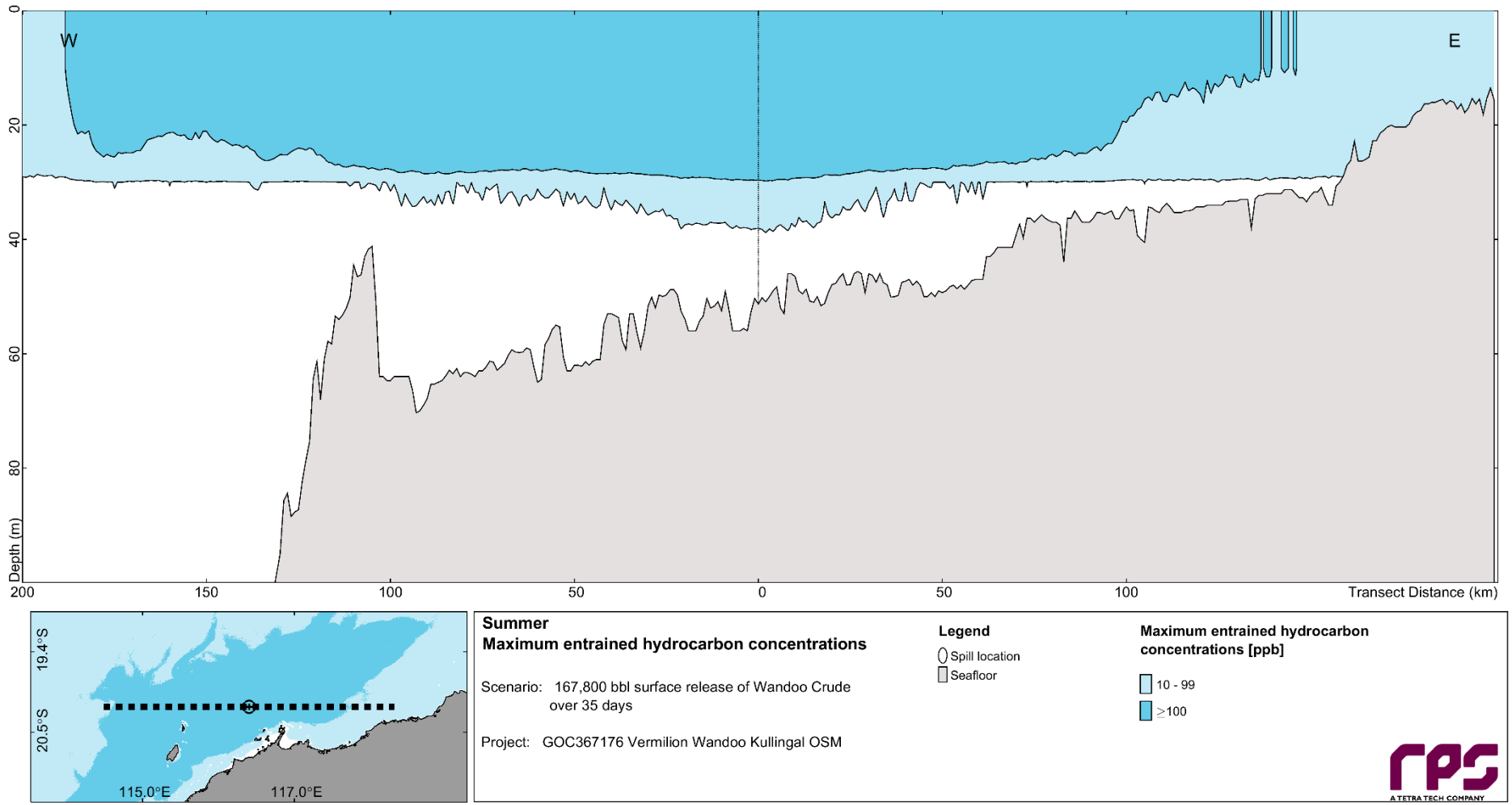


Figure 13.74 East-west cross-section transect of entrained hydrocarbon concentrations following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

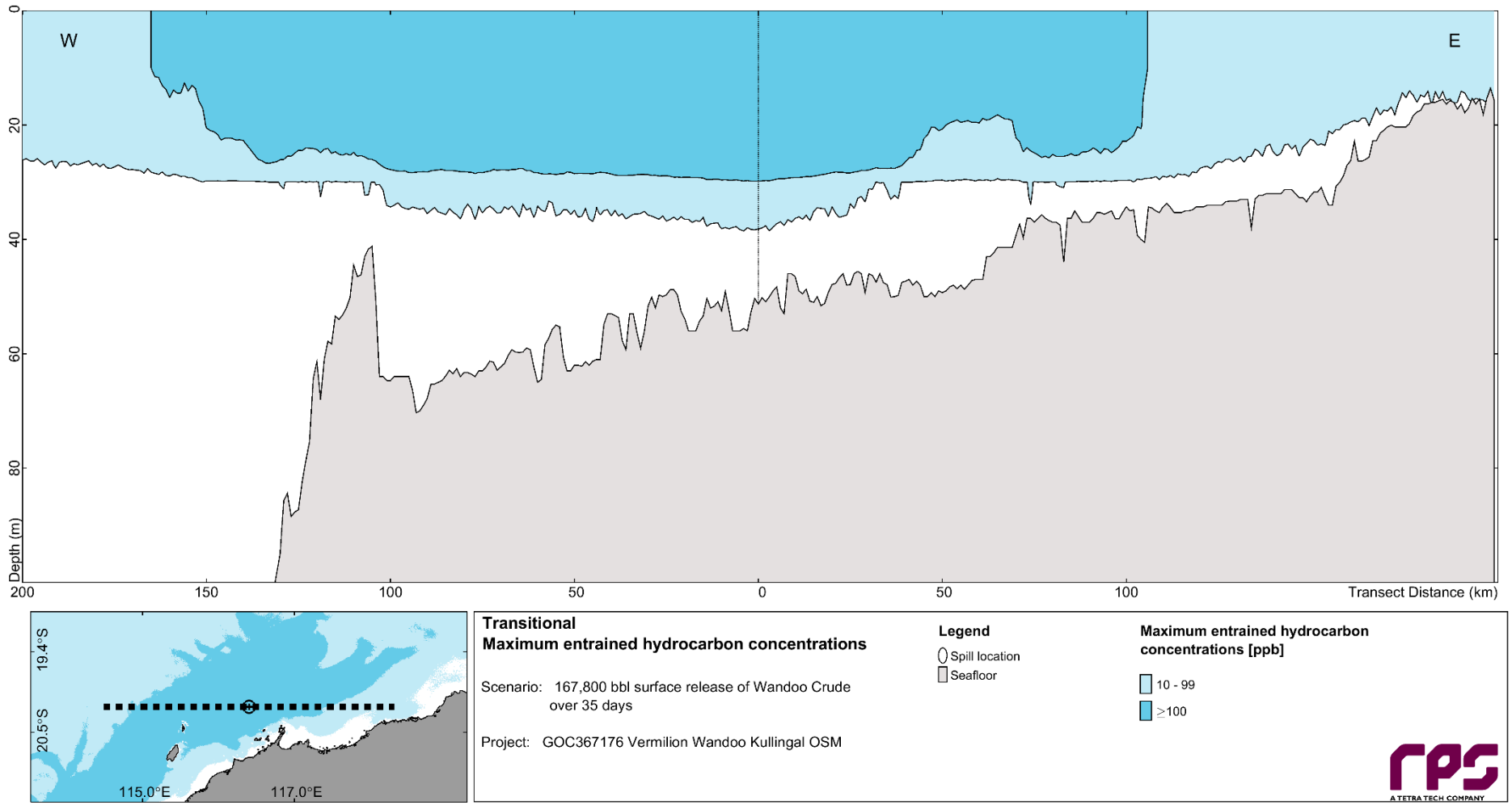


Figure 13.75 East-west cross-section transect of entrained hydrocarbon concentrations following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

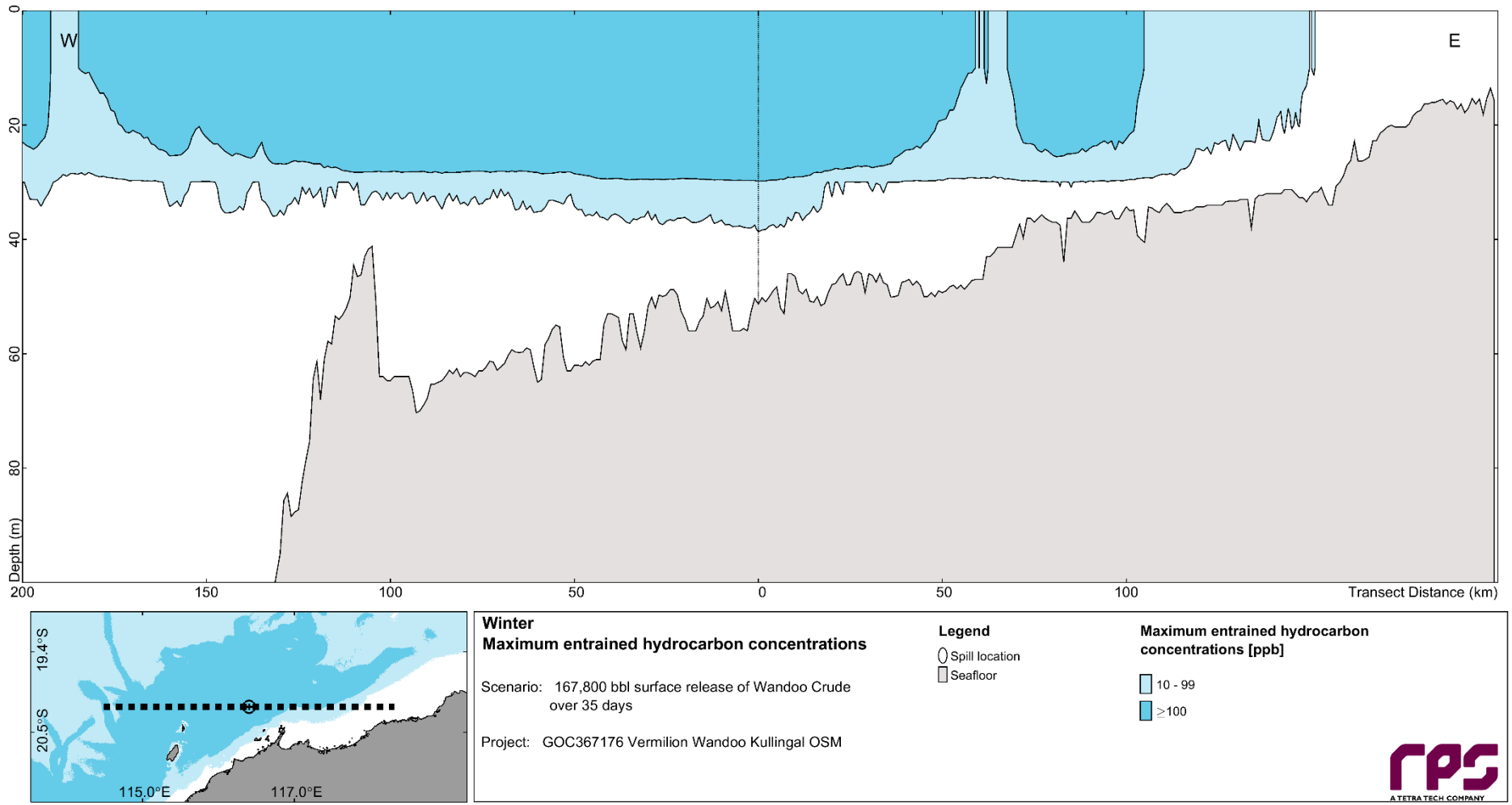


Figure 13.76 East-west cross-section transect of entrained hydrocarbon concentrations following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

13.2 Deterministic Analysis

13.2.1 Greatest Number of Receptors with Floating Oil Exposure Within 7 days

A spill simulation commencing during transitional conditions (run 31) resulted in the greatest number of receptors with floating oil exposure at or above 1 g/m^2 within 7 days.

Figure 13.77 shows the outer boundaries of the low threshold exposure area (EMBA) for the simulation. Figure 13.78 show the floating oil exposure on the surface and shoreline accumulation. Figure 13.79 and Figure 13.80 show the extent of the entrained and dissolved hydrocarbon exposure, respectively, over the entire 56 day simulation.

Table 13.11 provides a summary of the exposure to receptors during the simulation.

The greatest volume of oil accumulation was 2,570 m^3 for WA11.West (318) - Barrow Island and Montebello Islands (A), which also revealed the maximum length of oil accumulation on shorelines at the 10 g/m^2 or above threshold (64 km). The minimum time before floating oil exposure was predicted to be 57 hours for the Montebello AMP.

Figure 13.81 depicts the weathering and fates graph for the corresponding simulation. At the end of the 56-day simulation, approximately 29.2% (49,000.5 bbl) of the crude is predicted to have decayed, whilst 22.6% (37,846.1 bbl) will have evaporated and 14.9% (25,011.2 bbl) is predicted to entrain. Approximately 13.8% (23,085.0 bbl) of the total volume of oil is predicted to remain on shorelines at the end of the simulation and 7.4% (12,379.9 bbl) will float on the sea surface.

Table 13.11 Receptors predicted to be exposed by floating oil, shoreline accumulation and in-water hydrocarbons following a surface LOWC at Kullingal for the deterministic simulation (transitional, run 31) which greatest number of receptors with floating oil exposure at or above 1 g/m² within 7 days.

Receptors		Floating oil minimum time to receptor (hours) at			Shoreline accumulation minimum time to receptor (hours) at			Maximum local accumulated concentration (g/m²)	Maximum local accumulated volume (m²)			Maximum length of shoreline (km) at			Entrained minimum time to receptor waters (hours) at		Maximum entrained hydrocarbon concentration (ppb)	Dissolved minimum time to receptor waters (hours) at			Maximum dissolved aromatic hydrocarbon concentration (ppb)
		≥ 1 g/m²	≥ 10 g/m²	≥ 50 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²		≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 ppb	≥ 100 ppb		≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	
AMP	Gascoyne	703	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	451	NC	92	991	NC	NC	13
	Montebello	57	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	28	32	1,412	34	61	NC	94
KEF	Ancient coastline at 125 m depth contour	387	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	321	357	321	1,133	NC	NC	18
	Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	532	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	383	401	220	1,182	NC	NC	15
	Commonwealth waters adjacent to Ningaloo Reef	543	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	406	450	186	967	NC	NC	12
	Continental Slope Demersal Fish Communities	598	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	339	682	124	981	NC	NC	13
	Exmouth Plateau	751	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	658	NC	92	NC	NC	NC	5
	Western demersal slope and associated fish communities	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,101	NC	11	NC	NC	NC	<1
MMA	Muiron Islands	510	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	382	504	292	730	NC	NC	16
MP	Barrow Island	144	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	114	123	415	140	NC	NC	32
	Montebello Islands	141	779	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	65	72	2,062	82	118	NC	66
	Ningaloo	497	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	406	450	197	756	NC	NC	20
NR	Barrow Island	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	639	NC	63	NC	NC	NC	<1
	Lowendal Islands	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	326	451	294	NC	NC	NC	7
	Thevenard Island	623	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	635	NC	29	NC	NC	NC	3
RSB	Beryl Reef	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	759	NC	30	NC	NC	NC	<1
	Brewis Reef	635	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	589	NC	32	NC	NC	NC	2
	Camplin Shoal	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,321	NC	11	NC	NC	NC	<1
	Combe Reef	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	711	NC	69	NC	NC	NC	<1
	Dailey Shoal	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	475	689	182	NC	NC	NC	4
	Exmouth Reef	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	737	NC	39	NC	NC	NC	2
	Fairway Reef	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	516	NC	94	NC	NC	NC	<1
	Hood Reef	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	503	685	201	NC	NC	NC	3
	Locker Reef	625	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NC	NC	8	NC	NC	NC	<1
	Montebello Shoals	145	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	83	115	581	124	NC	NC	32
	Ningaloo Reef	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	443	478	161	NC	NC	NC	9
	North West Reef	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	502	NC	92	NC	NC	NC	4
	Otway Reef	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	490	710	168	NC	NC	NC	<1
	Outtrim Patches	683	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	384	826	206	NC	NC	NC	3
	Pearl Reef	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	760	NC	21	NC	NC	NC	<1
	Penguin Bank	536	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	142	587	261	NC	NC	NC	7
	Poivre Reef	524	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	166	524	244	598	NC	NC	18

	Rosily Shoals	603	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	289	610	149	NC	NC	NC	5
	Santo Rock	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,223	NC	13	NC	NC	NC	<1
	Spider Reef	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	698	NC	16	NC	NC	NC	<1
	Sultan Reef	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	624	NC	24	NC	NC	NC	2
	Taunton Reef	614	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	613	NC	18	NC	NC	NC	<1
	Trap Reef	614	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	574	NC	61	NC	NC	NC	2
	Tryal Rocks	393	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	195	405	217	475	NC	NC	15
	Web Reef	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	784	NC	17	NC	NC	NC	<1
	WA09 (169) - Cape Inscription - Herald Bay N (B)	NC	NC	NC	1,300	NC	NC	12	<1	NC	NC	1	NC	NC	NC	NC	3	NC	NC	NC	<1
	WA09 (171) - Steep Point - Quoin Head (C)	NC	NC	NC	1,332	NC	NC	12	<1	NC	NC	1	NC	NC	NC	NC	2	NC	NC	NC	<1
	WA09 (330) - Dorre Island and Bernier Island (A)	NC	NC	NC	1,300	NC	NC	13	<1	NC	NC	1	NC	NC	NC	NC	4	NC	NC	NC	<1
	WA09 (331) - Dorre Island and Bernier Island (B)	NC	NC	NC	1,313	NC	NC	12	<1	NC	NC	1	NC	NC	NC	NC	2	NC	NC	NC	<1
	WA10 (120) - Bundegi - Shothole Canyon N (A)	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1,247	NC	23	NC	NC	NC	<1
	WA10 (121) - Bundegi - Shothole Canyon N (B)	NC	NC	NC	521	1,003	NC	194	3	2	NC	3	1	NC	650	NC	67	NC	NC	NC	4
	WA10 (122) - Vlamingh Head - North West Cape	619	NC	NC	470	739	NC	770	42	42	NC	9	9	NC	413	1,179	157	778	NC	NC	15
SHORE-WAMOPRA	WA10 (123) - Low Point - Vlamingh Head (A)	615	NC	NC	499	1,260	NC	607	23	19	NC	13	6	NC	417	464	197	857	NC	NC	12
	WA10 (124) - Low Point - Vlamingh Head (B)	497	NC	NC	499	507	NC	470	28	24	NC	16	9	NC	453	478	192	NC	NC	NC	9
	WA10 (125) - Osprey Bay - Low Point	NC	NC	NC	600	1,039	NC	111	7	3	NC	13	2	NC	482	1,088	113	NC	NC	NC	4
	WA10 (126) - Winderabandi Point - Osprey Bay	NC	NC	NC	876	1,299	NC	120	5	3	NC	12	2	NC	823	NC	33	NC	NC	NC	5
	WA10 (127) - Coast Hill - Point Cloates	NC	NC	NC	1,214	NC	NC	36	2	NC	NC	7	NC	NC	868	NC	23	NC	NC	NC	3
	WA10 (128) - Point Maud - Coast Hill (A)	NC	NC	NC	1,237	1,335	NC	121	5	2	NC	11	1	NC	1,058	NC	27	NC	NC	NC	<1
	WA10 (129) - Point Maud - Coast Hill (B)	NC	NC	NC	1,264	1,335	NC	109	4	2	NC	10	1	NC	1,065	NC	24	NC	NC	NC	<1
	WA10 (130) - Alison Point - Point Maud	NC	NC	NC	1,297	NC	NC	25	2	NC	NC	8	NC	NC	NC	NC	7	NC	NC	NC	<1
	WA10 (131) - Gnarraloo Bay - Alison Point (A)	NC	NC	NC	1,294	NC	NC	25	<1	NC	NC	2	NC	NC	NC	NC	6	NC	NC	NC	<1
	WA10 (132) - Gnarraloo Bay - Alison Point (B)	NC	NC	NC	1,288	NC	NC	25	<1	NC	NC	5	NC	NC	NC	NC	5	NC	NC	NC	<1
	WA10 (133) - Red Bluff - Gnarraloo Bay (A)	NC	NC	NC	1,293	NC	NC	35	2	NC	NC	7	NC	NC	NC	NC	5	NC	NC	NC	<1

WA10 (134) - Red Bluff - Gnarraloo Bay (B)	NC	NC	NC	1,292	NC	NC	35	<1	NC	NC	4	NC	NC	NC	NC	5	NC	NC	NC	<1
WA10 (135) - Red Bluff - Gnarraloo Bay (C)	NC	NC	NC	1,278	NC	NC	24	2	NC	NC	9	NC	NC	NC	NC	5	NC	NC	NC	<1
WA10 (136) - Point Quobba - Cape Cuvier (A)	NC	NC	NC	1,293	NC	NC	13	<1	NC	NC	4	NC	NC	NC	NC	5	NC	NC	NC	<1
WA11.West (113) - Coolgra Point W - Yardie Landing (A)	NC	NC	NC	1,344	NC	NC	16	<1	NC	NC	1	NC	NC	NC	NC	2	NC	NC	NC	<1
WA11.West (114) - Coolgra Point W - Yardie Landing (B)	NC	NC	NC	1,295	NC	NC	30	<1	NC	NC	1	NC	NC	NC	NC	3	NC	NC	NC	<1
WA11.West (115) - Hope Point - Locker Point (A)	NC	NC	NC	601	1,299	NC	177	6	4	NC	11	2	NC	NC	NC	10	NC	NC	NC	<1
WA11.West (116) - Hope Point - Locker Point (B)	NC	NC	NC	1,303	NC	NC	29	<1	NC	NC	4	NC	NC	NC	NC	5	NC	NC	NC	<1
WA11.West (117) - Hope Point - Locker Point (C)	NC	NC	NC	1,272	1,340	NC	151	5	2	NC	12	1	NC	NC	NC	6	NC	NC	NC	<1
WA11.West (118) - Hope Point - Locker Point (D)	NC	NC	NC	1,333	NC	NC	12	<1	NC	NC	1	NC	NC	NC	NC	<1	NC	NC	NC	<1
WA11.West (318) - Barrow Island and Montebello Islands (A)	143	779	NC	85	129	329	22,688	2,570	2,565	2,493	64	50	29	81	115	2,062	116	118	NC	66
WA11.West (319) - Barrow Island and Montebello Islands (B)	166	NC	NC	141	166	458	5,979	187	187	133	15	14	5	127	134	766	451	NC	NC	49
WA11.West (320) - Barrow Island and Montebello Islands (C)	159	NC	NC	137	530	NC	298	32	23	NC	41	14	NC	131	566	110	NC	NC	NC	6
WA11.West (321) - Barrow Island and Montebello Islands (D)	149	NC	NC	141	174	NC	637	60	53	NC	41	20	NC	130	176	336	529	NC	NC	25
WA11.West (324) - Yardie Landing - Weld Island coast S (B)	516	NC	NC	613	615	NC	672	8	7	NC	3	1	NC	141	527	526	600	NC	NC	18
WA11.West (325) - Coolgra Point W - Yardie Landing (C)	610	NC	NC	603	624	NC	744	37	36	NC	9	7	NC	314	612	289	NC	NC	NC	10
WA11.West (326) - Baresand Point - Entrance Point E	497	637	NC	357	470	598	6,552	282	281	221	24	21	10	345	499	568	653	NC	NC	28
WA11.West (327) - Hope Point - Locker Point (E)	NC	NC	NC	604	630	NC	525	9	9	NC	2	2	NC	477	696	198	NC	NC	NC	3
WA11.West (328) - Hope Point - Locker Point (F)	1,322	NC	NC	624	1,274	NC	723	42	41	NC	13	11	NC	736	NC	34	NC	NC	NC	<1
WA11.West (329) - Locker Point - Baresand Point	510	NC	NC	377	416	545	4,271	404	400	374	30	21	14	375	430	292	726	NC	NC	18

NA: Not applicable for receptor; NC: No contact to receptor predicted for specified threshold.

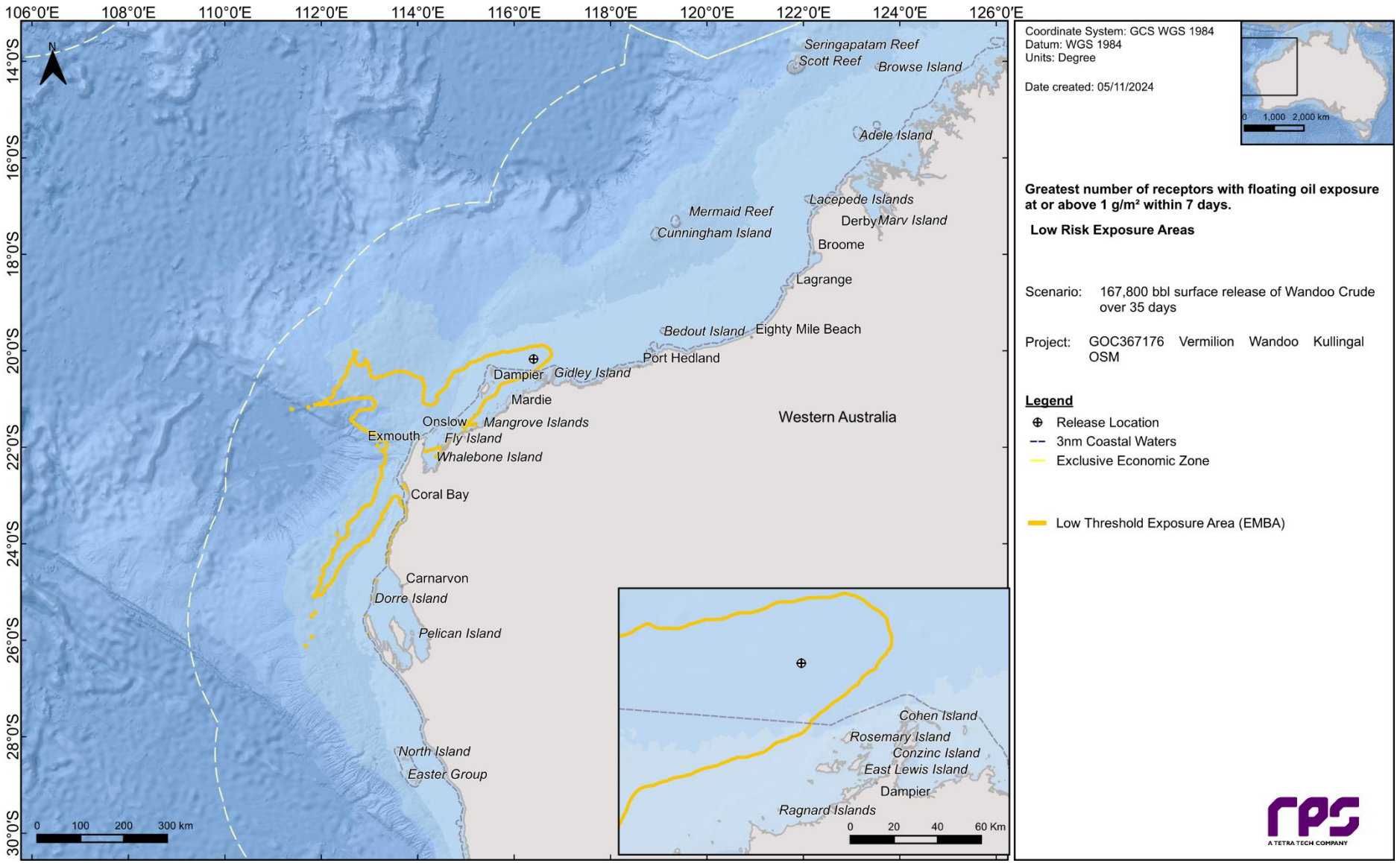


Figure 13.77 Predicted low threshold exposure area following a surface LOWC at Kullingal for the deterministic simulation (transitional, run 31) which resulted in the greatest number of receptors with floating oil exposure at or above 1 g/m² within 7 days.

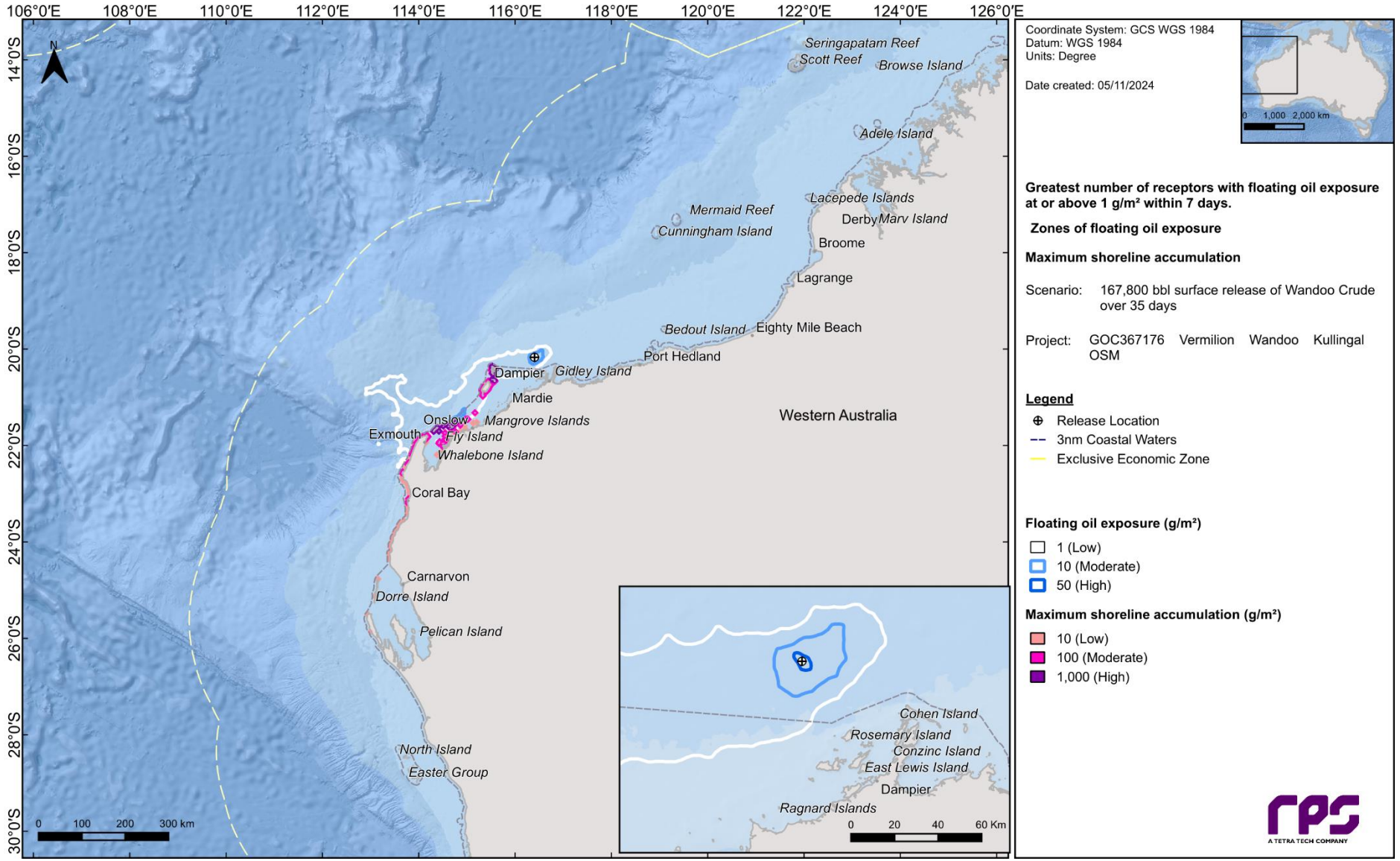


Figure 13.78 Predicted zones of floating oil exposure and maximum shoreline accumulation following a surface LOWC at Kullingal for the deterministic simulation (transitional, run 31) which resulted in the greatest number of receptors with floating oil exposure at or above 1 g/m² within 7 days.

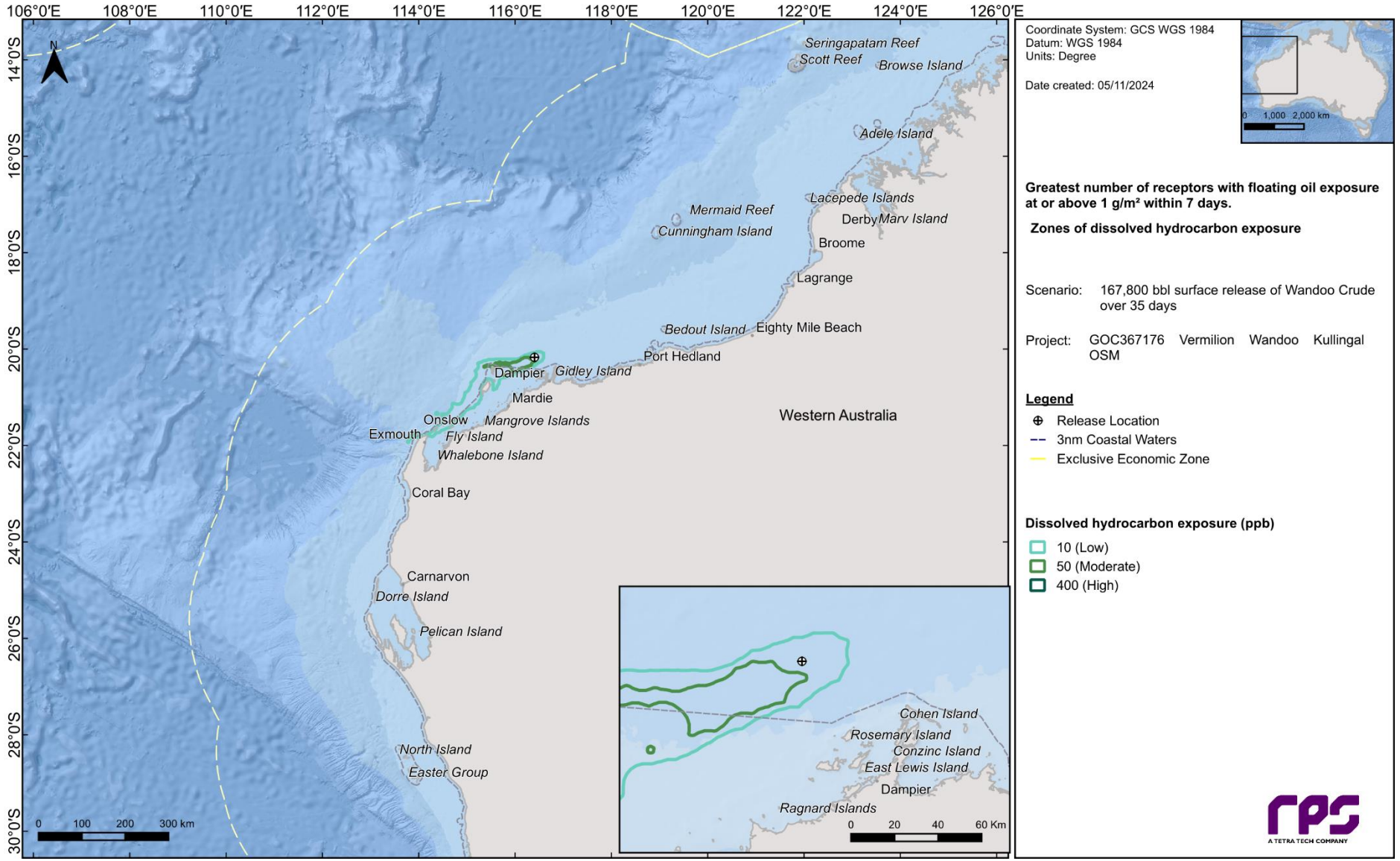


Figure 13.79 Predicted zones of dissolved oil exposure and maximum shoreline accumulation following a surface LOWC at Kullingal for the deterministic simulation (transitional, run 31) which resulted in the greatest number of receptors with floating oil exposure at or above 1 g/m² within 7 days.

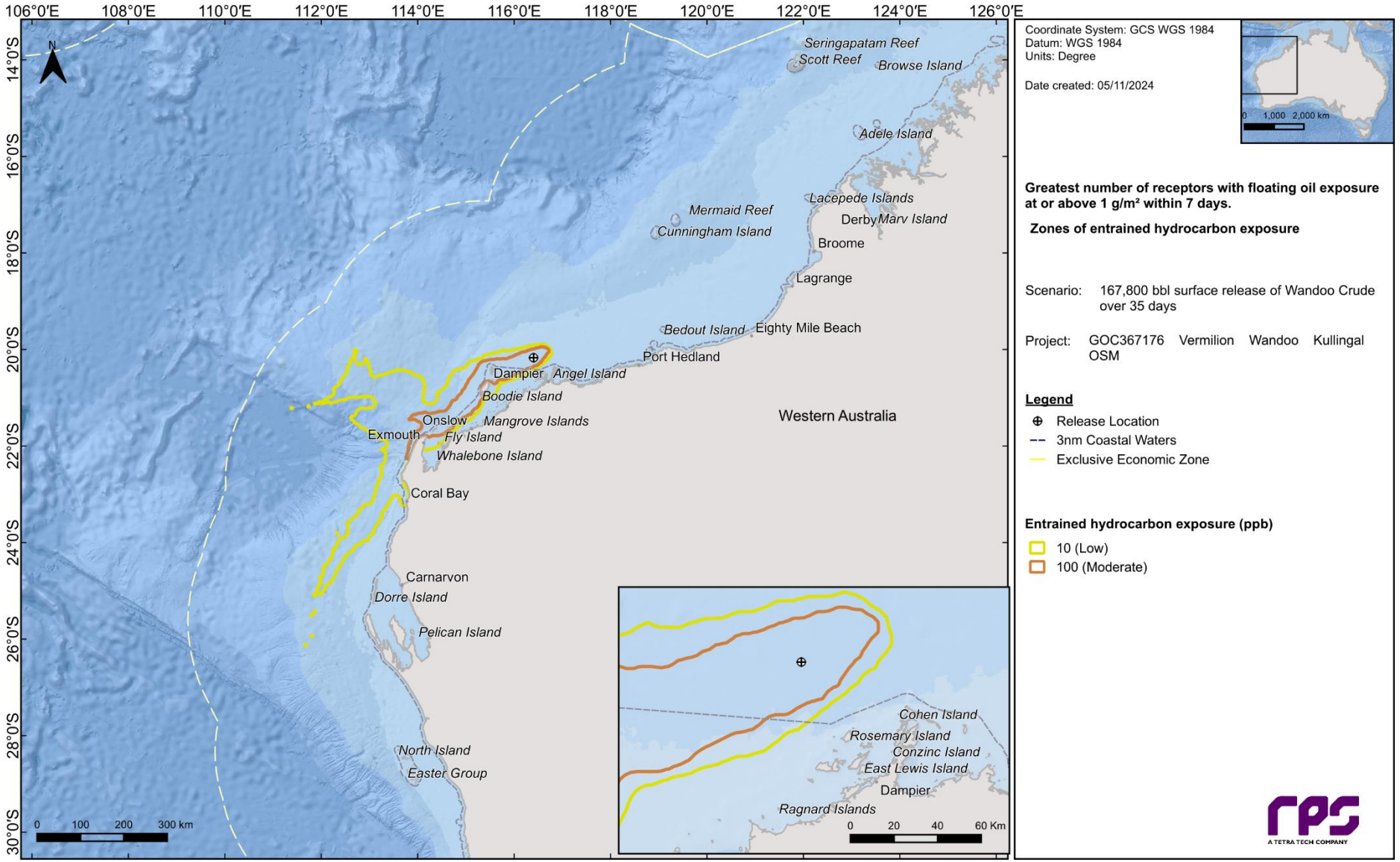


Figure 13.80 Predicted zones of entrained oil exposure and maximum shoreline accumulation following a surface LOWC at Kullingal for the deterministic simulation (transitional, run 31) which resulted in the greatest number of receptors with floating oil exposure at or above 1 g/m² within 7 days.

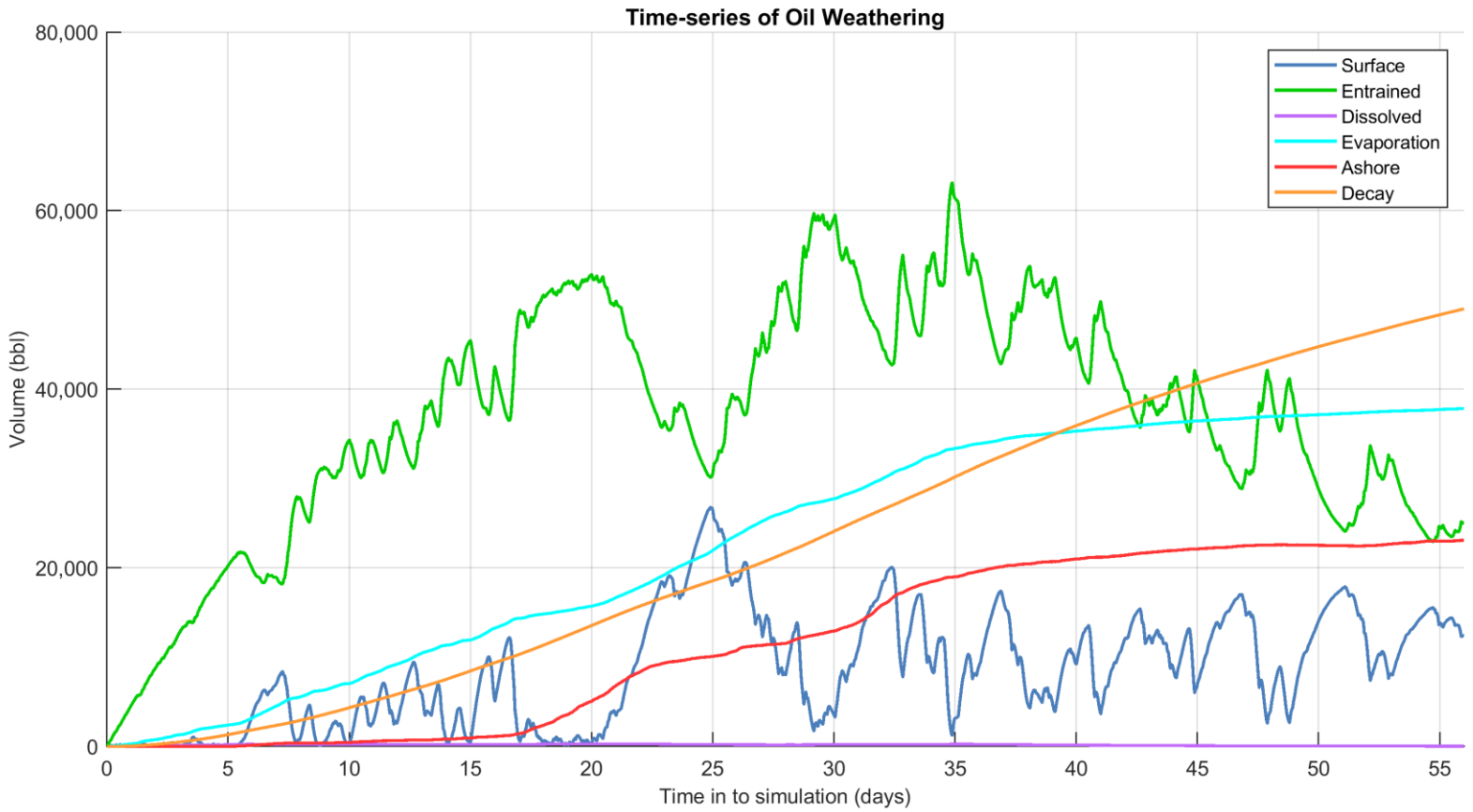


Figure 13.81 Predicted weathering and fates graph following a surface LOWC at Kullingal for the deterministic simulation (transitional, run 31) which resulted in the greatest number of receptors with floating oil exposure at or above 1 g/m^2 within 7 days.

14 MODELLING RESULTS: VESSEL COLLISION

This scenario investigated the potential exposure from a 300 m^3 surface release of MDO over 6 hours resulting from a vessel collision at Kullingal. The MDO was tracked for 30 days from the commencement of the spill to allow the concentrations to decrease below the lowest thresholds. The modelling for this scenario assumed no mitigation efforts are undertaken to collect or otherwise affect the natural transport and weathering.

14.1 Stochastic Analysis

14.1.1 Exposure Areas

Figure 14.1 illustrates the exposure areas for the vessel collision results, determined by integrating the low, moderate, and high threshold results of all 300 spill simulations.

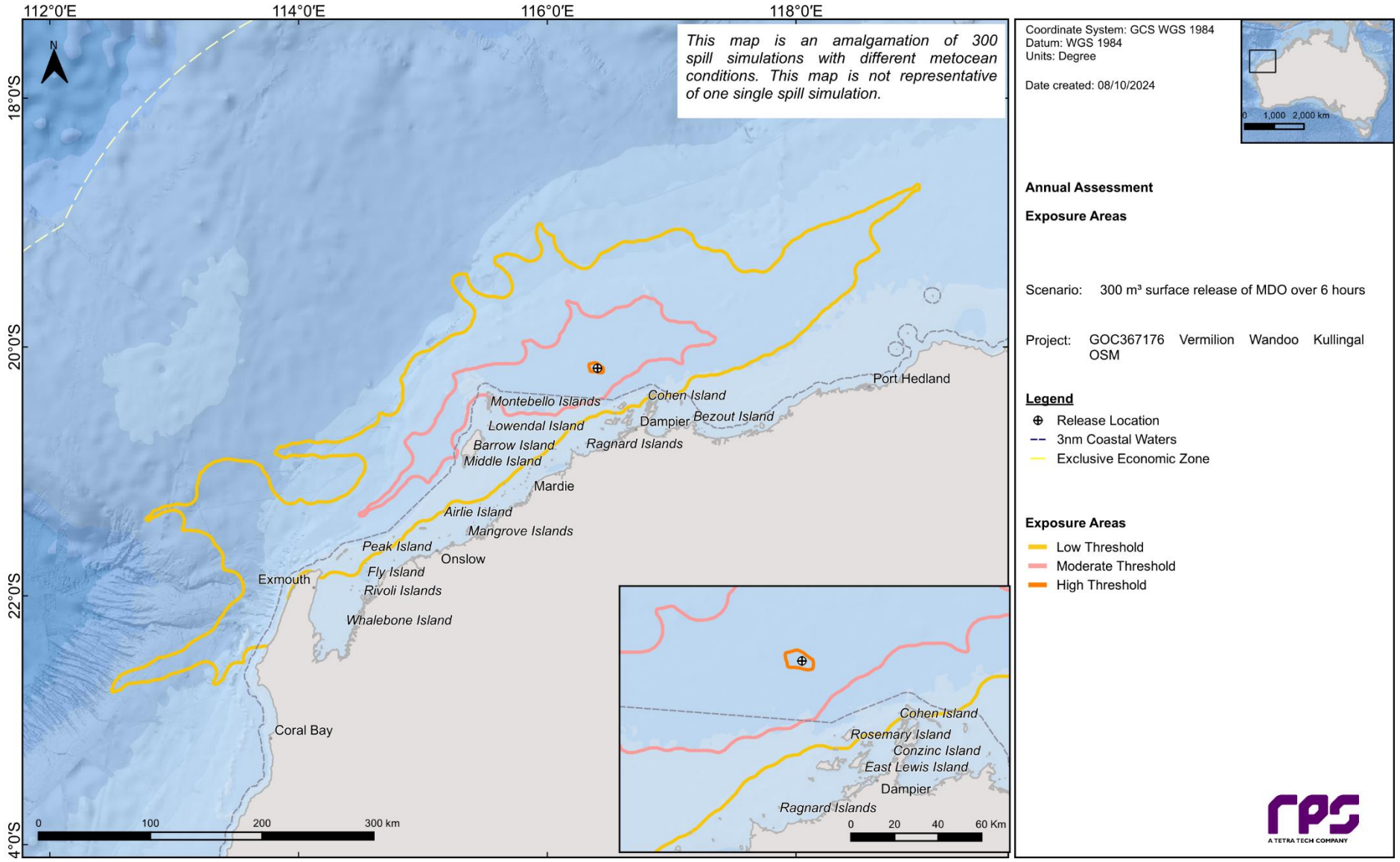


Figure 14.1 Predicted exposure areas following a vessel collision at Kullingal, presented as an annual assessment. The exposure areas were determined by integrating the results of all 300 spill simulations across low, moderate and high thresholds.

14.1.2 Floating Oil Exposure

Table 14.1 summarises the maximum distances from the release location to floating oil exposure thresholds for each season. Concentrations exceeding 1 g/m^2 could extend up to 31 km from the release location. The maximum distances reduced to 18 km and 6 km as the threshold increases to 10 g/m^2 and 50 g/m^2, respectively.

No receptors were predicted to be exposed to floating oil exposure at, or above, 1, g/m^2.

Figure 14.2 to Figure 14.4 illustrate the extent floating oil exposure zones for each season. Figure 14.5 to Figure 14.22 depict the seasonal minimum times before exposure and probability of exposure for assessed thresholds.

Table 14.1 Maximum distances from the release location to floating oil exposure thresholds from a vessel collision at Kullingal. Results were calculated from 100 spill simulations per season.

Season	Distance and direction travelled	Floating oil exposure thresholds		
		1 g/m^2	10 g/m^2	50 g/m^2
Summer	Maximum distance (km) from release location	21	14	5
	Direction	Northeast	Northeast	West
Transitional	Maximum distance (km) from release location	31	17	6
	Direction	East	Northwest	Northwest
Winter	Maximum distance (km) from release location	29	18	3
	Direction	South	South	East

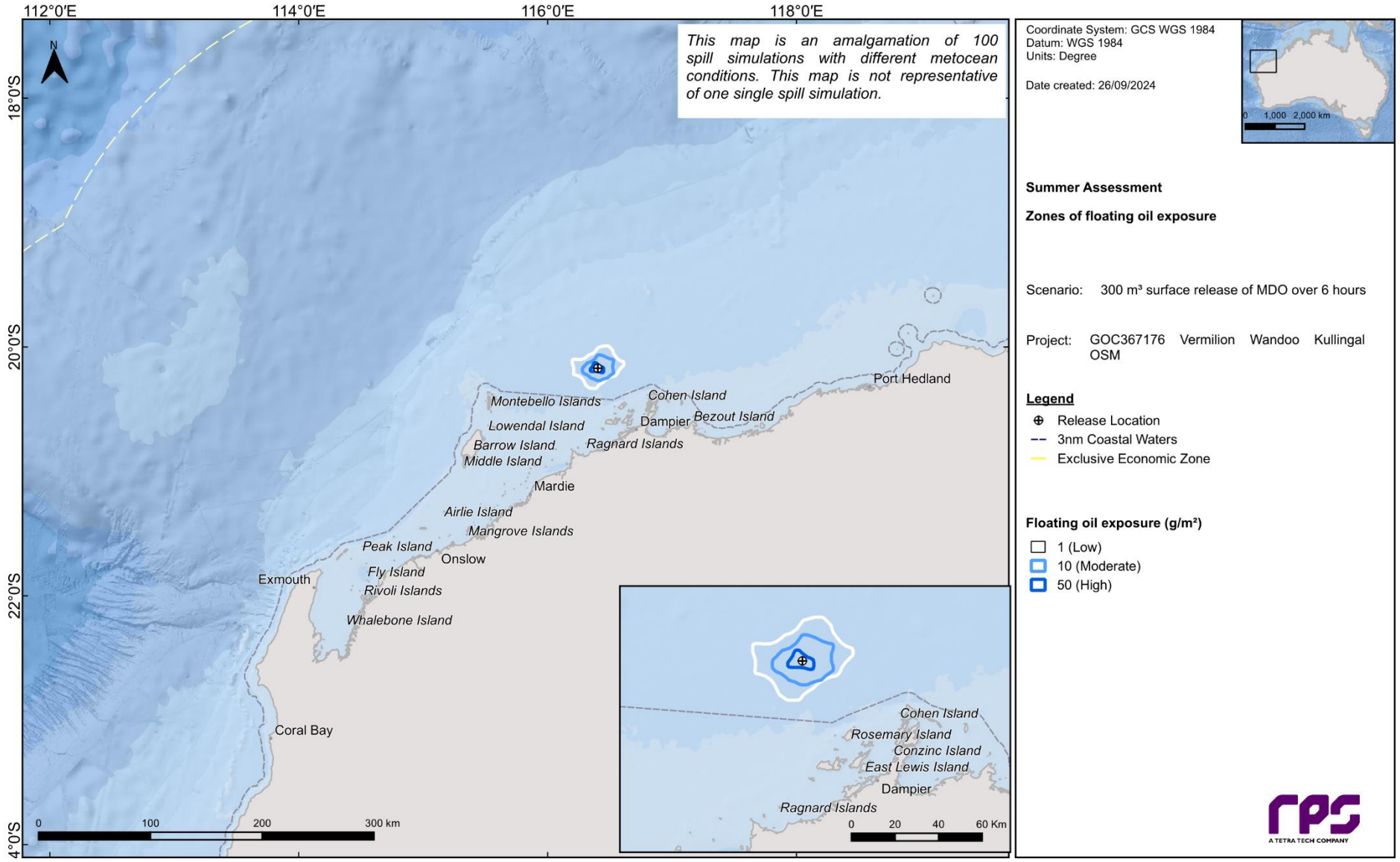


Figure 14.2 Predicted zones of floating oil exposure following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

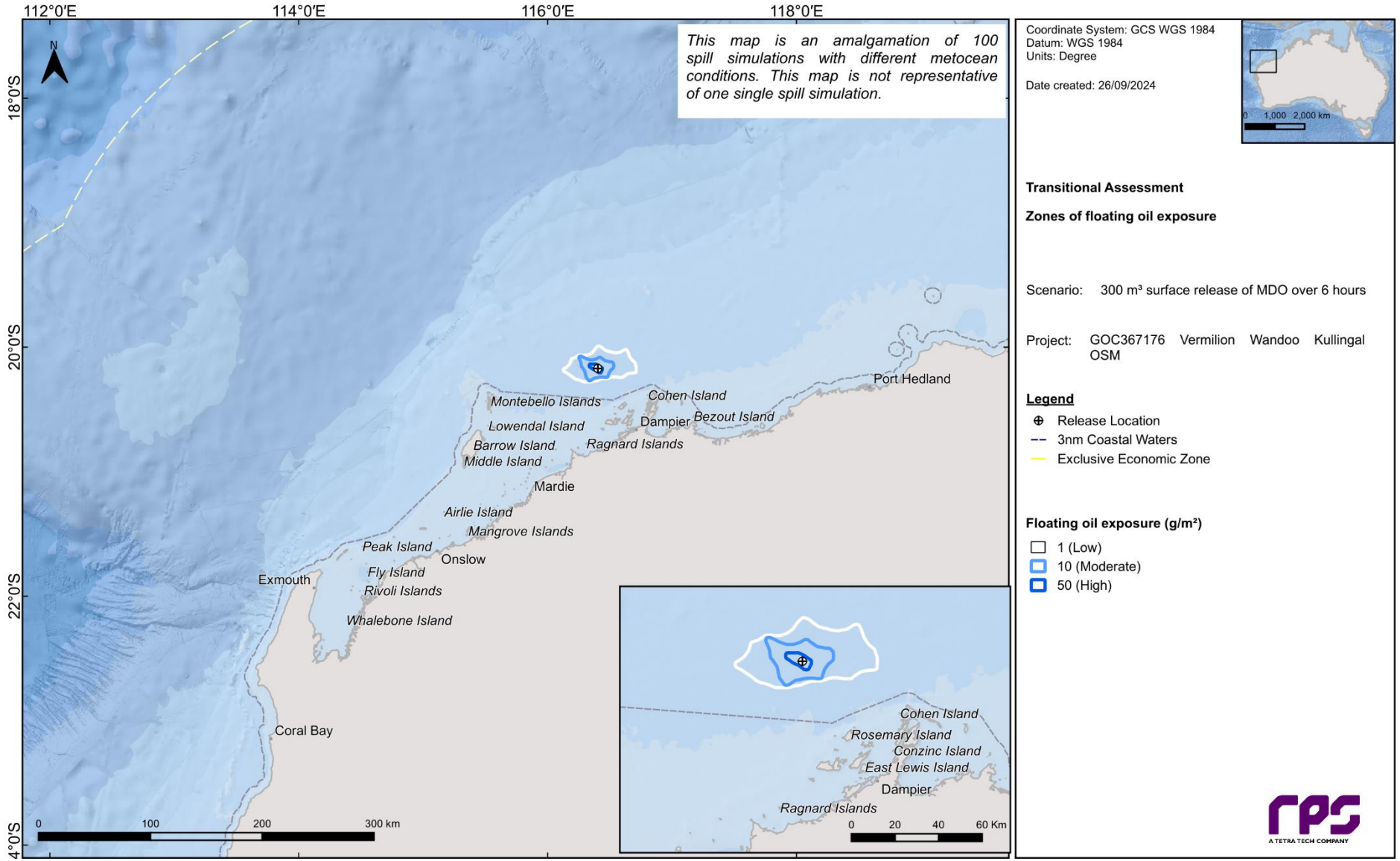


Figure 14.3 Predicted zones of floating oil exposure following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

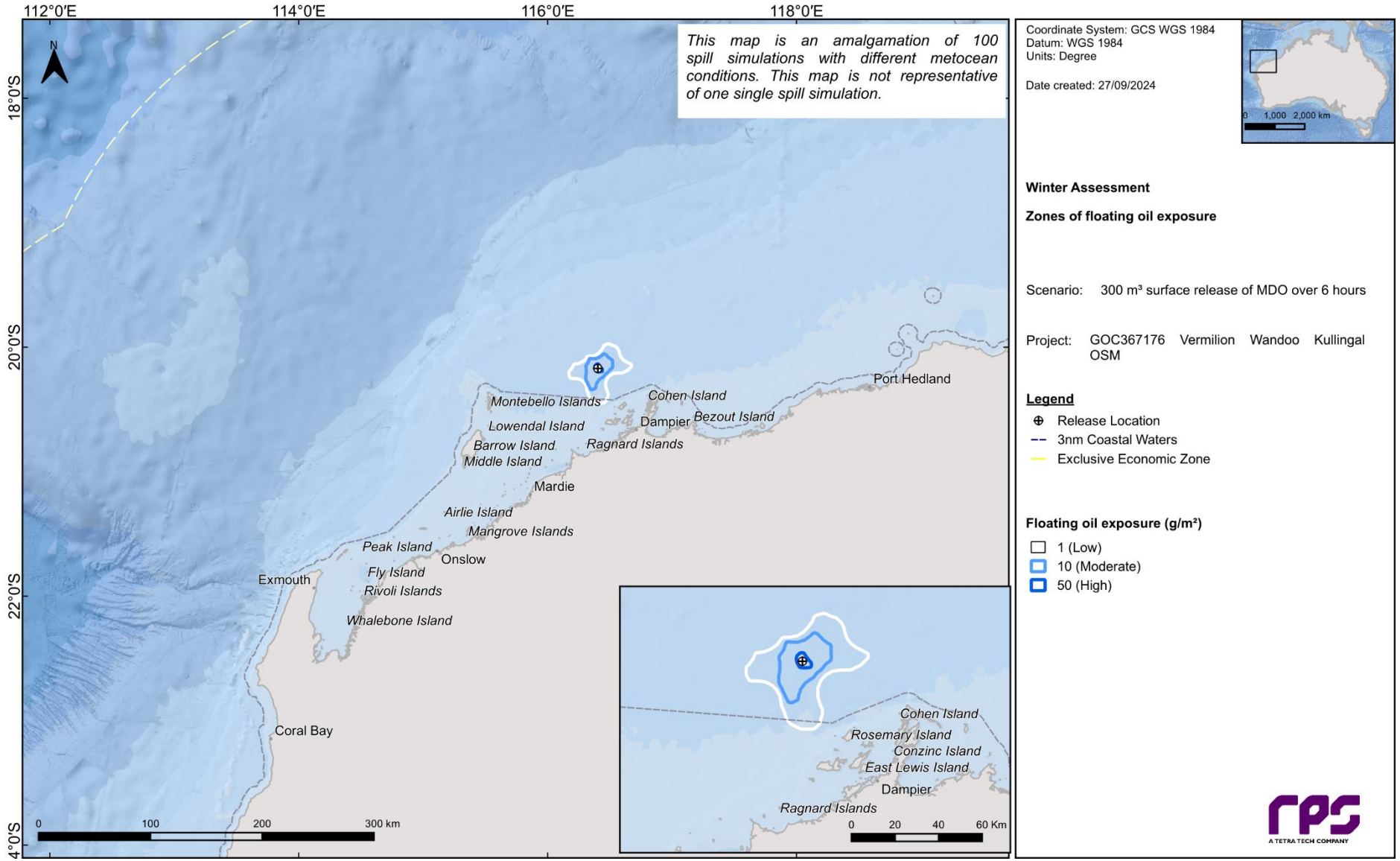


Figure 14.4 Predicted zones of floating oil exposure following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

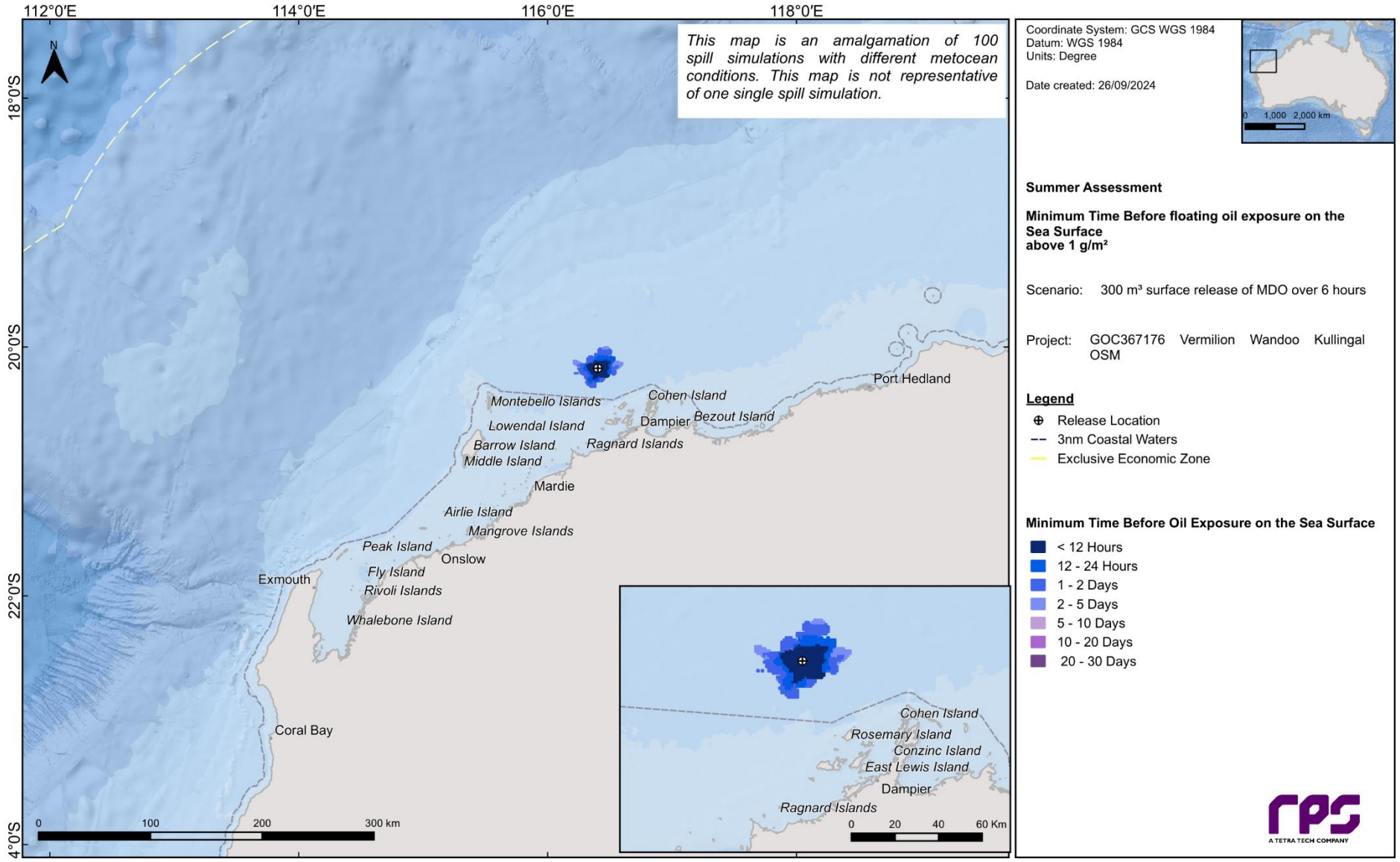


Figure 14.5 Minimum time before floating oil exposure at, or above, 1 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

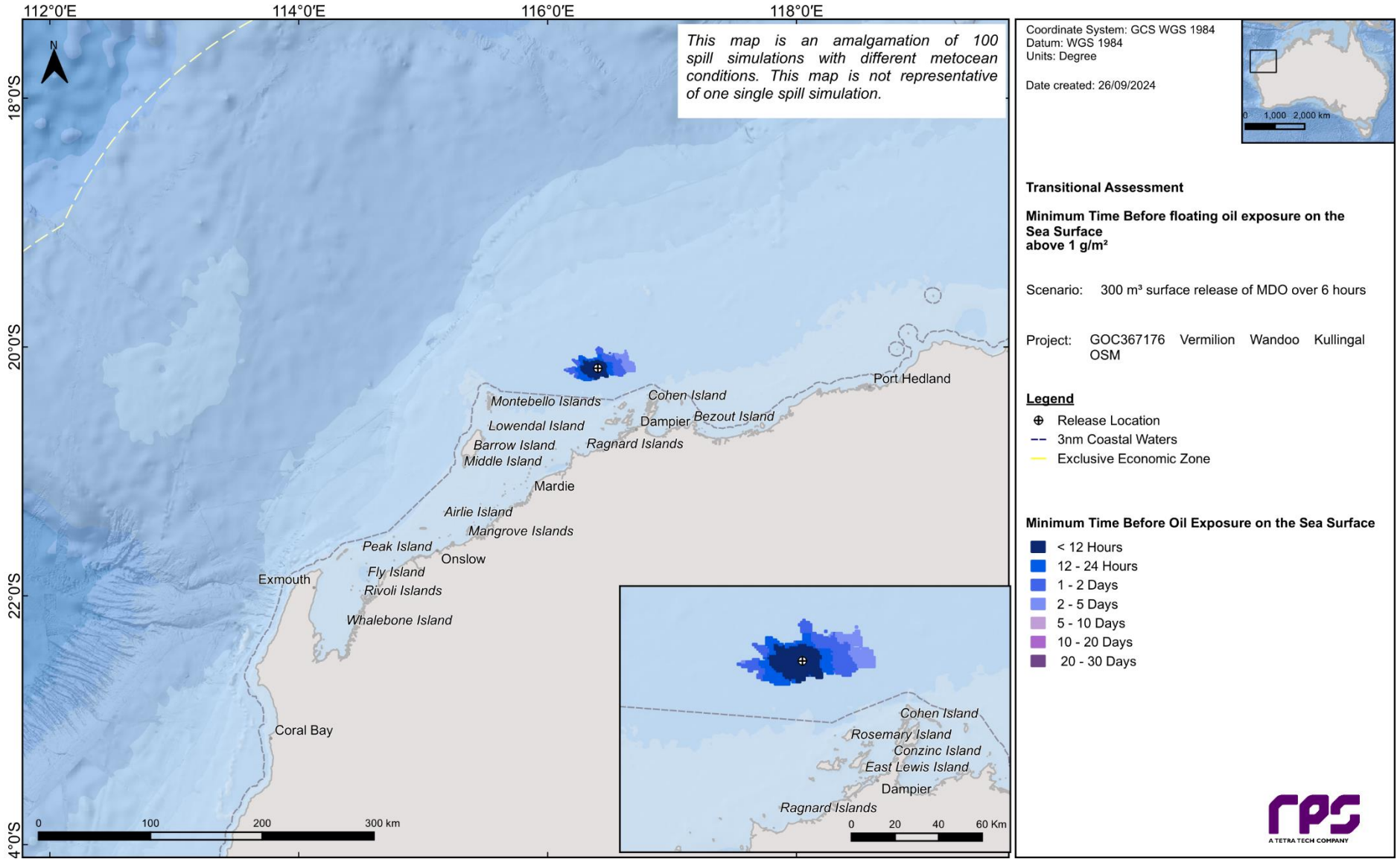


Figure 14.6 Minimum time before floating oil exposure at, or above, 1 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

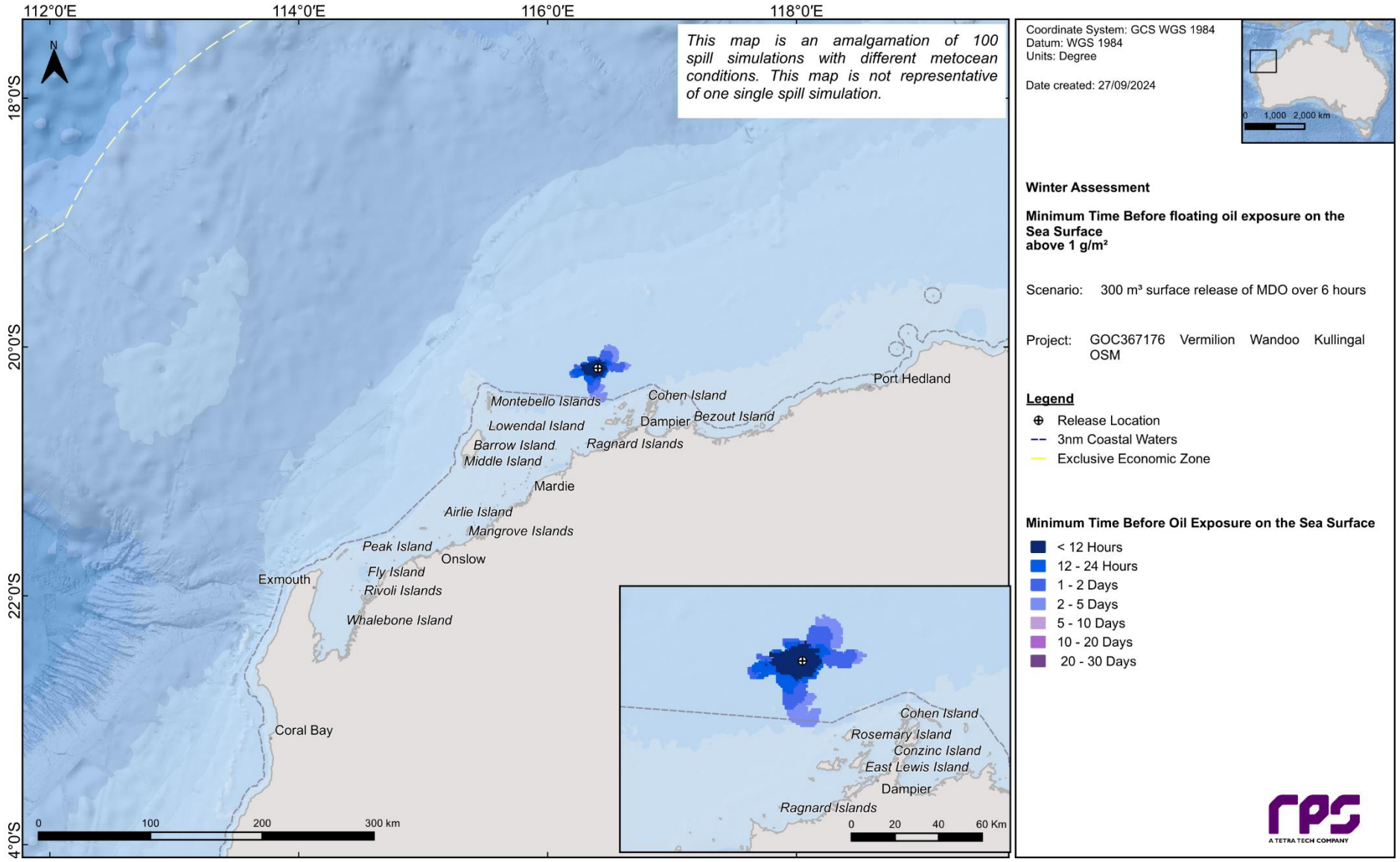


Figure 14.7 Minimum time before floating oil exposure at, or above, 1 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

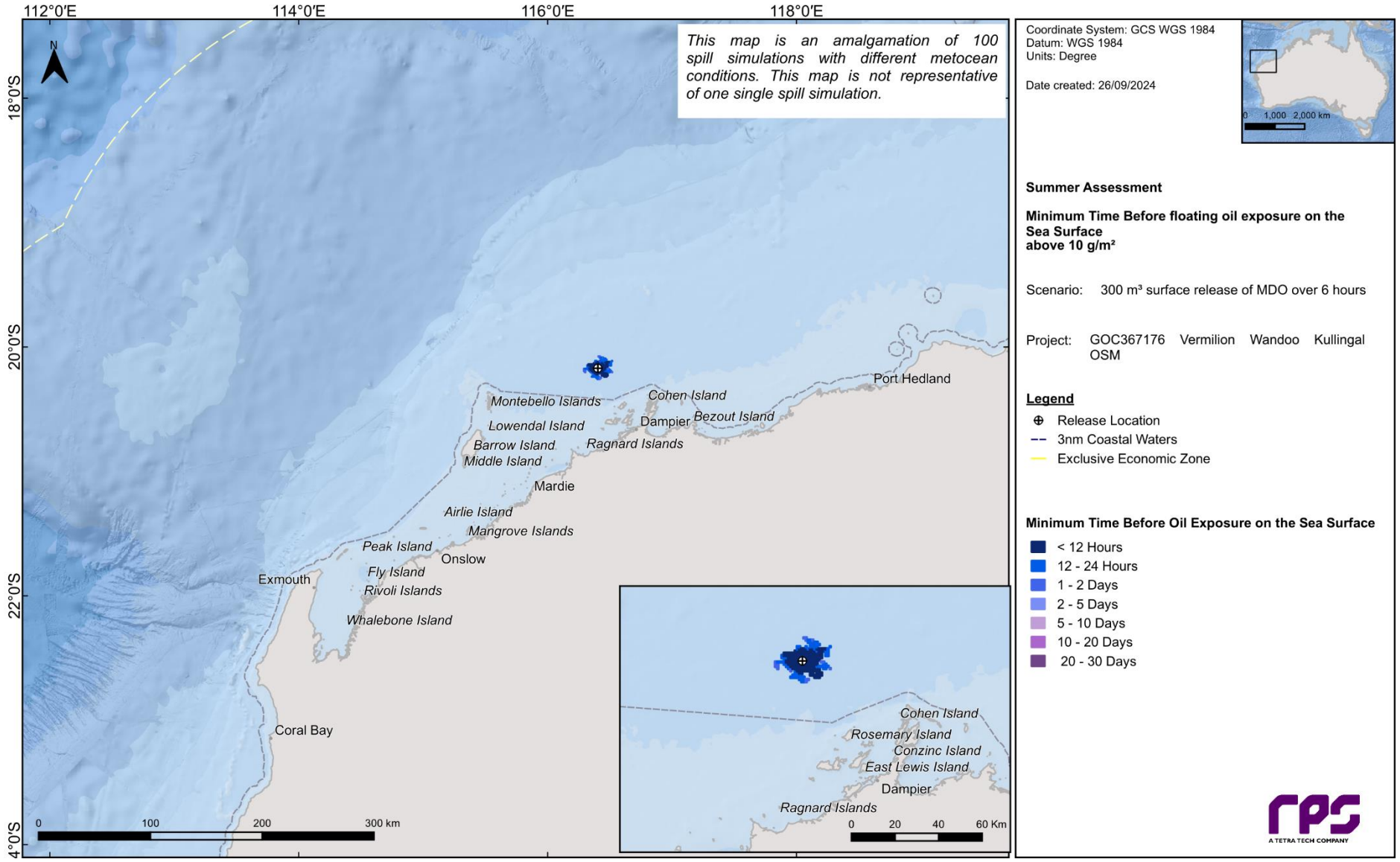


Figure 14.8 Minimum time before floating oil exposure at, or above, 10 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

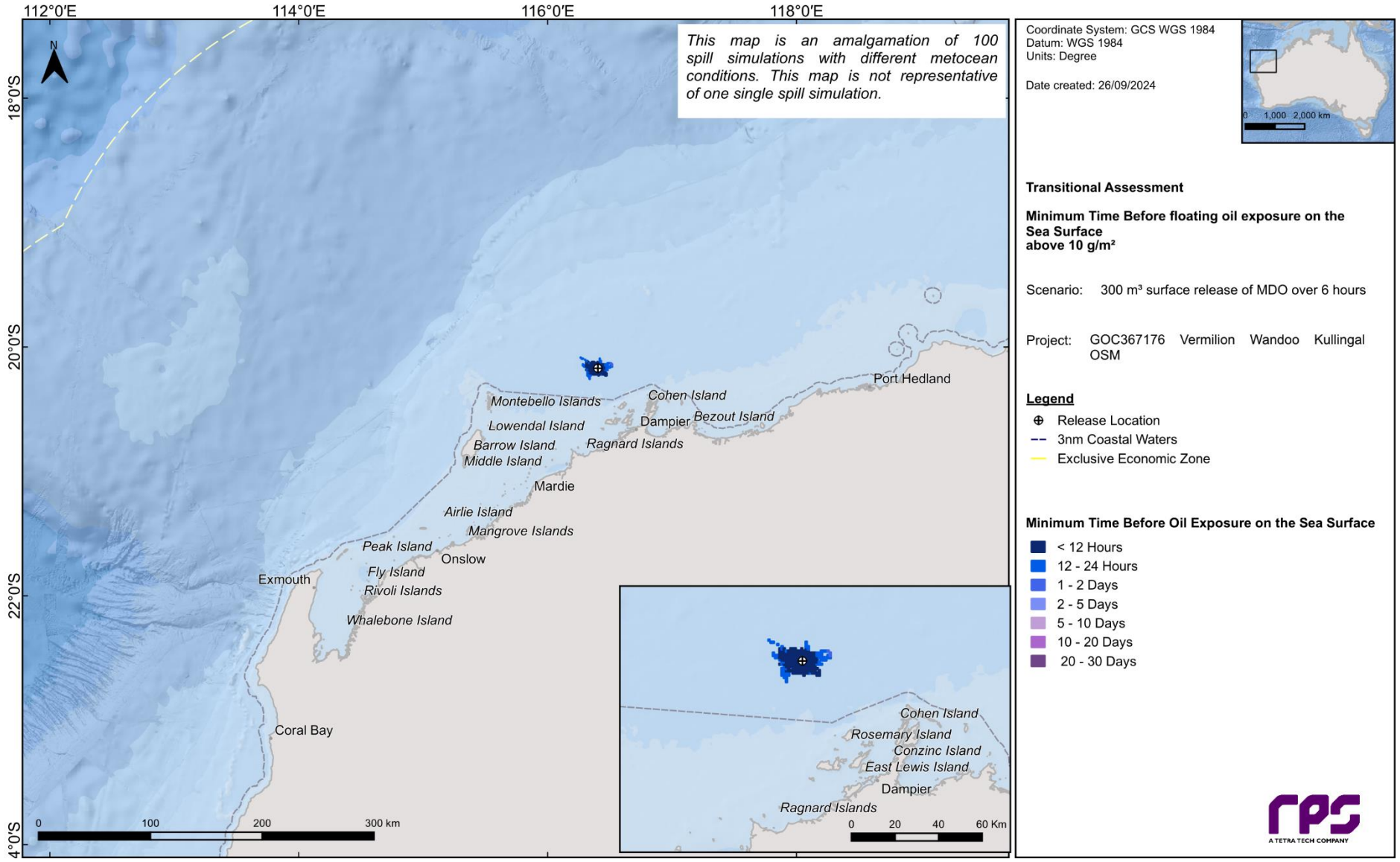


Figure 14.9 Minimum time before floating oil exposure at, or above, 10 g/m^2 following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

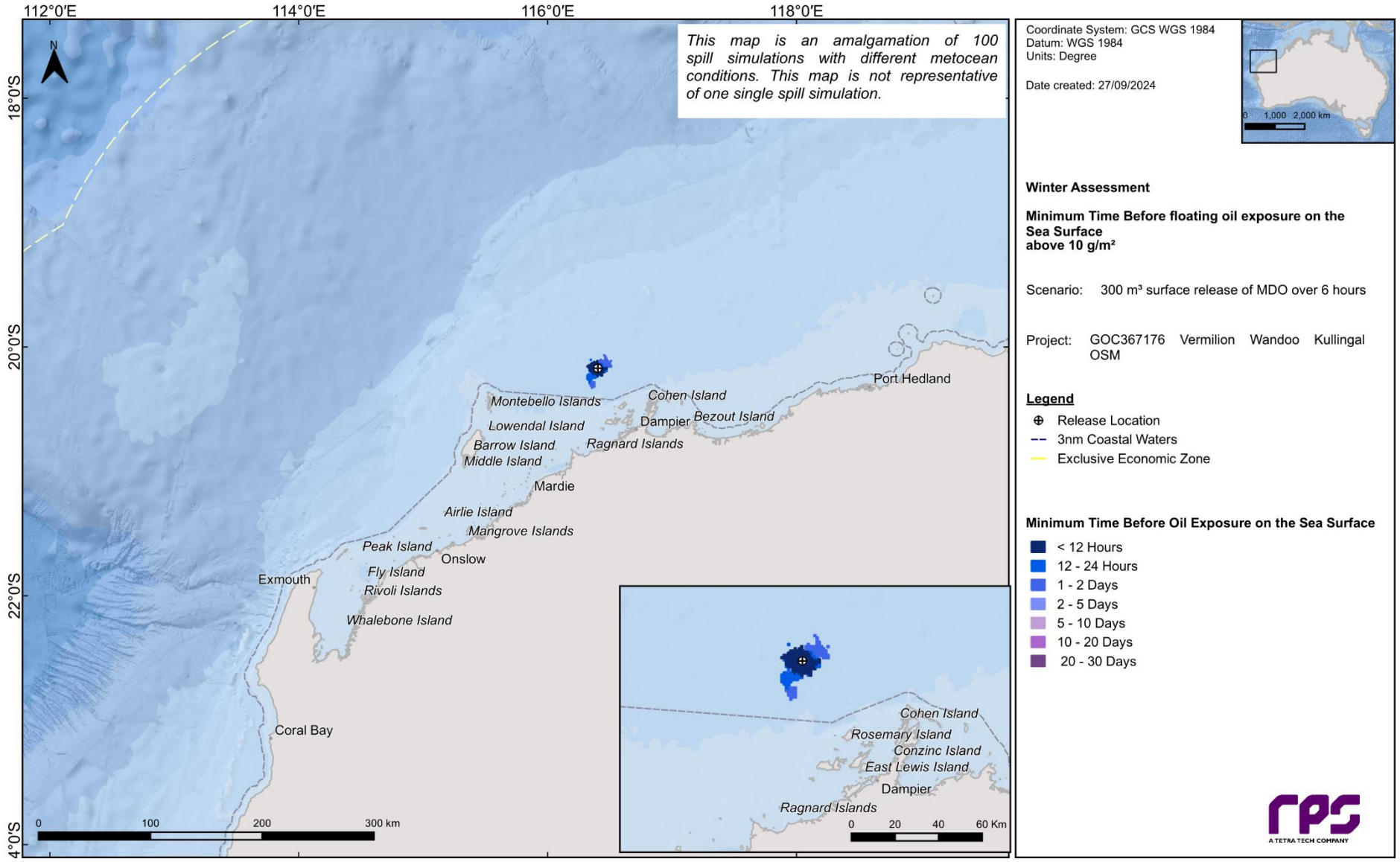


Figure 14.10 Minimum time before floating oil exposure at, or above, 10 g/m^2 following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

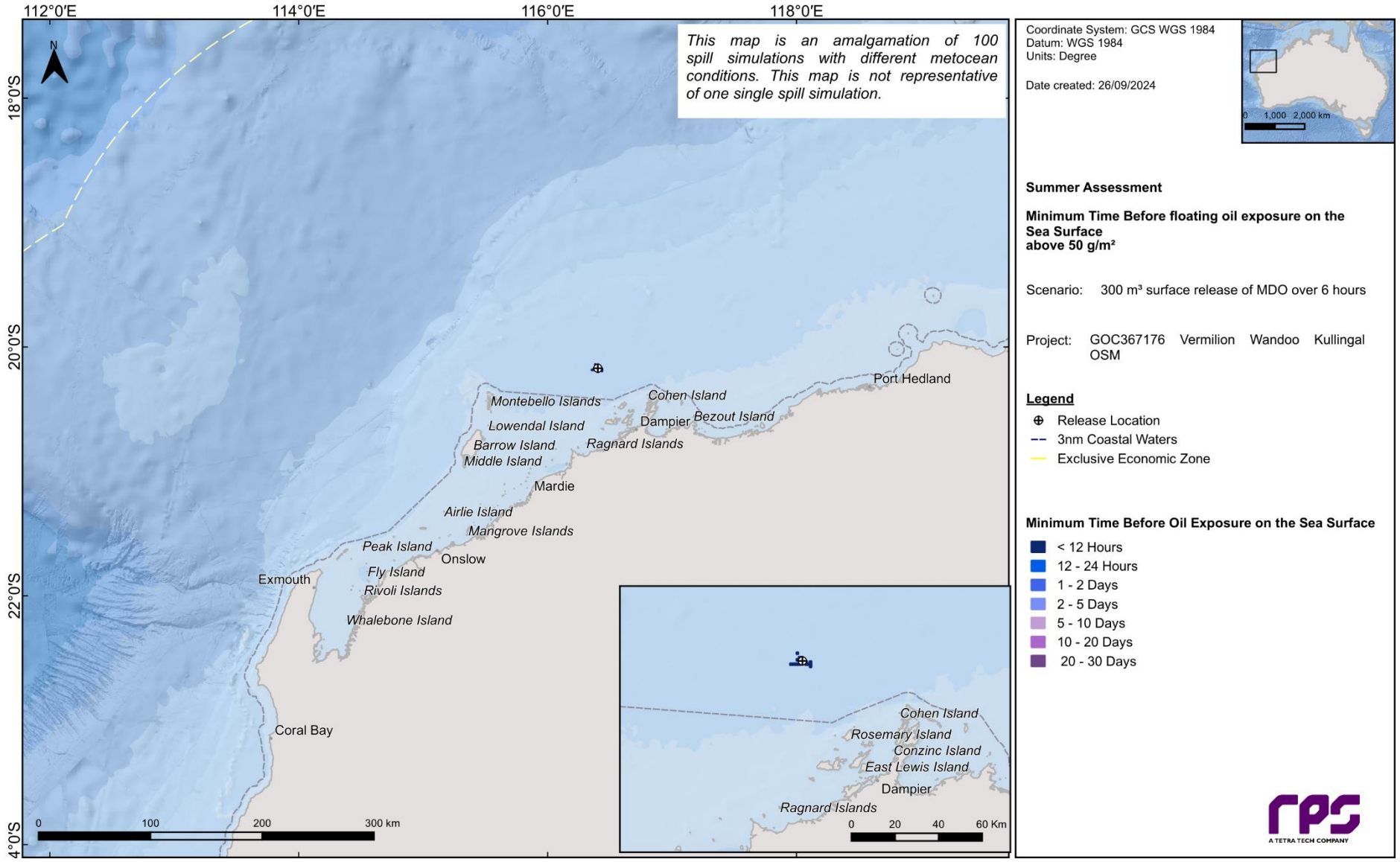


Figure 14.11 Minimum time before floating oil exposure at, or above, 50 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

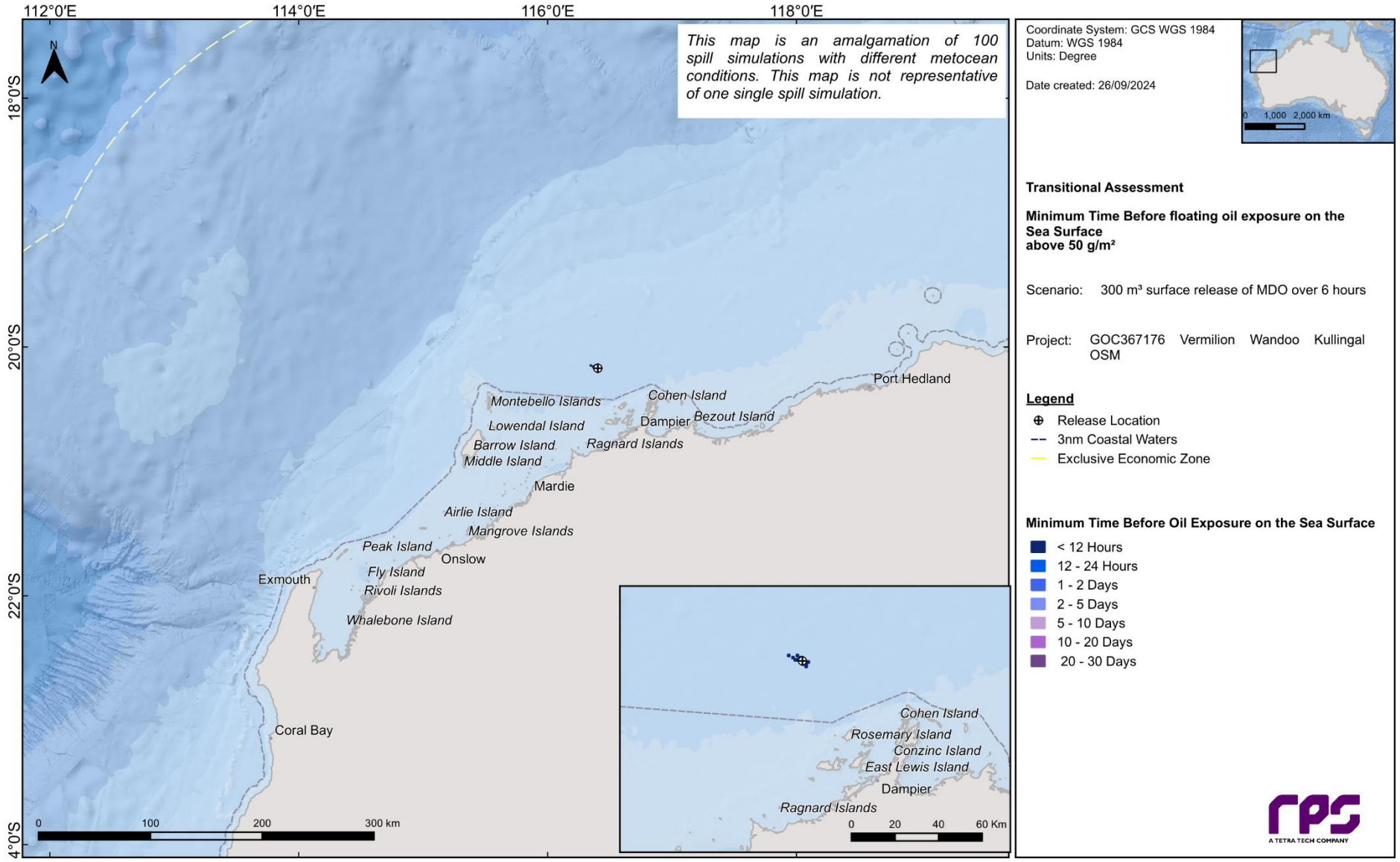


Figure 14.12 Minimum time before floating oil exposure at, or above, 50 g/m^2 following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

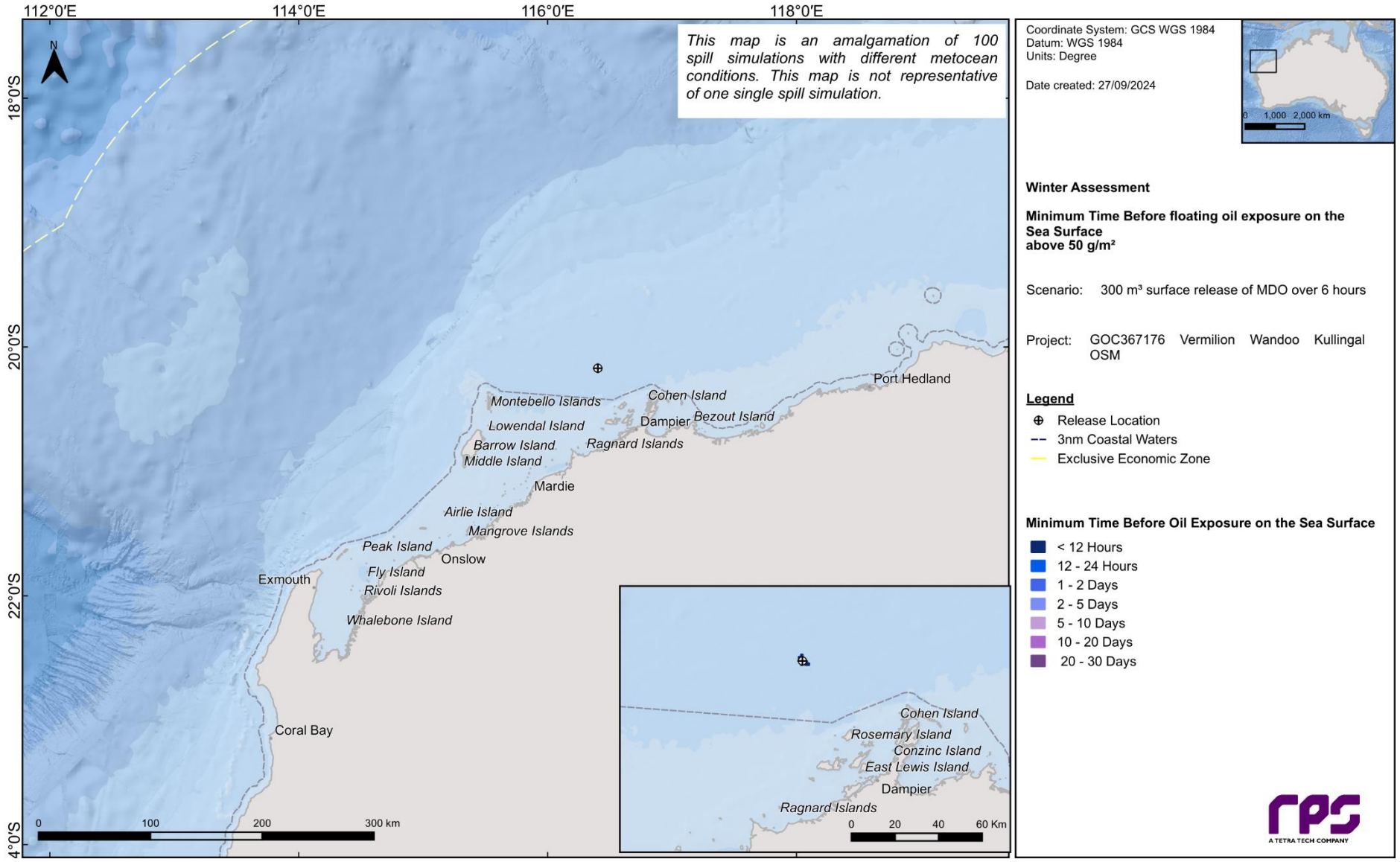


Figure 14.13 Minimum time before floating oil exposure at, or above, 50 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

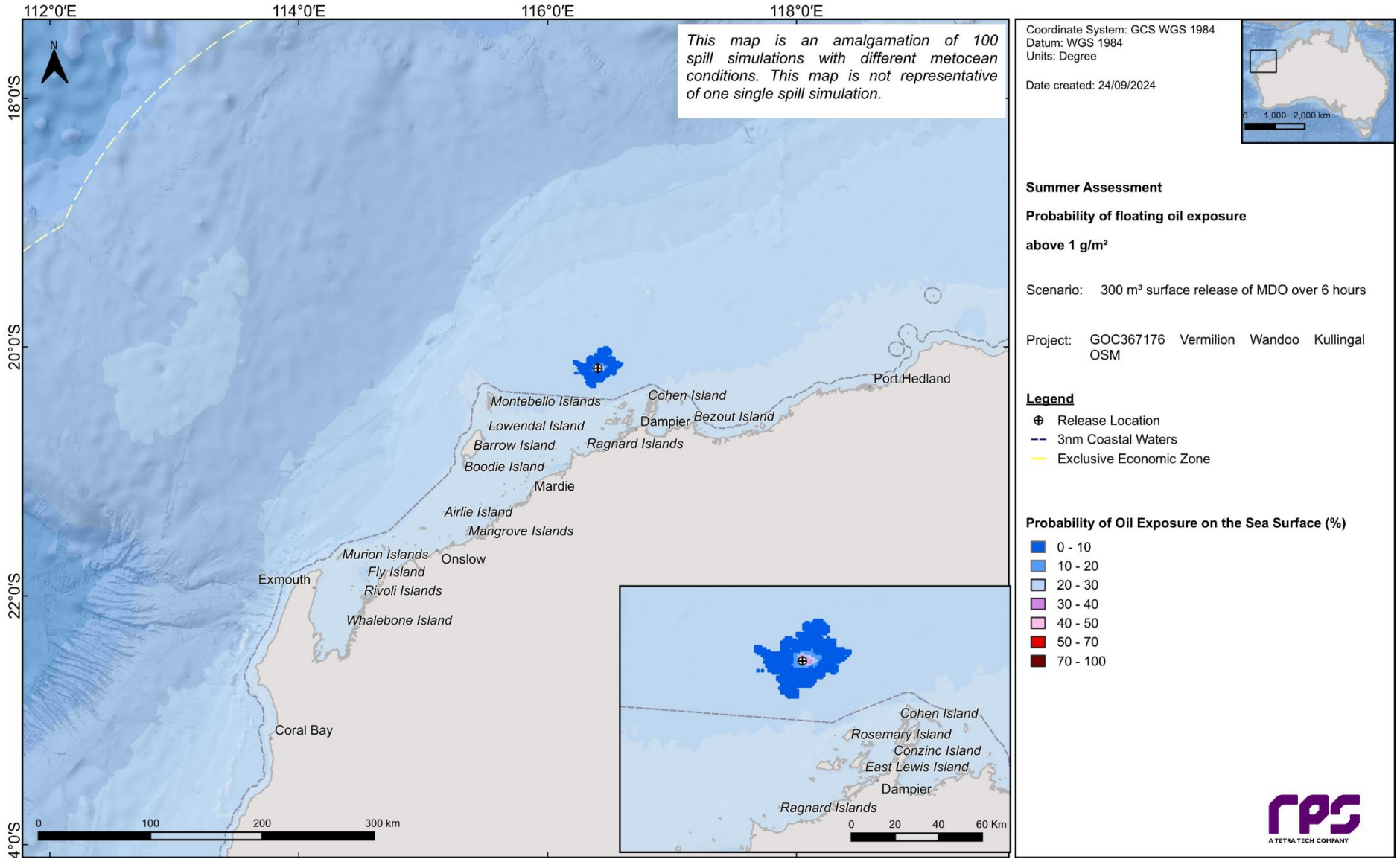


Figure 14.14 Probability of floating oil exposure at, or above, 1 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

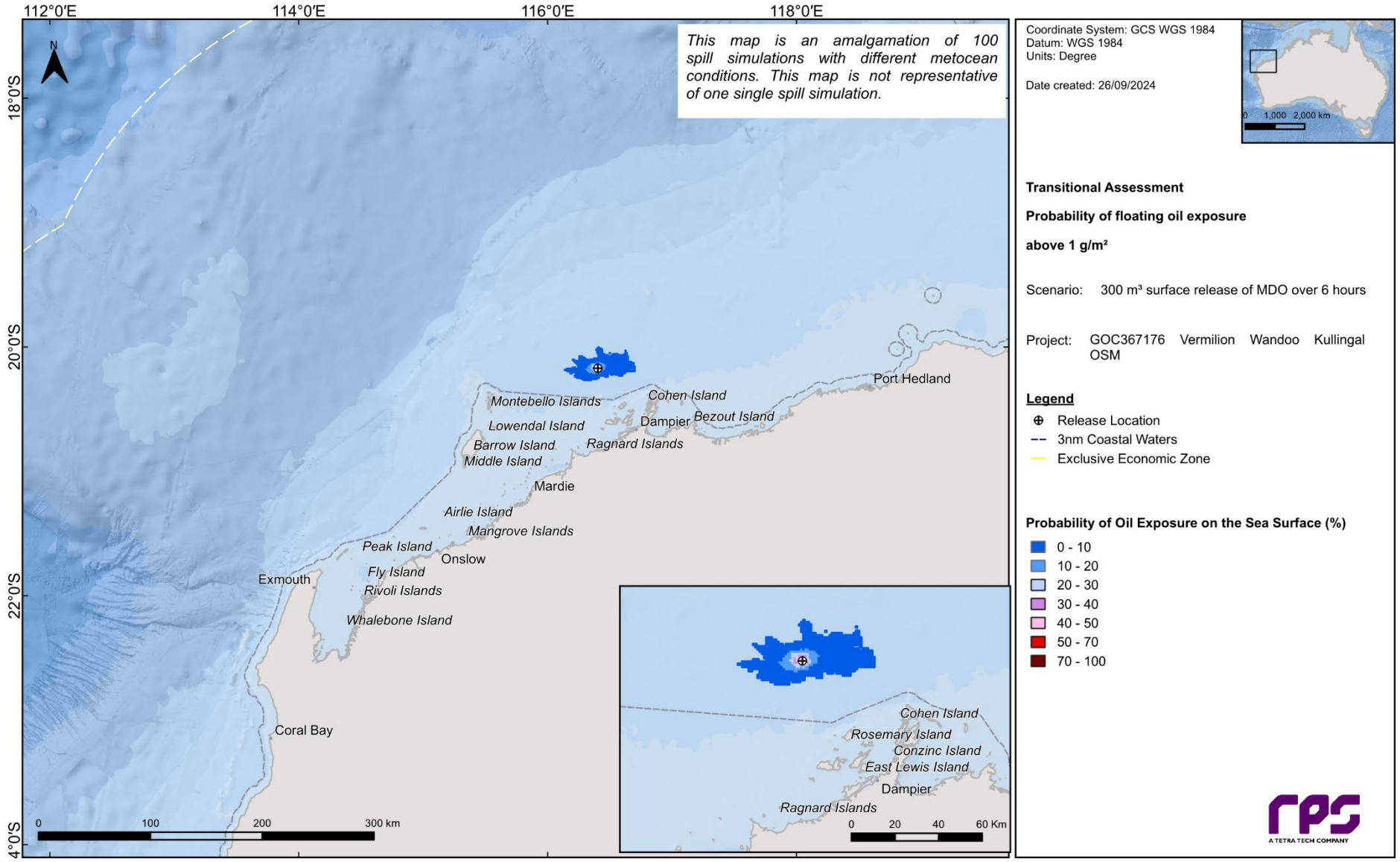


Figure 14.15 Probability of floating oil exposure at, or above, 1 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

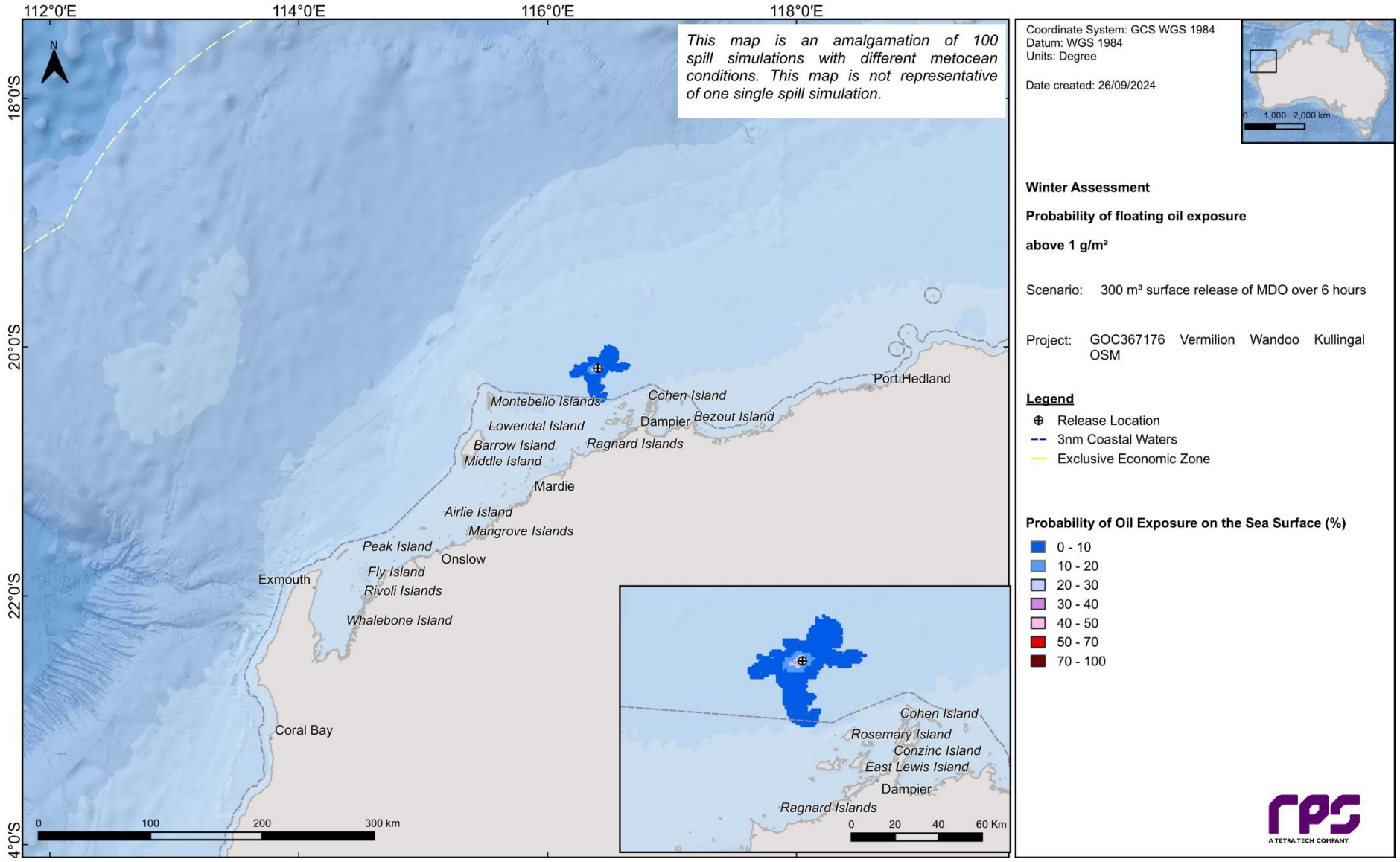


Figure 14.16 Probability of floating oil exposure at, or above, 1 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

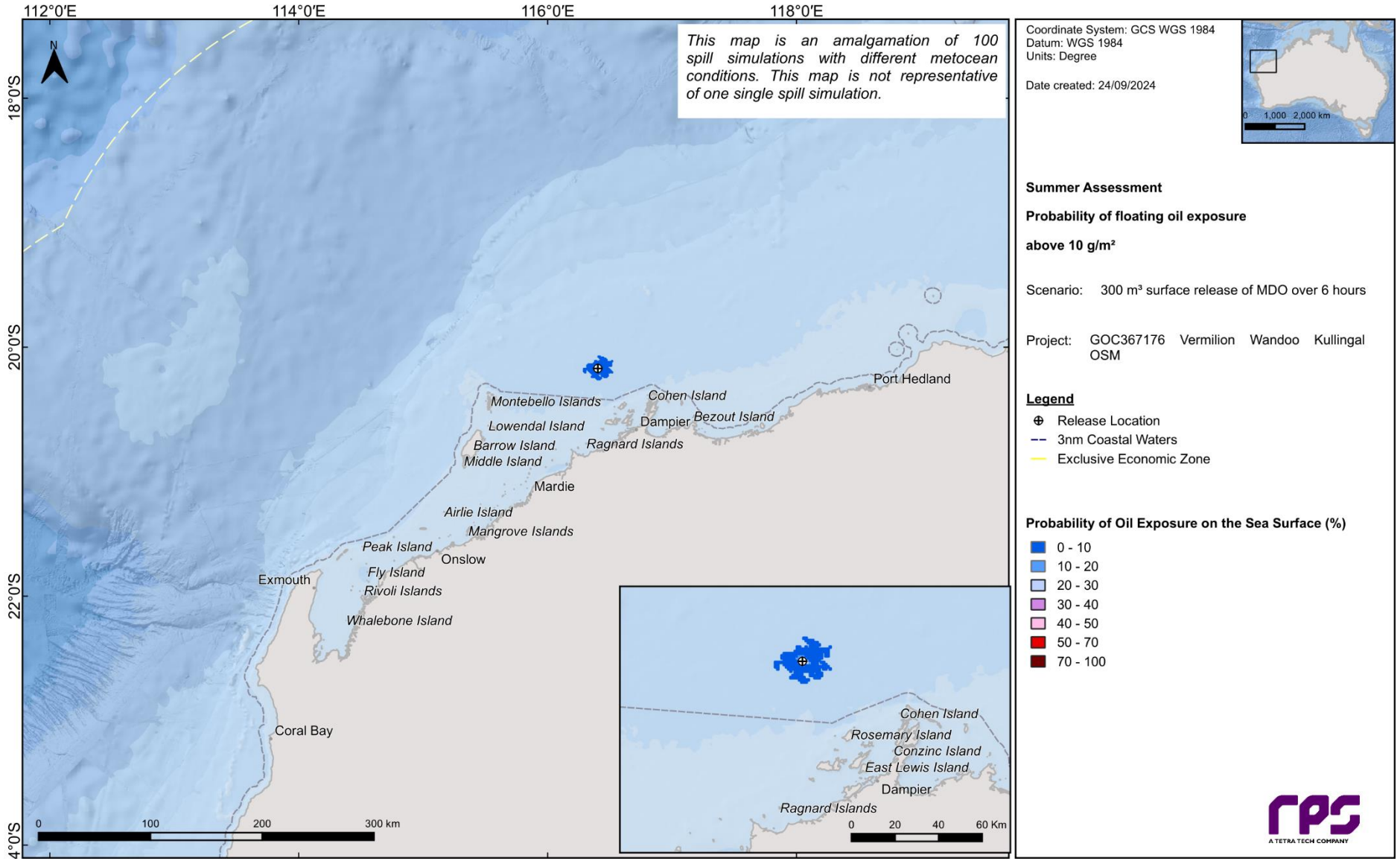


Figure 14.17 Probability of floating oil exposure at, or above, 10 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

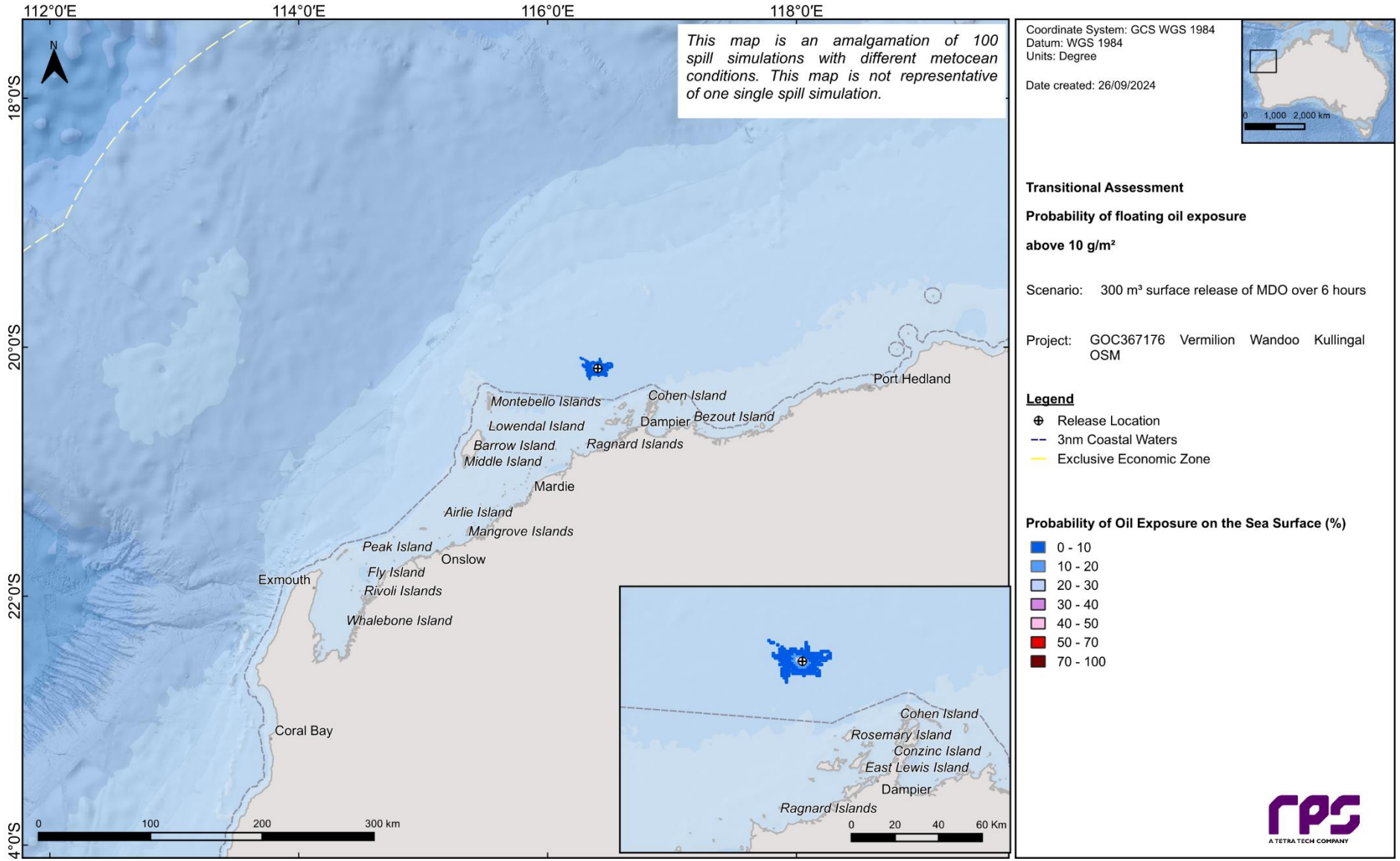


Figure 14.18 Probability of floating oil exposure at, or above, 10 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

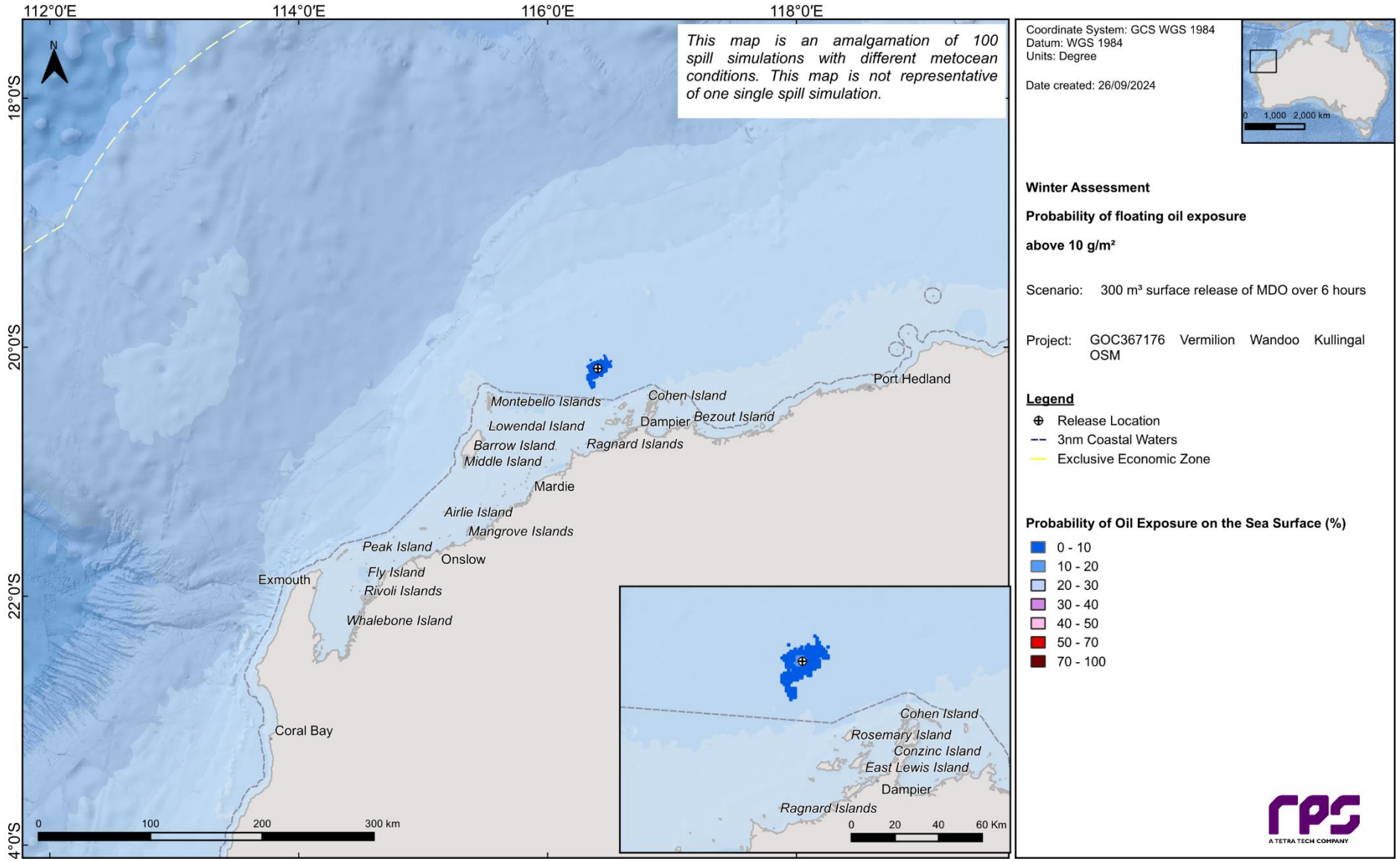


Figure 14.19 Probability of floating oil exposure at, or above, 10 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

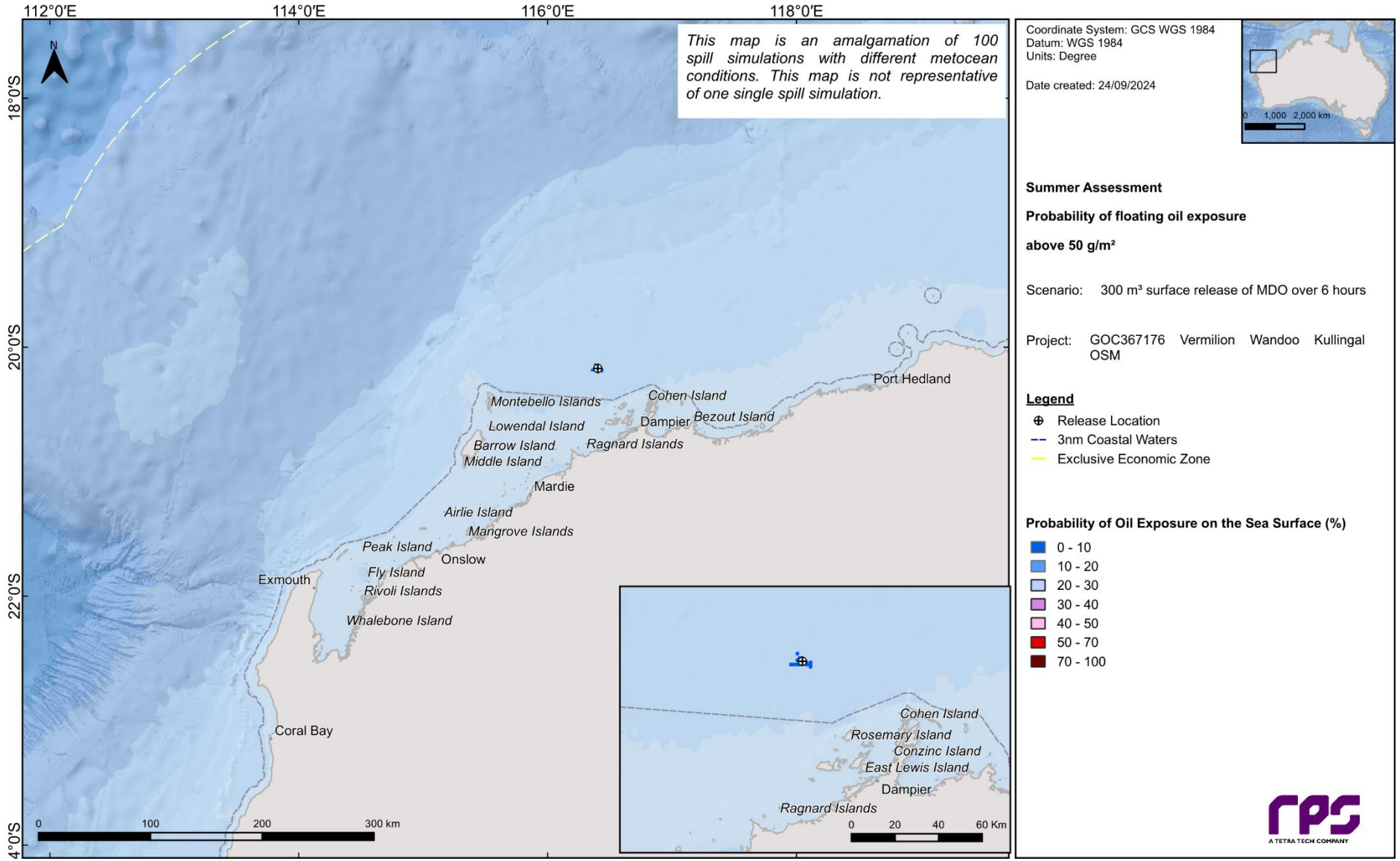


Figure 14.20 Probability of floating oil exposure at, or above, 50 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

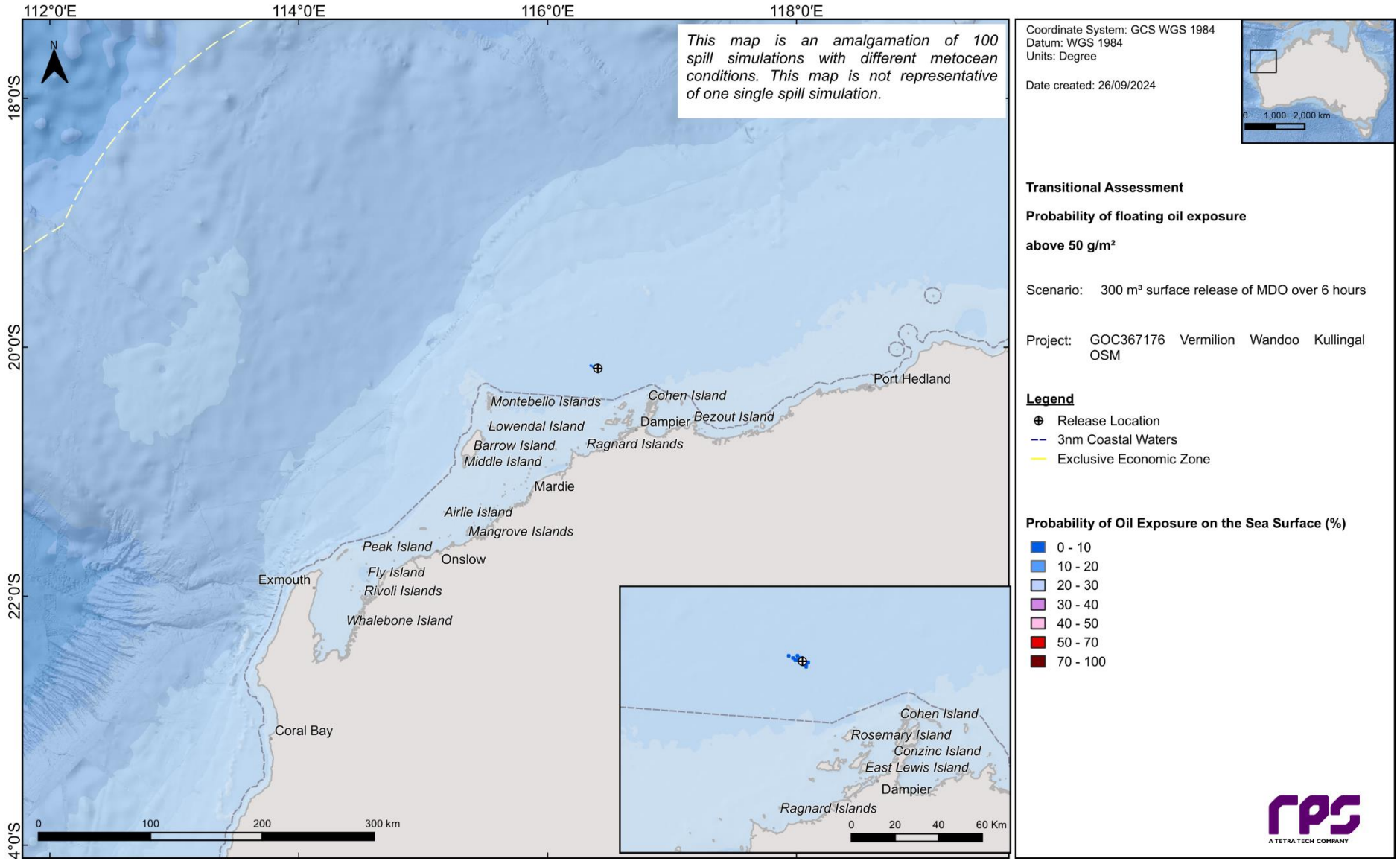


Figure 14.21 Probability of floating oil exposure at, or above, 50 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

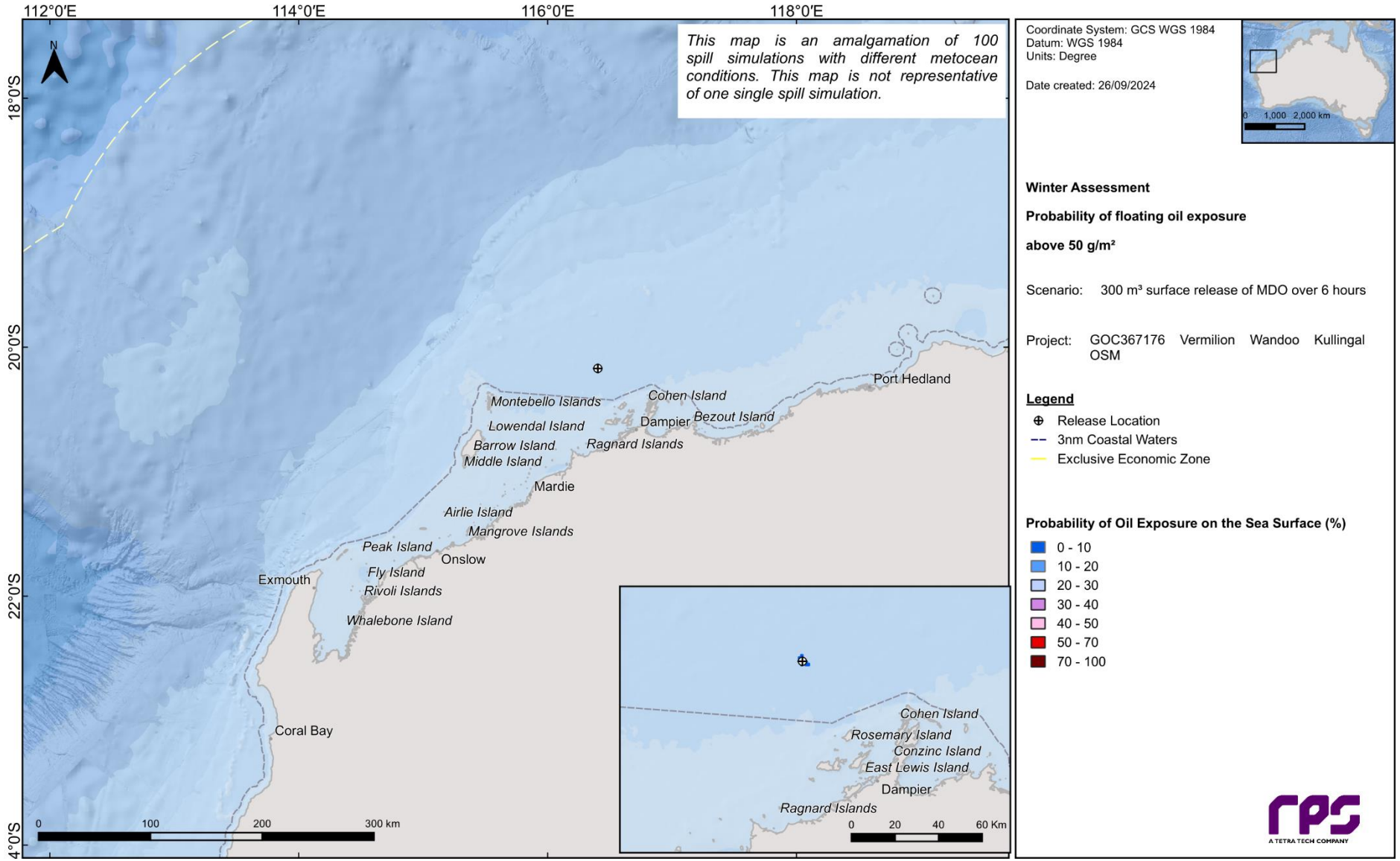


Figure 14.22 Probability of floating oil exposure at, or above, 50 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

14.1.3 Shoreline accumulation

Table 14.2 summarizes the predicted oil accumulation on shorelines across different seasons and thresholds. The highest probability of oil accumulation on any shoreline at, or above, the 10 g/m^2 threshold was recorded during winter, reaching 24%. The shortest time for oil to reach any shoreline at this threshold was 91 hours, also during winter. The maximum volume of oil ashore from a single spill was 23.2 m^3 also occurring during winter.

Table 14.3 to

Table 14.5 present the predicted oil accumulation for specific shoreline cells for each season.

The highest probability of shoreline oil accumulation at, or above, the 10 g/m^2 threshold was forecast for WA11.West (318) - Barrow Island and Montebello Islands (A), with probabilities of 2%, 6%, and 15% during the summer, transitional, and winter seasons, respectively. During summer, transitional and winter conditions, the same shoreline cell was predicted to experience quickest time before oil accumulation at 152 hours, 136 hours and 91 hours after the spill commencement. Additionally, the same shoreline cell recorded the highest volume of oil ashore with 23.2 m^3, during a spill simulation that commenced under winter conditions (see Table 14.5).

The seasonal maximum potential shoreline oil accumulation are presented in Figure 14.23 to Figure 14.25 and probabilities for each of the thresholds and seasons are presented in Figure 14.26 to Figure 14.30.

Table 14.2 Summary of oil accumulation on any shoreline following a vessel collision at Kullingal. Results were calculated from 100 spill simulations per season.

Shoreline statistics	Summer			Transitional			Winter		
	Shoreline accumulation thresholds			Shoreline accumulation thresholds			Shoreline accumulation thresholds		
	10 g/m^2	100 g/m^2	1,000 g/m^2	10 g/m^2	100 g/m^2	1,000 g/m^2	10 g/m^2	100 g/m^2	1,000 g/m^2
Probability of contact to any shoreline (%)	2	NC	NC	9	1	NC	24	6	NC
Absolute minimum time to shore (hours)	152	NC	NC	136	366	NC	91	110	NC
Maximum accumulated volume (m^3) from a single spill simulation	1.2	NC	NC	5.3	1.6	NC	23.2	20.3	NC
Average accumulated volume (m^3) across all spill simulations	<1	NC	NC	<1	<1	NC	1.0	<1	NC
Maximum length of shoreline (km) from a single spill simulation	5	NC	NC	19	1	NC	14	6	NC
Average length of shoreline (km) across all spill simulations	0.08	NC	NC	0.51	0.01	NC	1.55	0.23	NC

NC: No contact to receptor predicted for specified threshold.

Table 14.3 Summary of shoreline oil accumulation on WAMOPRA shoreline cells following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

WAMOPRA shoreline cells	Probability (%) of shoreline oil on receptors at			Minimum time to receptor (hours) for shoreline oil at			Maximum local accumulated concentration (g/m²)		Maximum accumulated volume (m³) along this shoreline with concentrations ≥ 10 g/m²		Maximum accumulated volume (m³) along this shoreline with concentrations ≥ 100 g/m²		Maximum accumulated volume (m³) along this shoreline with concentrations ≥ 1,000 g/m²		Maximum length of shoreline (km) with concentrations ≥ 10 g/m²		Maximum length of shoreline (km) with concentrations ≥ 100 g/m²		Maximum length of shoreline (km) with concentrations ≥ 1,000 g/m²	
	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all replicate spills	in the worst replicate spill	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation
WA11.West (318) - Barrow Island and Montebello Islands (A)	2	NC	NC	152	NC	NC	<1	50	<1	2	NC	NC	NC	NC	<1	5	NC	NC	NC	NC

Table 14.4 Summary of shoreline oil accumulation on WAMOPRA shoreline cells following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

WAMOPRA shoreline cells	Probability (%) of shoreline oil on receptors at			Minimum time to receptor (hours) for shoreline oil at			Maximum local accumulated concentration (g/m²)		Maximum accumulated volume (m³) along this shoreline with concentrations ≥ 10 g/m²		Maximum accumulated volume (m³) along this shoreline with concentrations ≥ 100 g/m²		Maximum accumulated volume (m³) along this shoreline with concentrations ≥ 1,000 g/m²		Maximum length of shoreline (km) with concentrations ≥ 10 g/m²		Maximum length of shoreline (km) with concentrations ≥ 100 g/m²		Maximum length of shoreline (km) with concentrations ≥ 1,000 g/m²	
	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all replicate spills	in the worst replicate spill	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation
WA11.West (318) - Barrow Island and Montebello Islands (A)	6	1	NC	136	366	NC	3.3	150	<1	4	<1	2	NC	NC	<1	11	<1	1	NC	NC
WA11.West (319) - Barrow Island and Montebello Islands (B)	1	NC	NC	158	NC	NC	<1	66	<1	3	NC	NC	NC	NC	<1	8	NC	NC	NC	NC
WA11.West (329) - Locker Point - Baresand Point	1	NC	NC	387	NC	NC	<1	18	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC

Table 14.5 Summary of shoreline oil accumulation on WAMOPRA shoreline cells following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

WAMOPRA shoreline cells	Probability (%) of shoreline oil on receptors at			Minimum time to receptor (hours) for shoreline oil at			Maximum local accumulated concentration (g/m²)		Maximum accumulated volume (m³) along this shoreline with concentrations ≥ 10 g/m²		Maximum accumulated volume (m³) along this shoreline with concentrations ≥ 100 g/m²		Maximum accumulated volume (m³) along this shoreline with concentrations ≥ 1,000 g/m²		Maximum length of shoreline (km) with concentrations ≥ 10 g/m²		Maximum length of shoreline (km) with concentrations ≥ 100 g/m²		Maximum length of shoreline (km) with concentrations ≥ 1,000 g/m²	
	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all replicate spills	in the worst replicate spill	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation	averaged over all replicate simulations	in the worst replicate simulation
WA11.West (318) - Barrow Island and Montebello Islands (A)	15	6	NC	91	110	NC	26	634	<1	23	<1	21	NC	NC	2	14	<1	6	NC	NC
WA11.West (319) - Barrow Island and Montebello Islands (B)	4	NC	NC	163	NC	NC	1.4	41	<1	2	NC	NC	NC	NC	<1	6	NC	NC	NC	NC
WA11.West (321) - Barrow Island and Montebello Islands (D)	1	NC	NC	412	NC	NC	<1	22	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA11.West (326) - Baresand Point - Entrance Point E	1	NC	NC	265	NC	NC	<1	17	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA11.West (329) - Locker Point - Baresand Point	4	NC	NC	276	NC	NC	1.4	21	<1	<1	NC	NC	NC	NC	<1	6	NC	NC	NC	NC

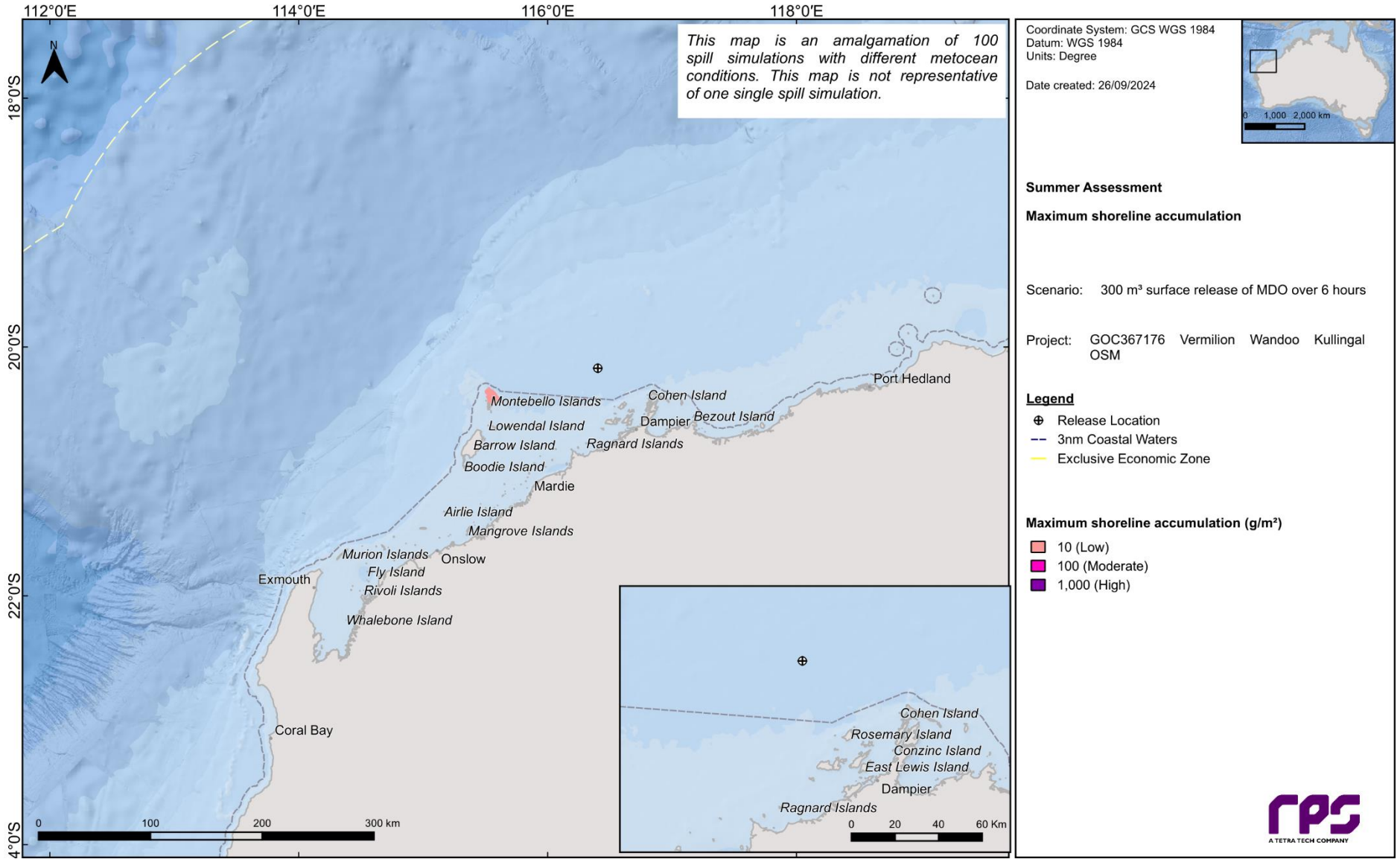


Figure 14.23 Maximum potential shoreline oil accumulation following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

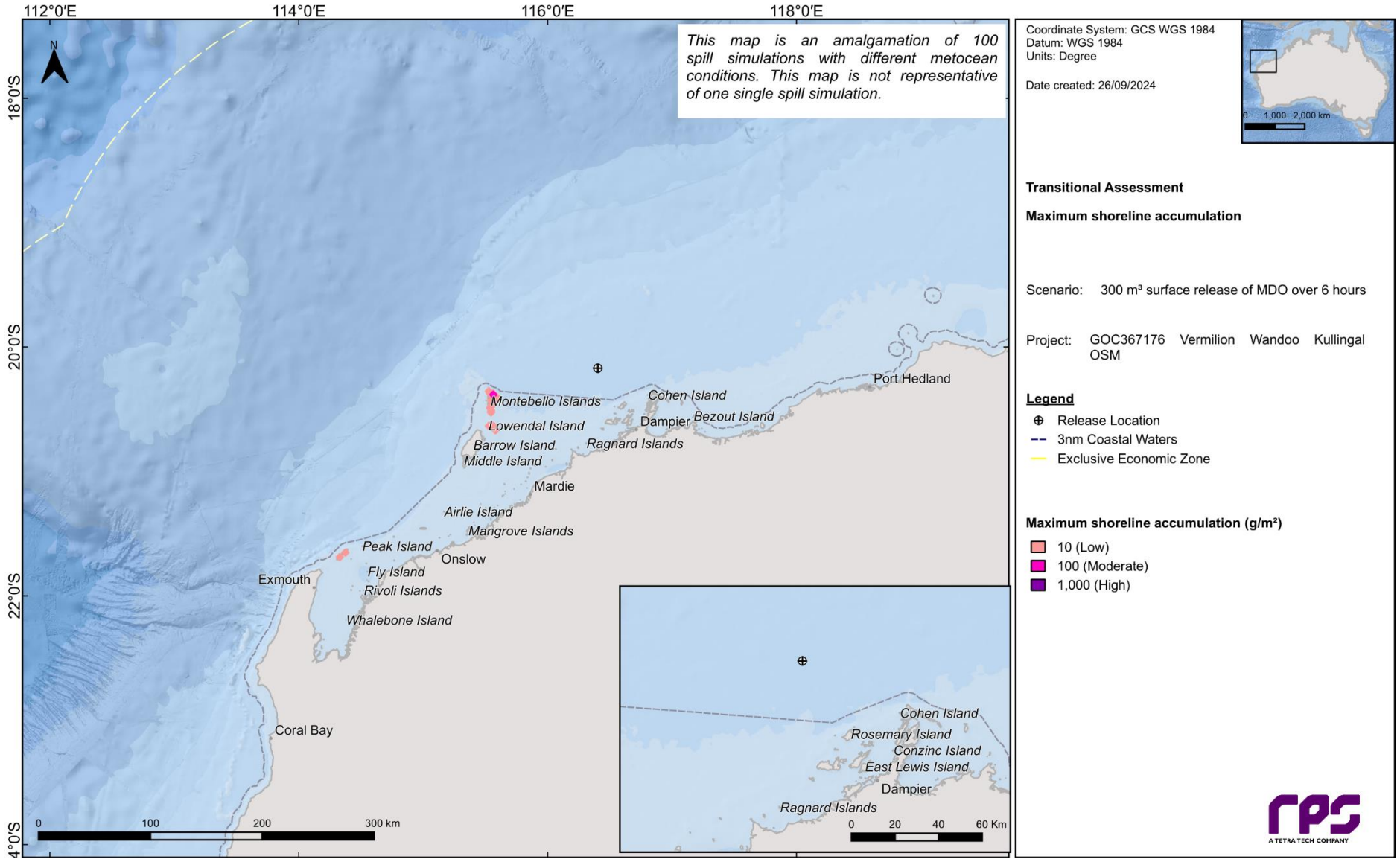


Figure 14.24 Maximum potential shoreline oil accumulation following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

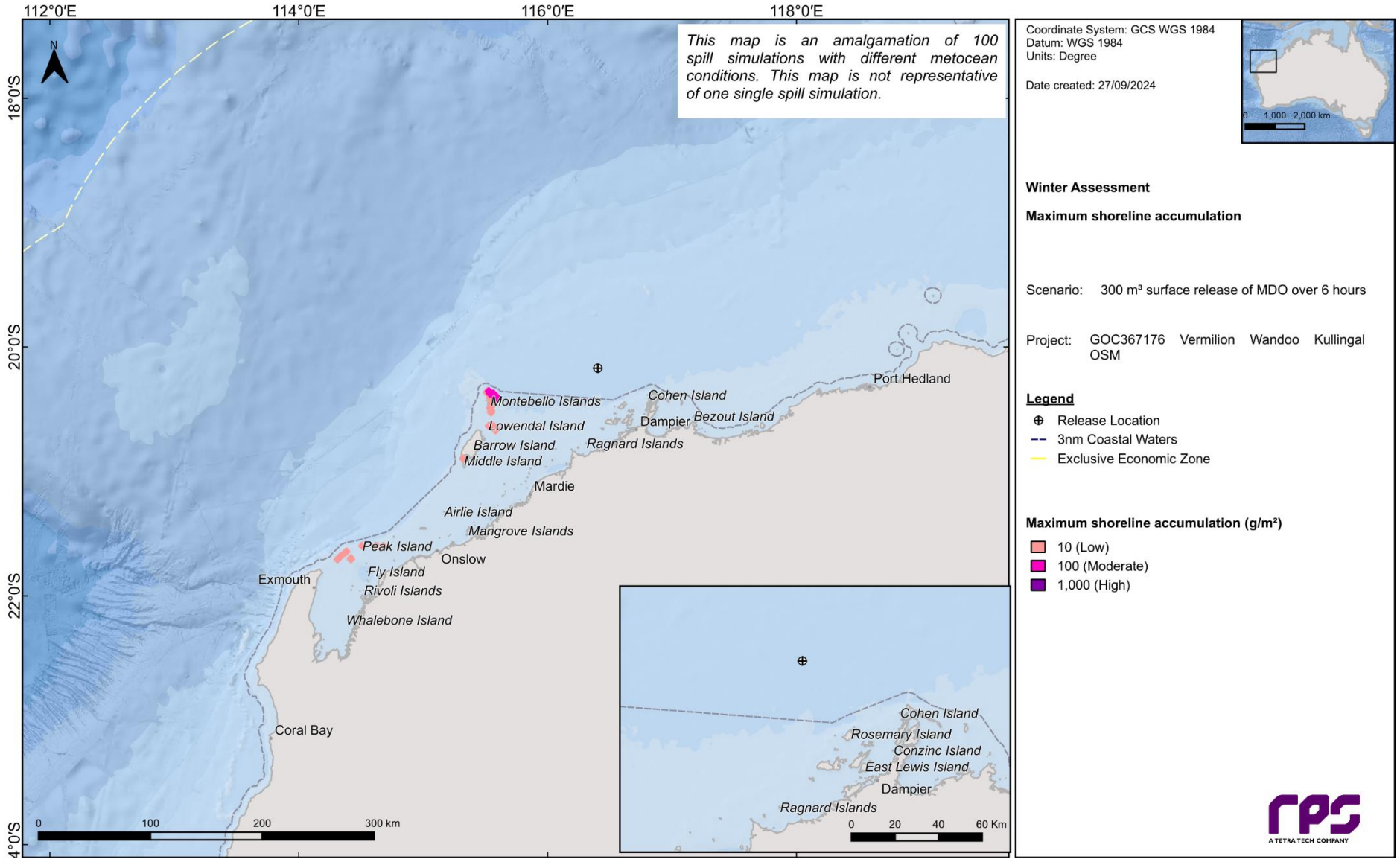


Figure 14.25 Maximum potential shoreline oil accumulation following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

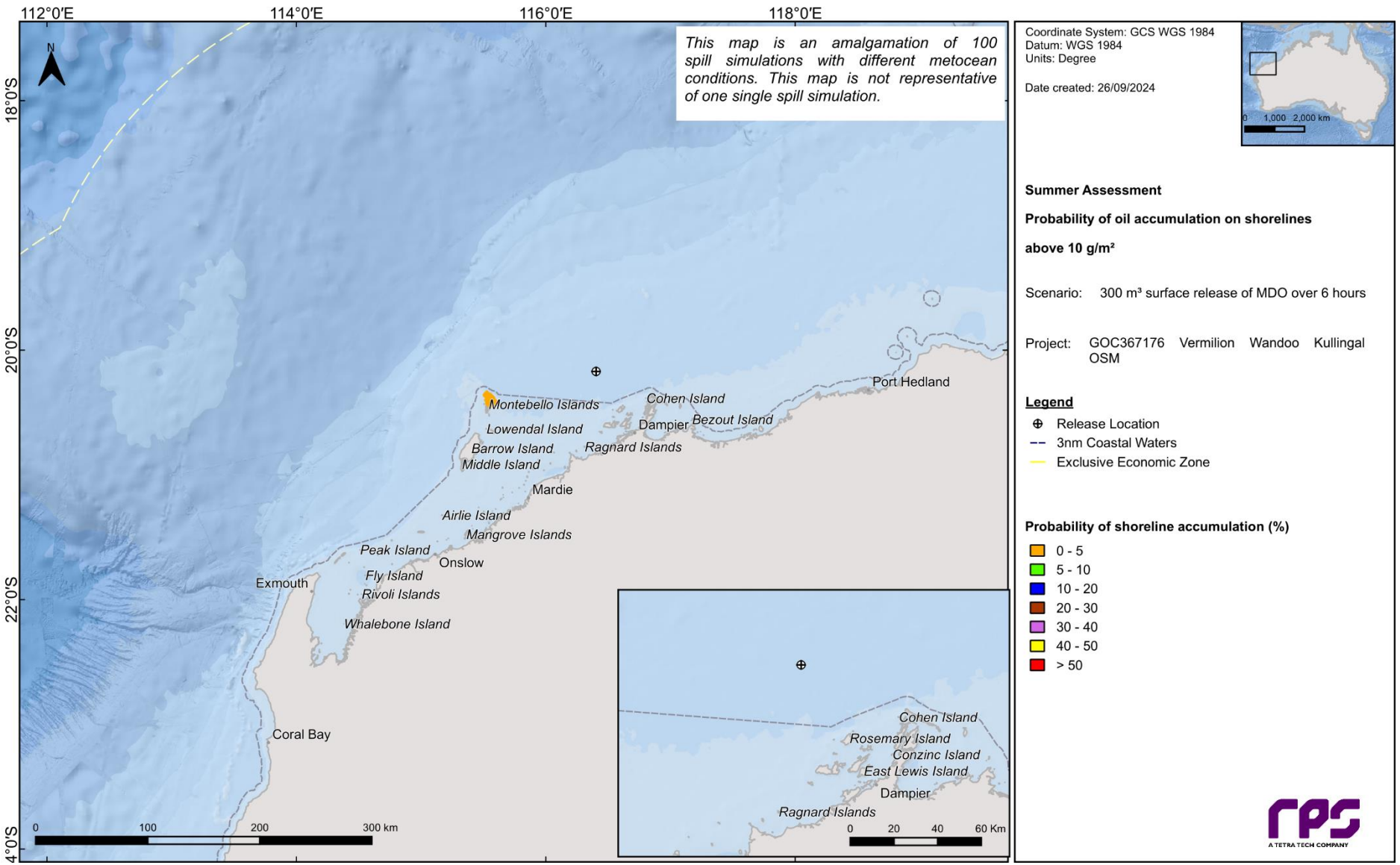


Figure 14.26 Predicted probability of shoreline oil accumulation at, or above, 10 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

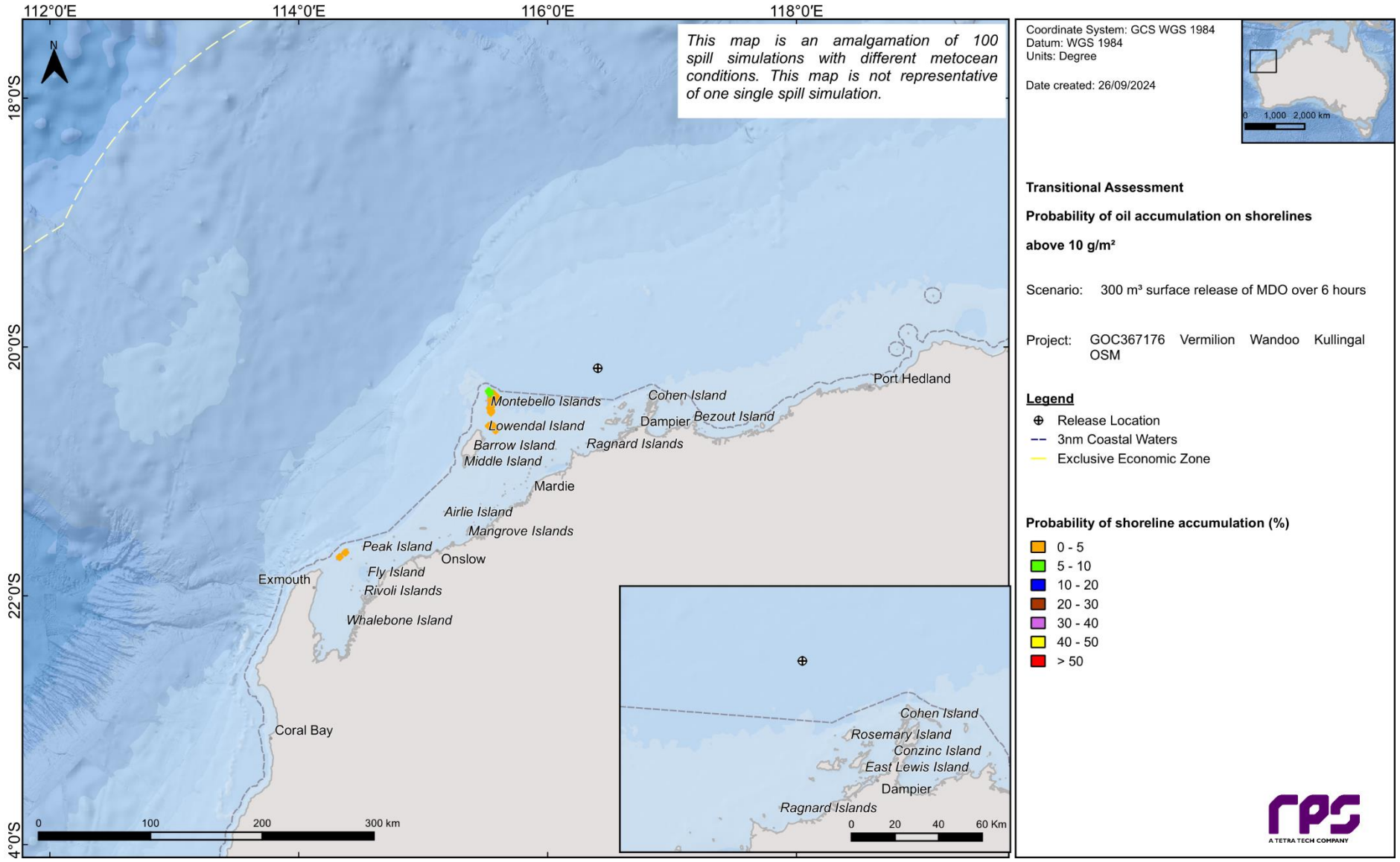


Figure 14.27 Predicted probability of shoreline oil accumulation at, or above, 10 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

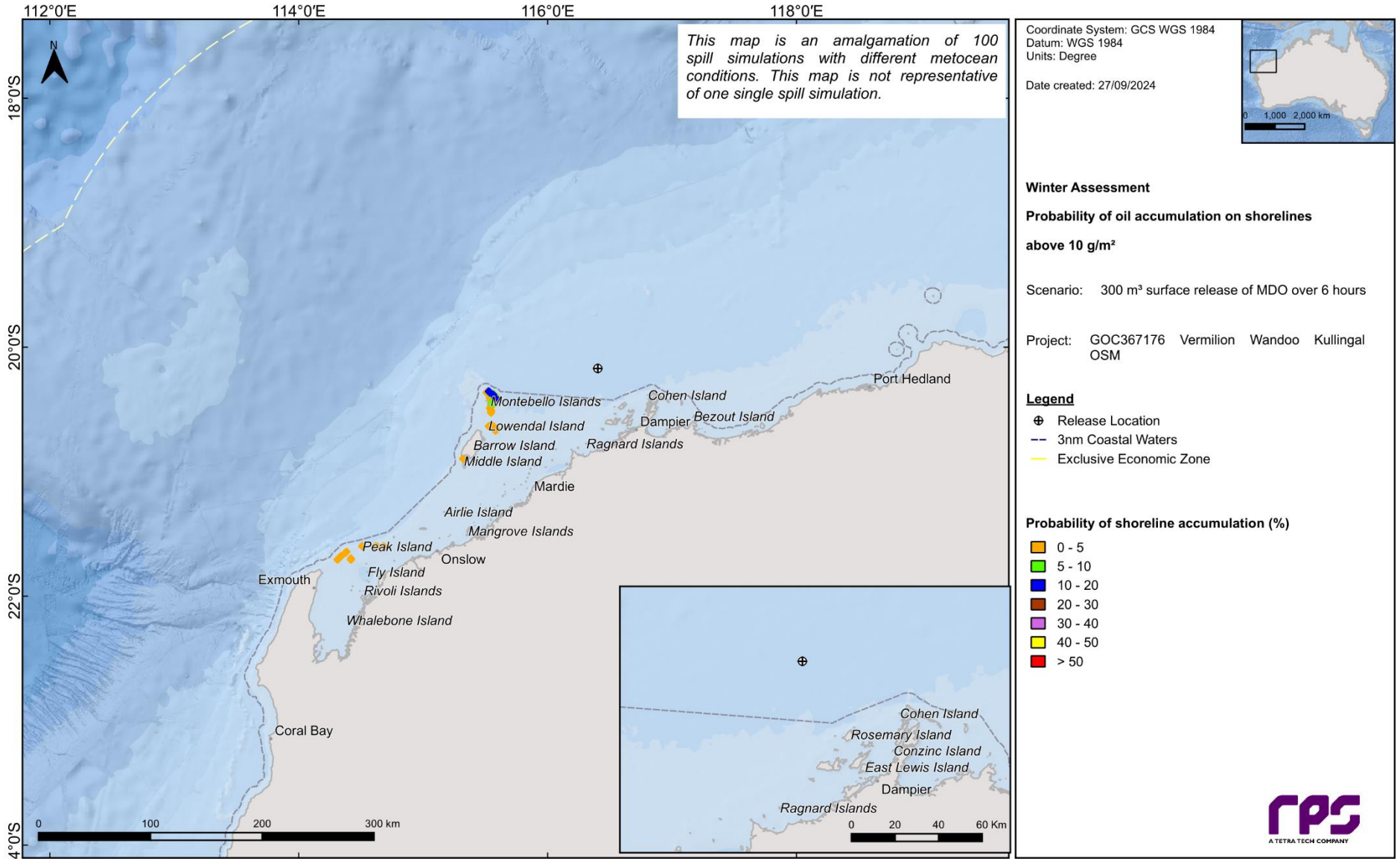


Figure 14.28 Predicted probability of shoreline oil accumulation at, or above, 10 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

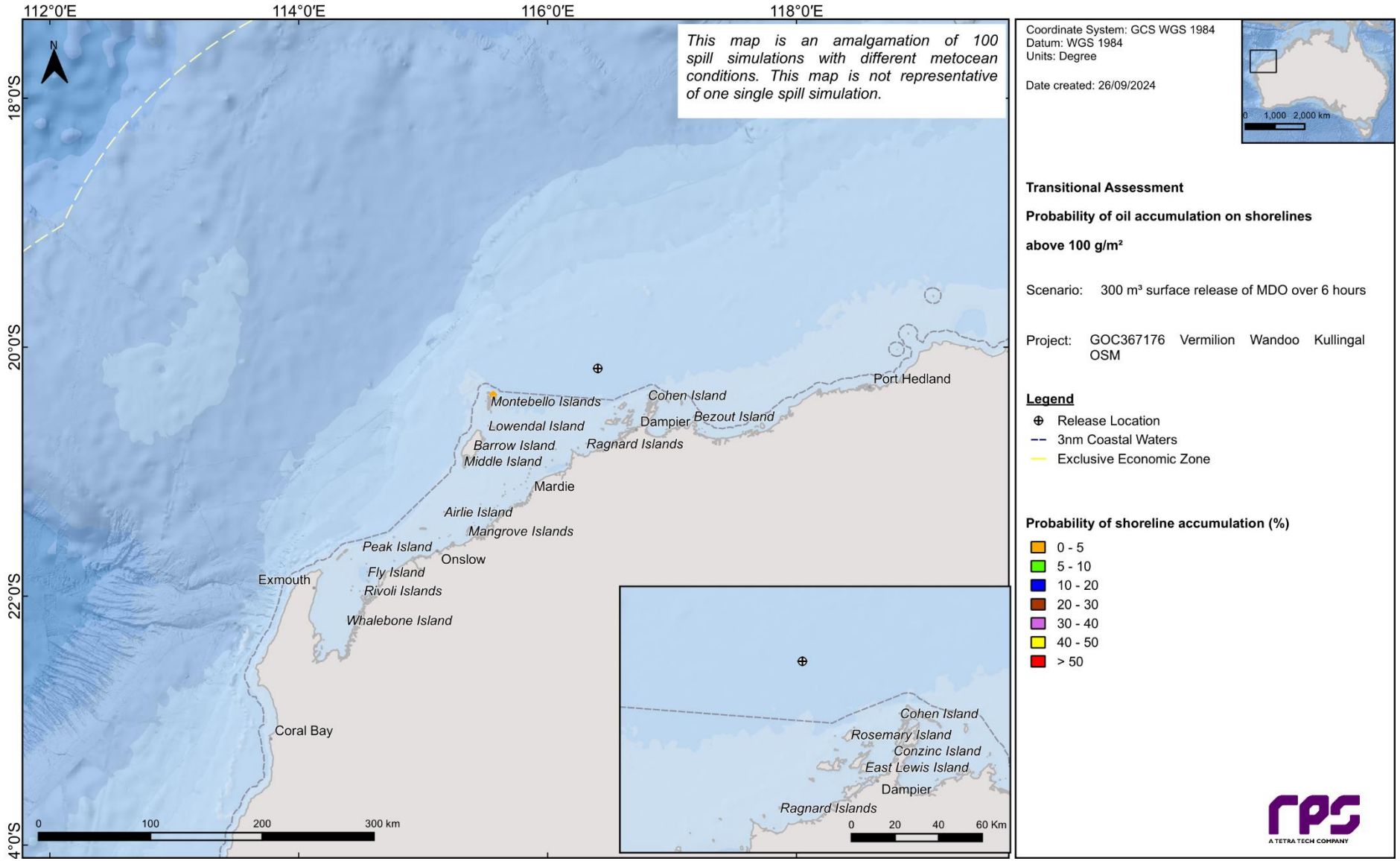


Figure 14.29 Predicted probability of shoreline oil accumulation at, or above, 100 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

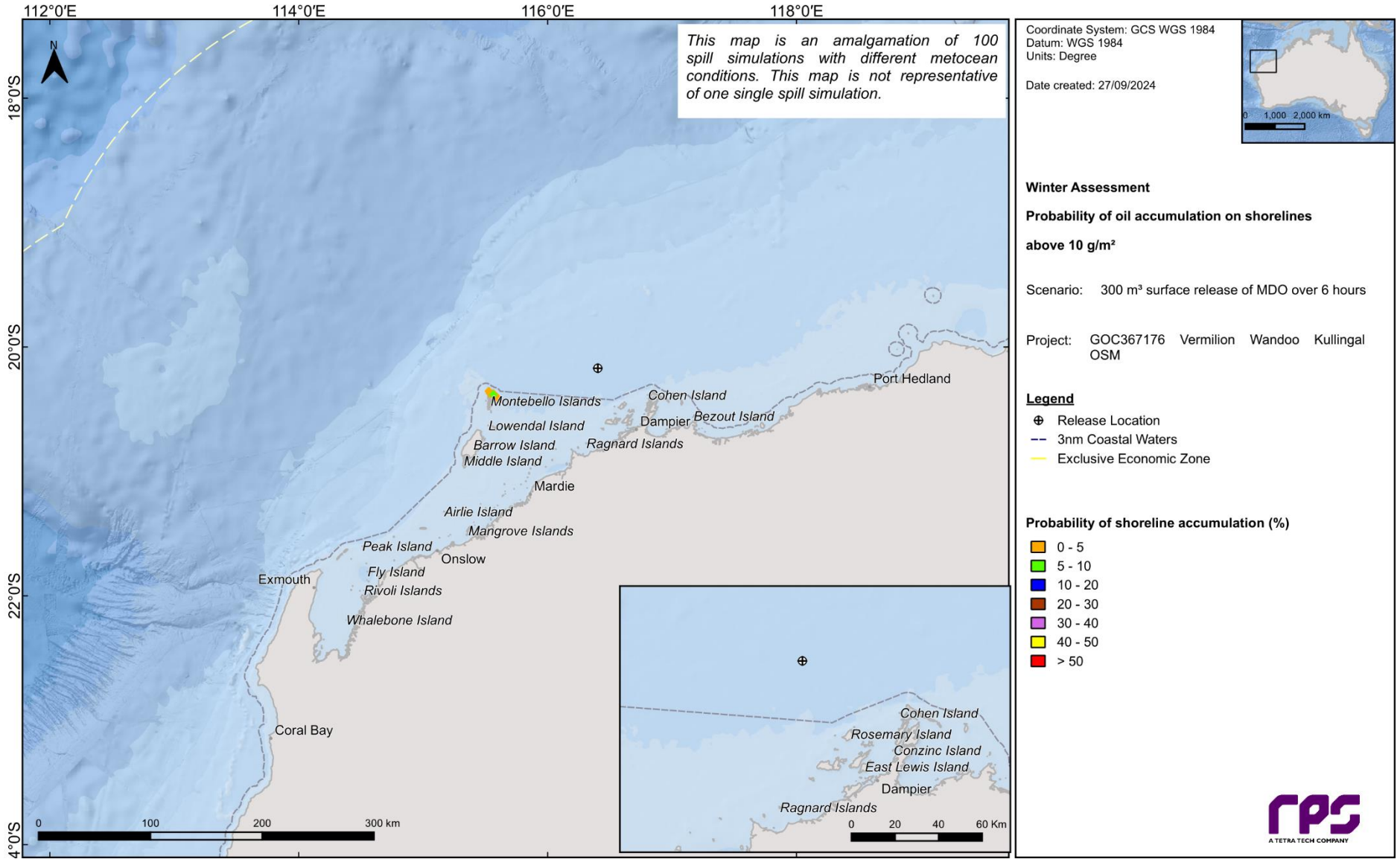


Figure 14.30 Predicted probability of shoreline oil accumulation at, or above, 100 g/m² following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

14.1.4 In-water exposure

14.1.4.1 Dissolved Hydrocarbons

Table 14.6 summarises the maximum distances from the release location to the dissolved hydrocarbon exposure thresholds for each season. Concentrations exceeding 10 ppb may potentially extend up to 169 km from the release location. As the threshold increases to 50 ppb, the maximum distance decreases to 58 km. No exposure was predicted above 400 ppb.

Table 14.7 summarises the predicted dissolved hydrocarbon exposure to receptors (either at, or above, receptors in the water column).

The Montebello AMP recorded the highest probabilities of exposure at, or above, 10 ppb during summer (2%), transitional (4%) and winter (7%) conditions. The same receptor recorded the quickest time to exposure during transitional conditions (27 hours). The Montebello AMP also recorded the highest concentration at 41 ppb during winter conditions.

Figure 14.31 to Figure 14.33 illustrate the dissolved hydrocarbon exposure zones for the three seasons, whilst Figure 14.34 to Figure 14.45 show the minimum times before exposure and probabilities of exposure at or above, 10 ppb and 50 ppb.

Seasonal cross-sectional transects (north-south and east-west) of the maximum dissolved hydrocarbons in the vicinity of the release site are presented in Figure 14.46 to Figure 14.51.

Table 14.6 Maximum distances from the release location to dissolved hydrocarbon exposure thresholds following a vessel collision at Kullingal. Results were calculated from 100 spill simulations per season.

Season	Distance and direction travelled	Dissolved hydrocarbon exposure thresholds		
		10 ppb	50 ppb	400 ppb
Summer	Maximum distance (km) from release location	148	32	-
	Direction	East	Northeast	-
Transitional	Maximum distance (km) from release location	155	58	-
	Direction	Southwest	West	-
Winter	Maximum distance (km) from release location	169	31	-
	Direction	Southwest	West	-

Table 14.7 Receptors predicted to be exposed by dissolved hydrocarbons following a vessel collision at Kullingal. Results were calculated from100 spill simulations per season.

Category	Name	Summer								Transitional								Winter							
		Probability (%) of dissolved concentration			Minimum time to receptor waters (hours) at			Maximum dissolved hydrocarbon concentration (ppb)		Probability (%) of dissolved concentration			Minimum time to receptor waters (hours) at			Maximum dissolved hydrocarbon concentration (ppb)		Probability (%) of dissolved concentration			Minimum time to receptor waters (hours) at			Maximum dissolved hydrocarbon concentration (ppb)	
		≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	averaged over all replicate spills	in the worst replicate	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	averaged over all replicate spills	in the worst replicate	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	averaged over all replicate spills	in the worst replicate
AMP	Montebello	2	NC	NC	33	NC	NC	<1	29	4	1	NC	31	51	NC	2	56	7	NC	NC	27	NC	NC	2	41
KEF	Glomar Shoals	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	121	NC	NC	<1	16	1	NC	NC	81	NC	NC	<1	18
MP	Montebello Islands	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	79	NC	NC	<1	26	1	NC	NC	79	NC	NC	<1	26
State and Territory Waters	WA	1	NC	NC	26	NC	NC	<1	29	1	NC	NC	42	NC	NC	<1	26	1	NC	NC	42	NC	NC	<1	26

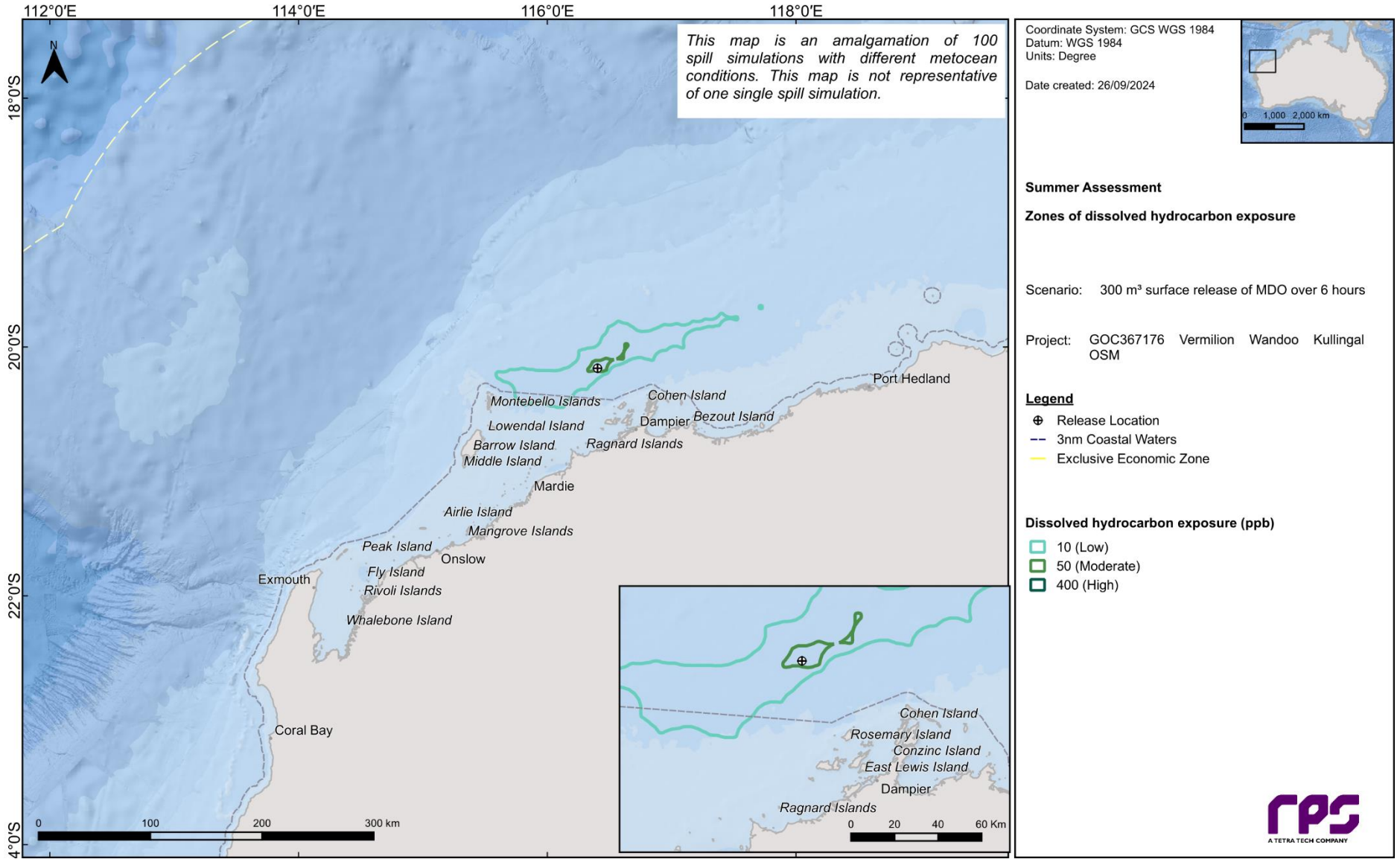


Figure 14.31 Predicted zones of dissolved hydrocarbon exposure following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

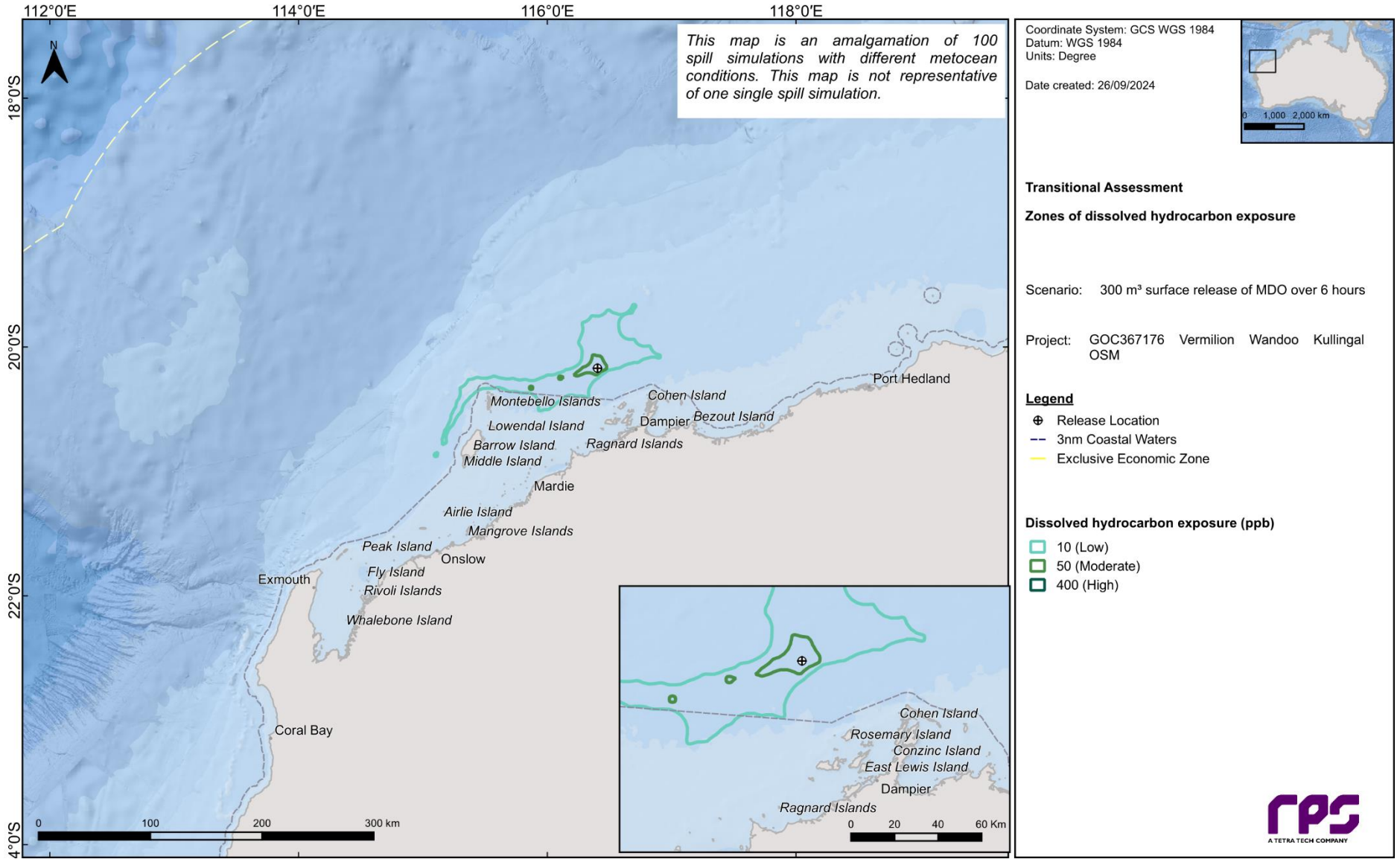


Figure 14.32 Predicted zones of dissolved hydrocarbon exposure following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

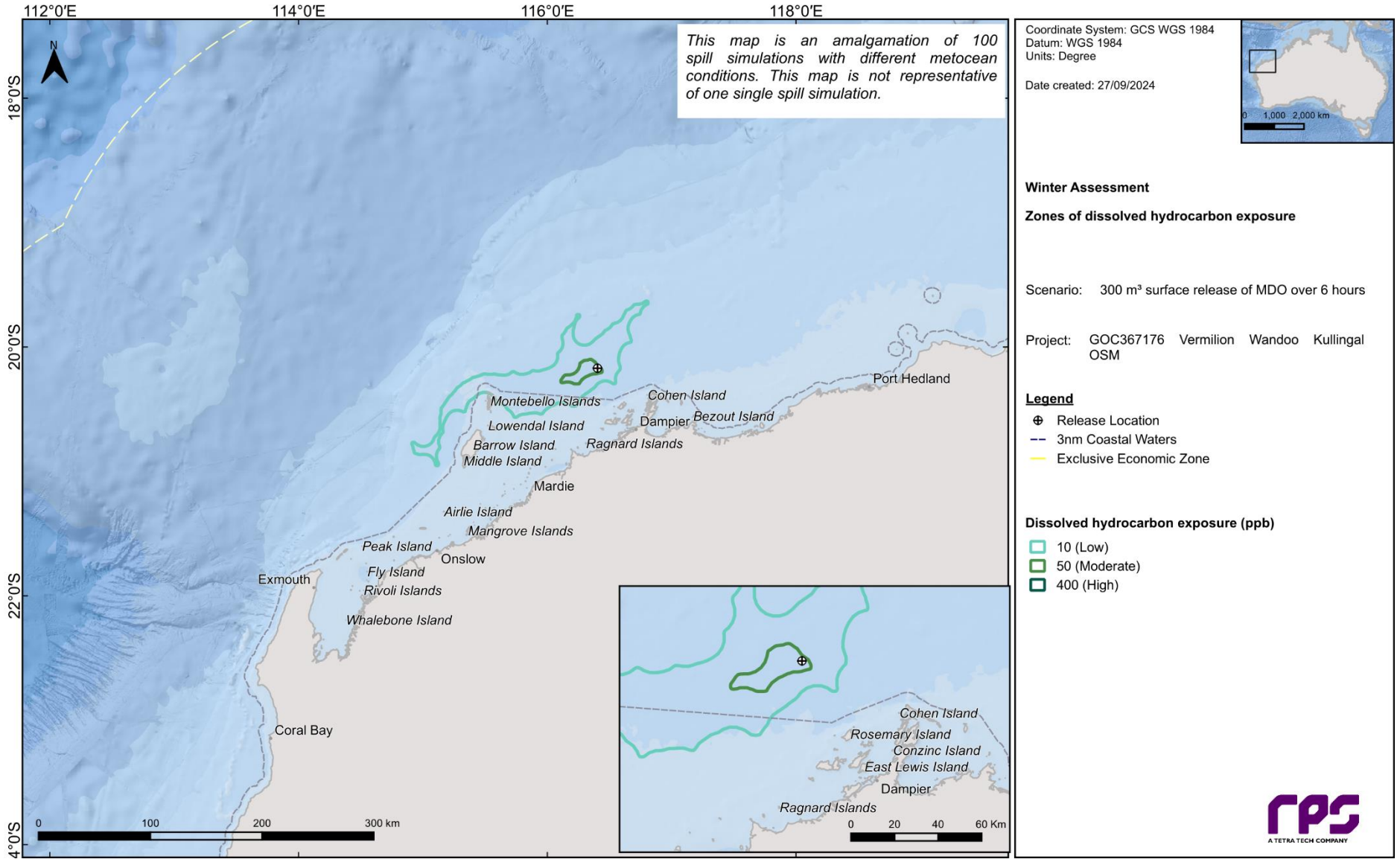


Figure 14.33 Predicted zones of dissolved hydrocarbon exposure following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

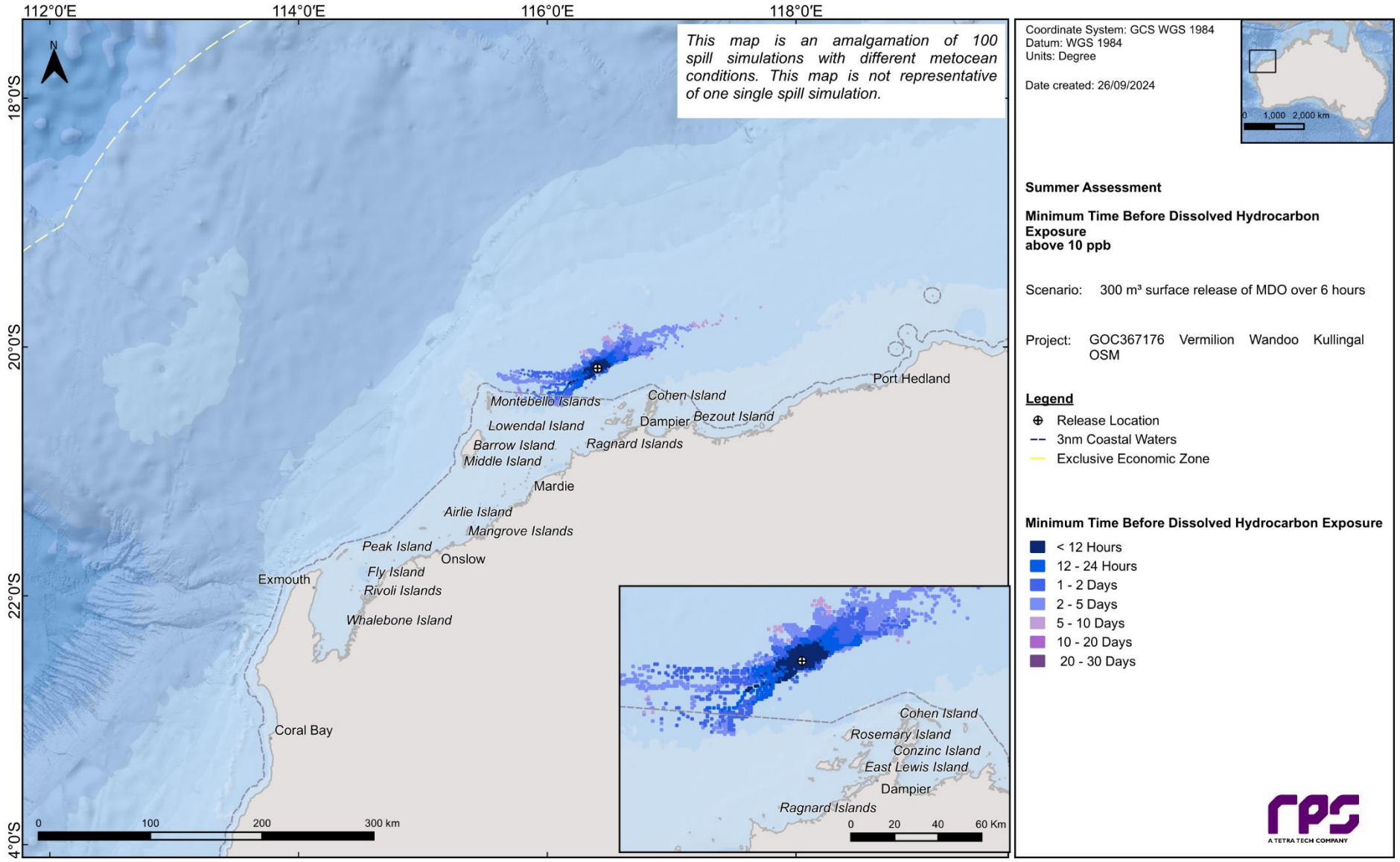


Figure 14.34 Minimum time before dissolved hydrocarbon exposure at, or above, 10 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

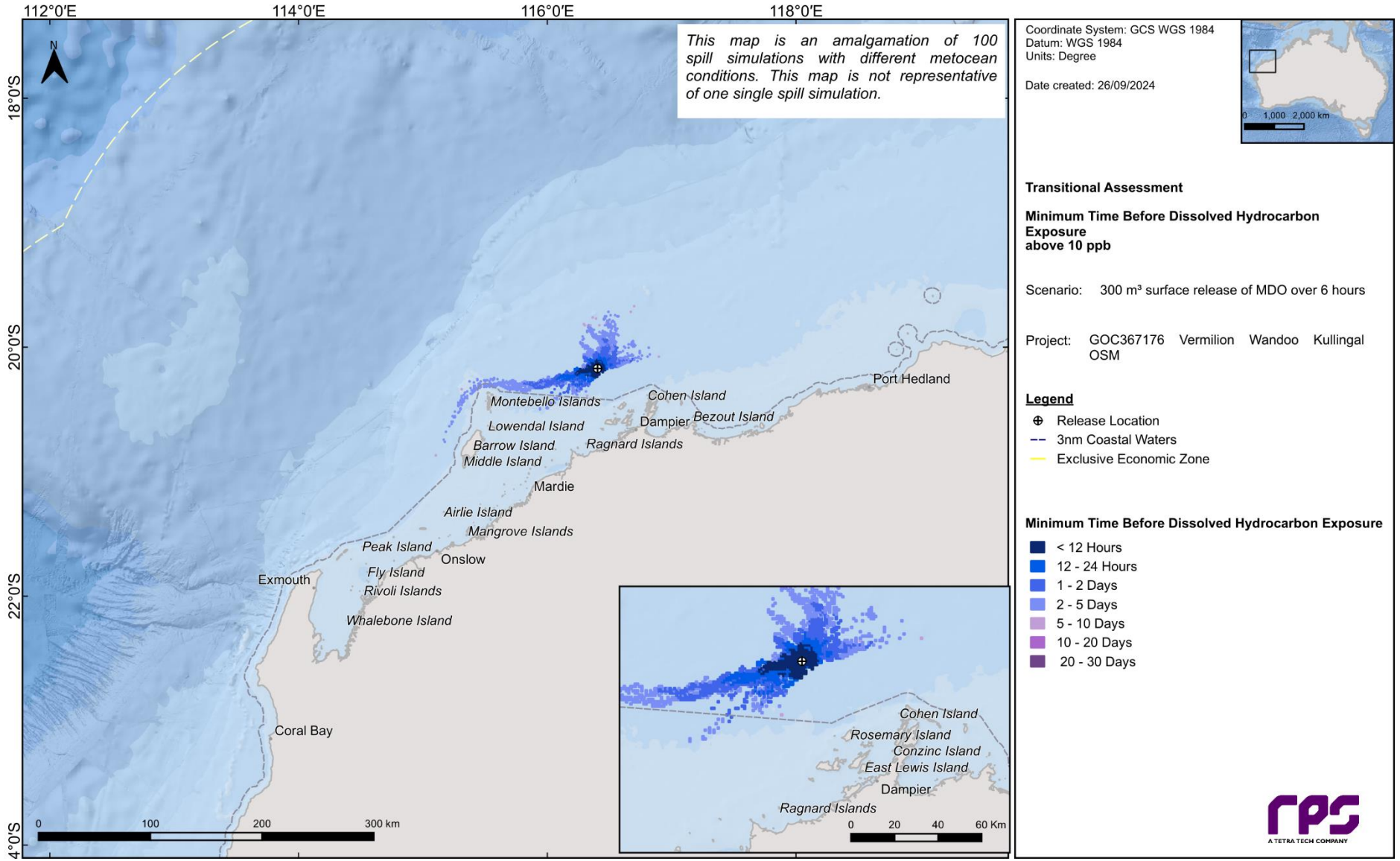


Figure 14.35 Minimum time before dissolved hydrocarbon exposure at, or above, 10 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

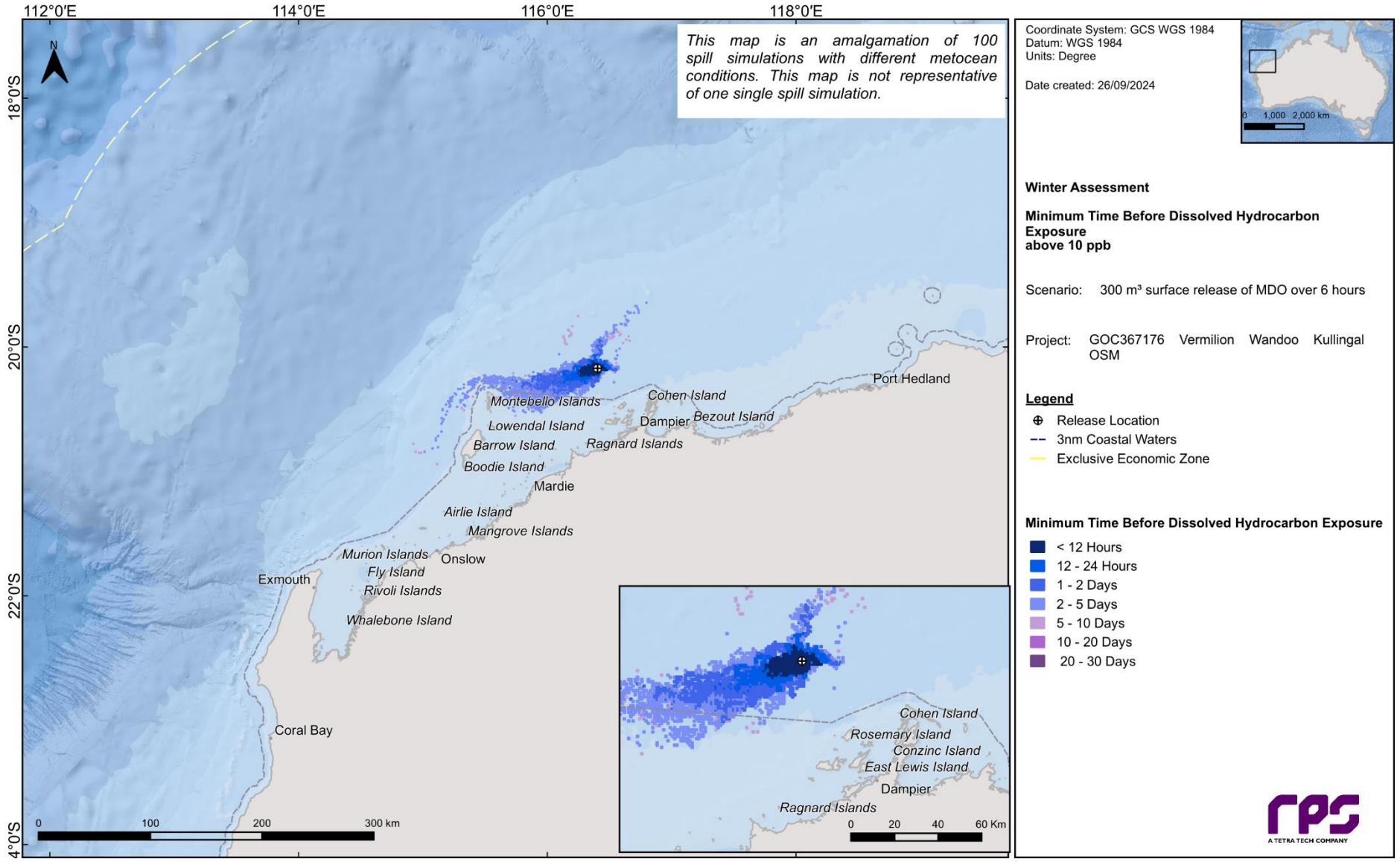


Figure 14.36 Minimum time before dissolved hydrocarbon exposure at, or above, 10 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

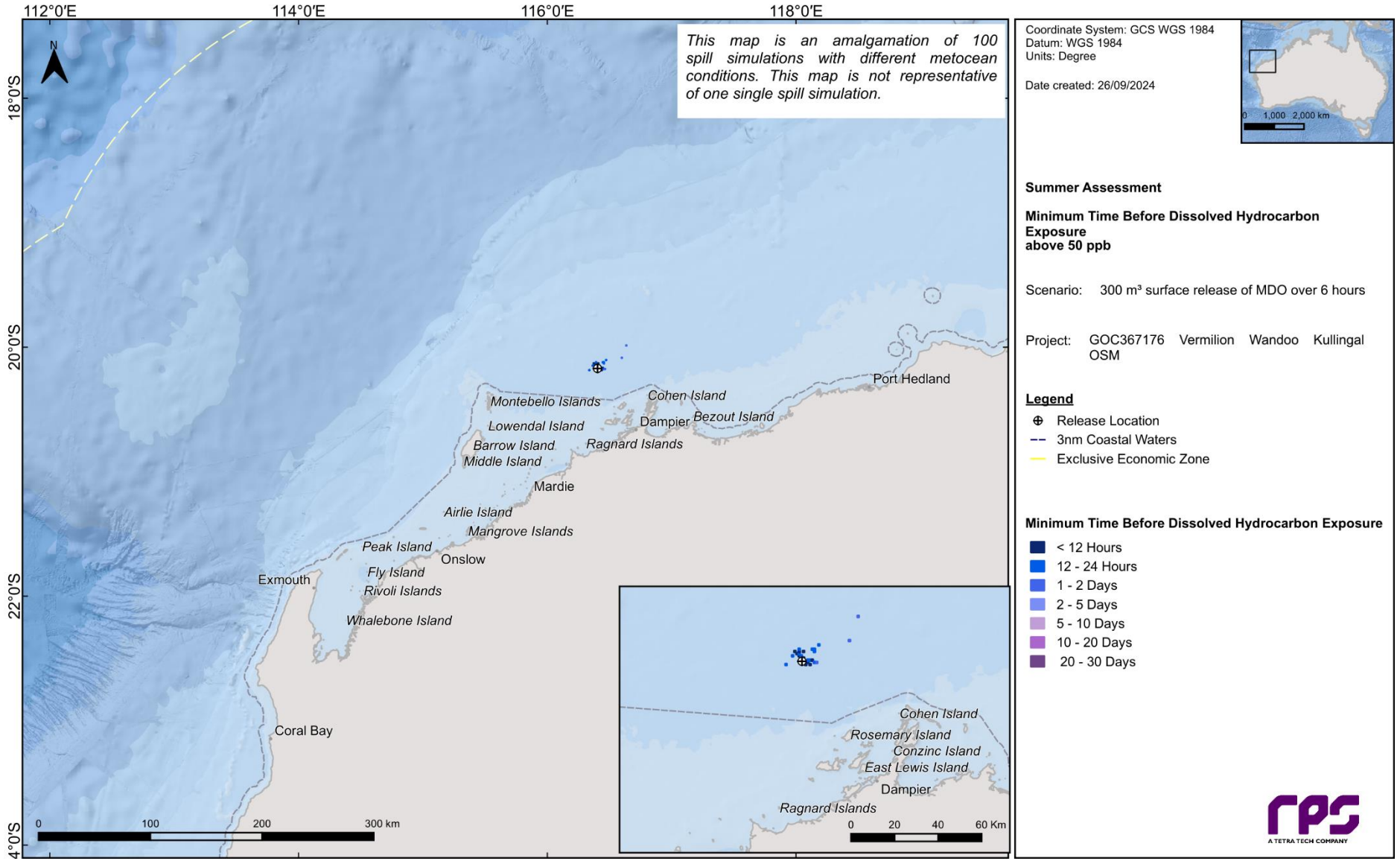


Figure 14.37 Minimum time before dissolved hydrocarbon exposure at, or above, 50 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

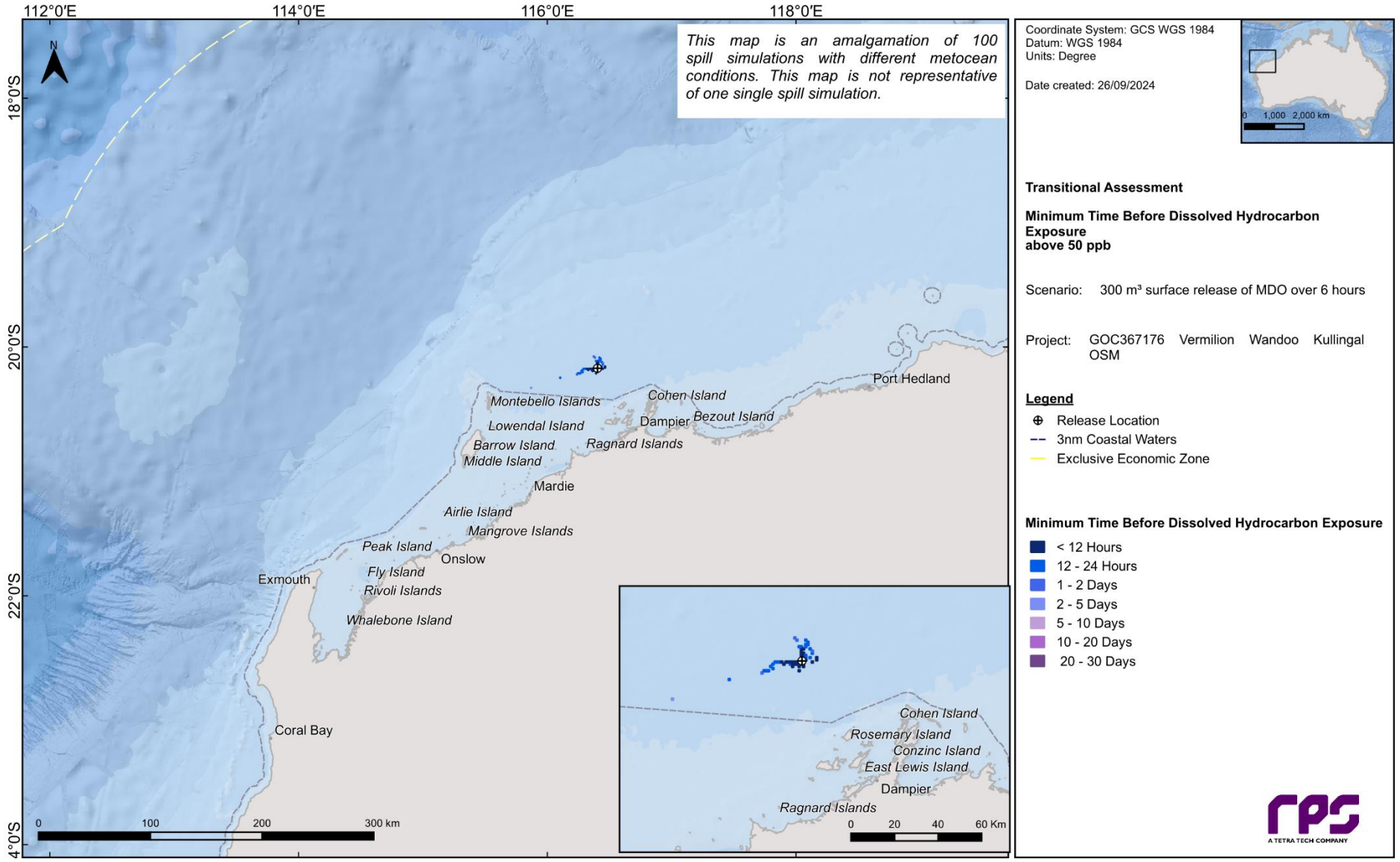


Figure 14.38 Minimum time before dissolved hydrocarbon exposure at, or above, 50 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

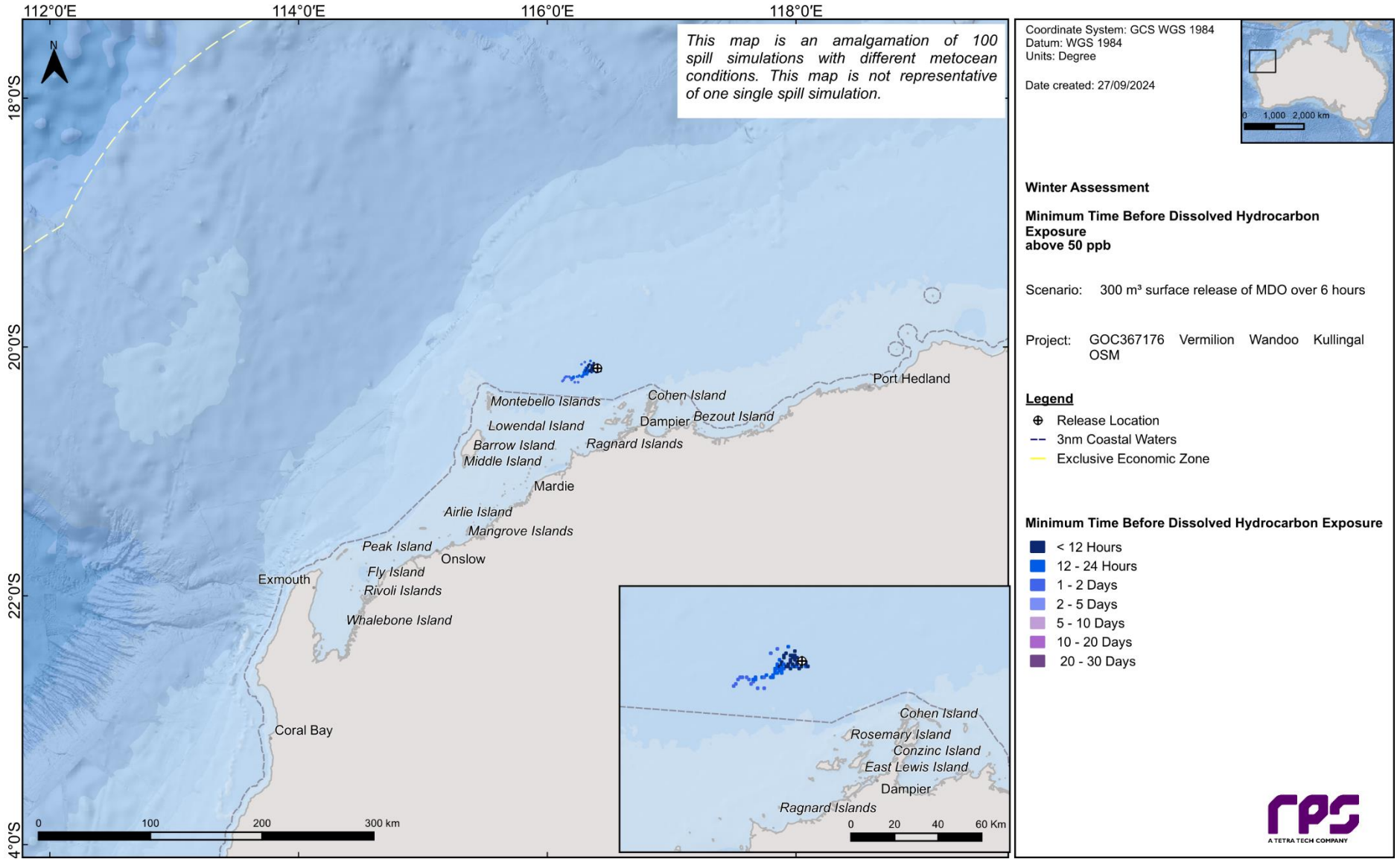


Figure 14.39 Minimum time before dissolved hydrocarbon exposure at, or above, 50 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

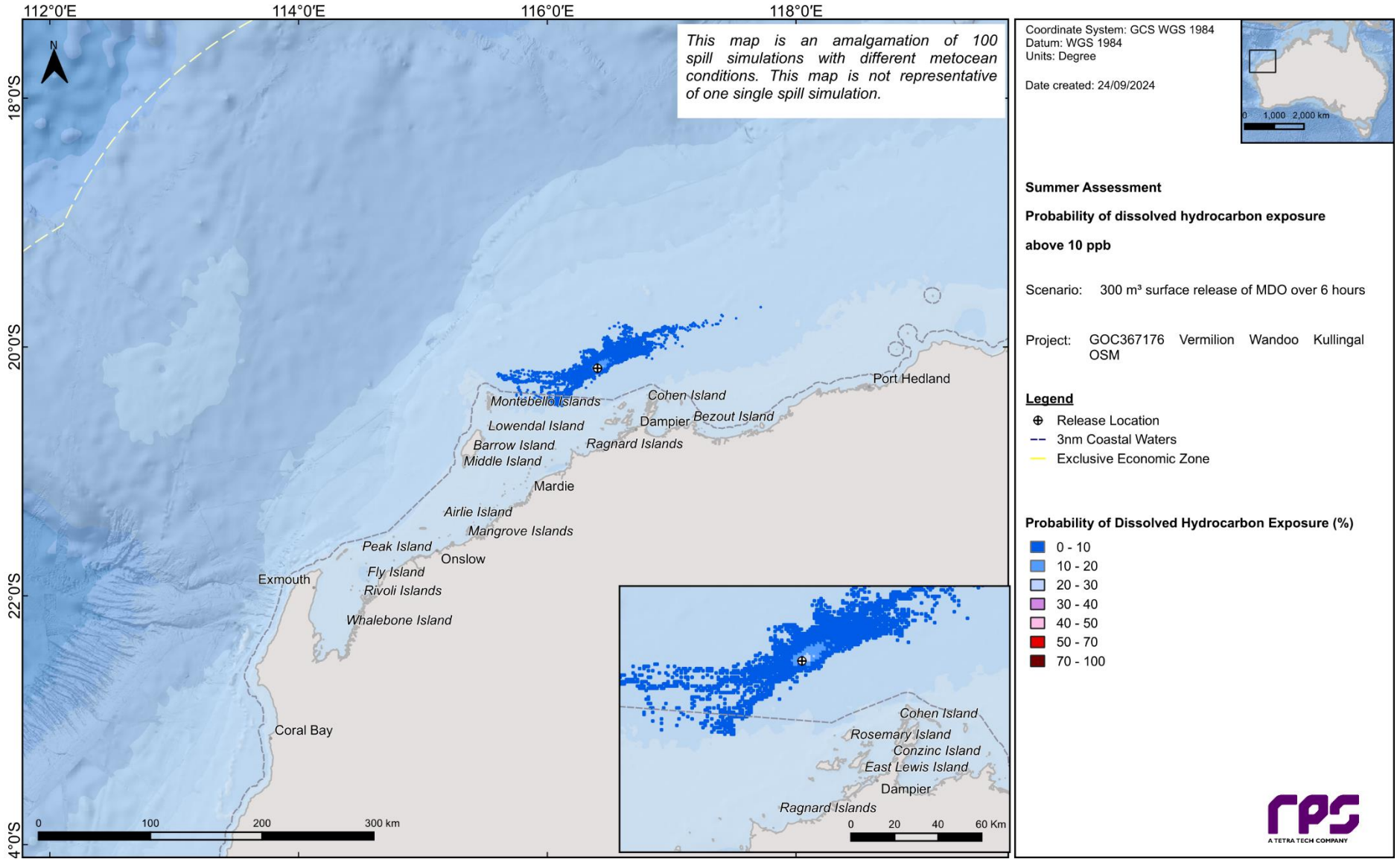


Figure 14.40 Probability of dissolved hydrocarbon exposure at, or above, 10 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

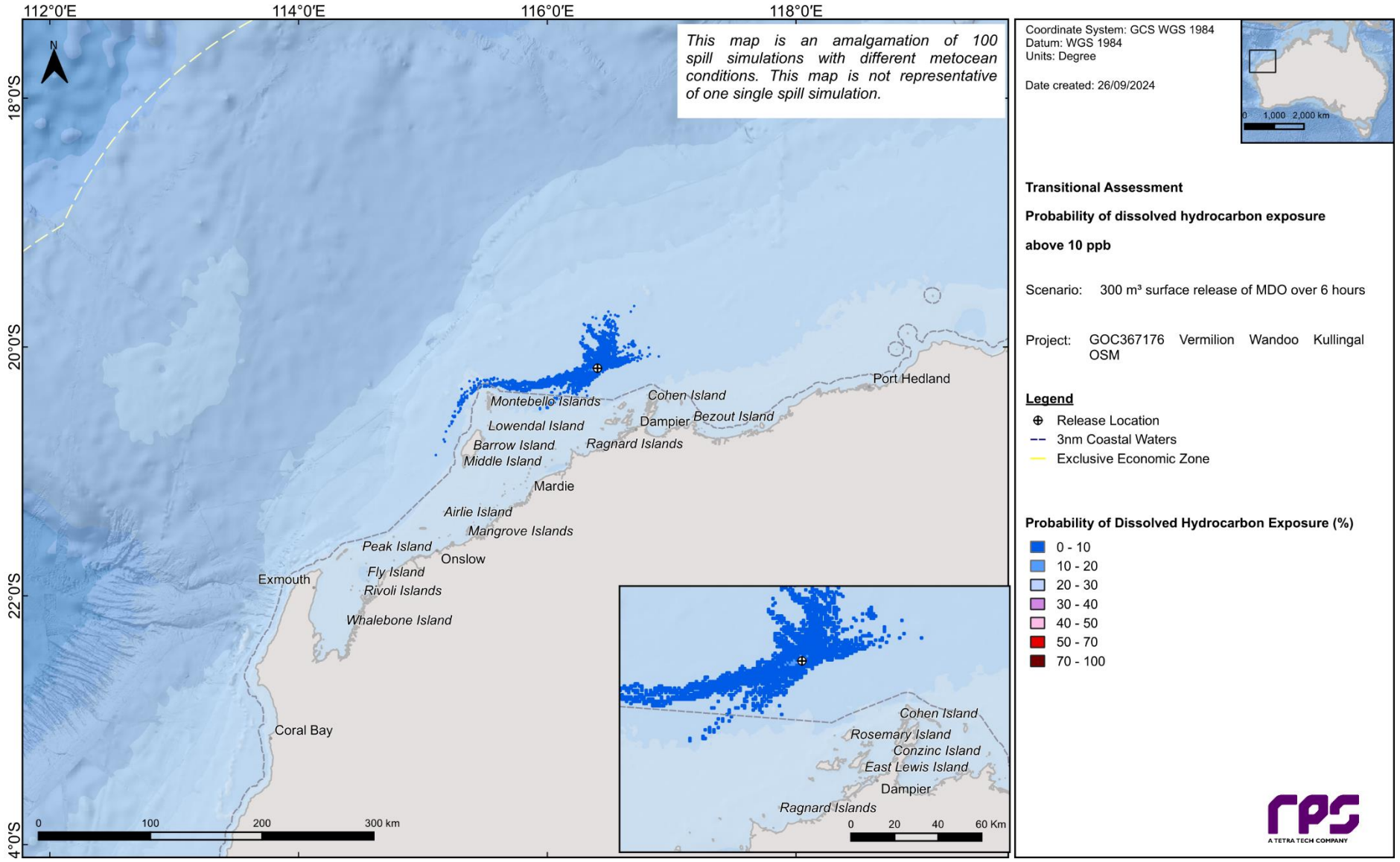


Figure 14.41 Probability of dissolved hydrocarbon exposure at, or above, 10 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

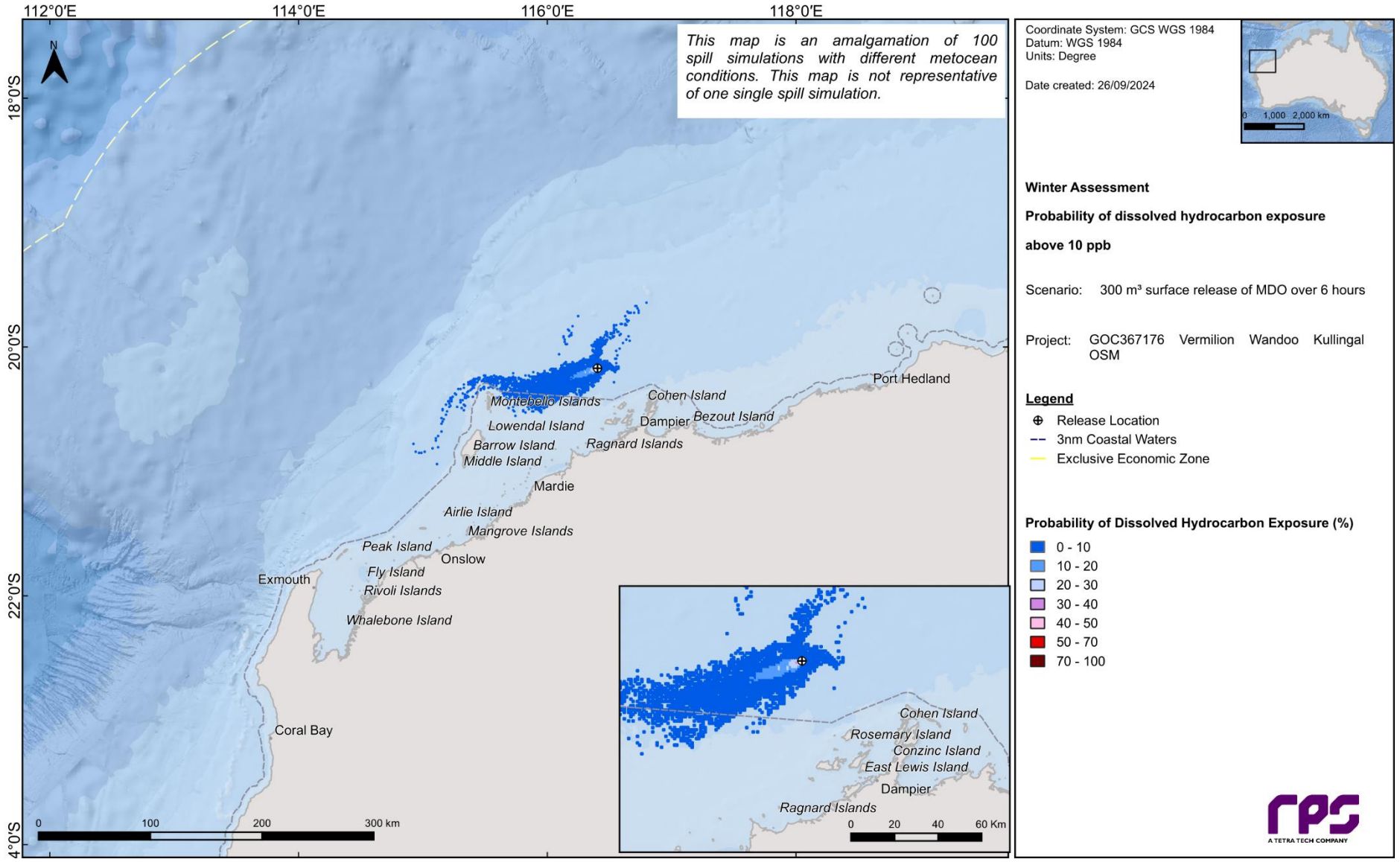


Figure 14.42 Probability of dissolved hydrocarbon exposure at, or above, 10 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

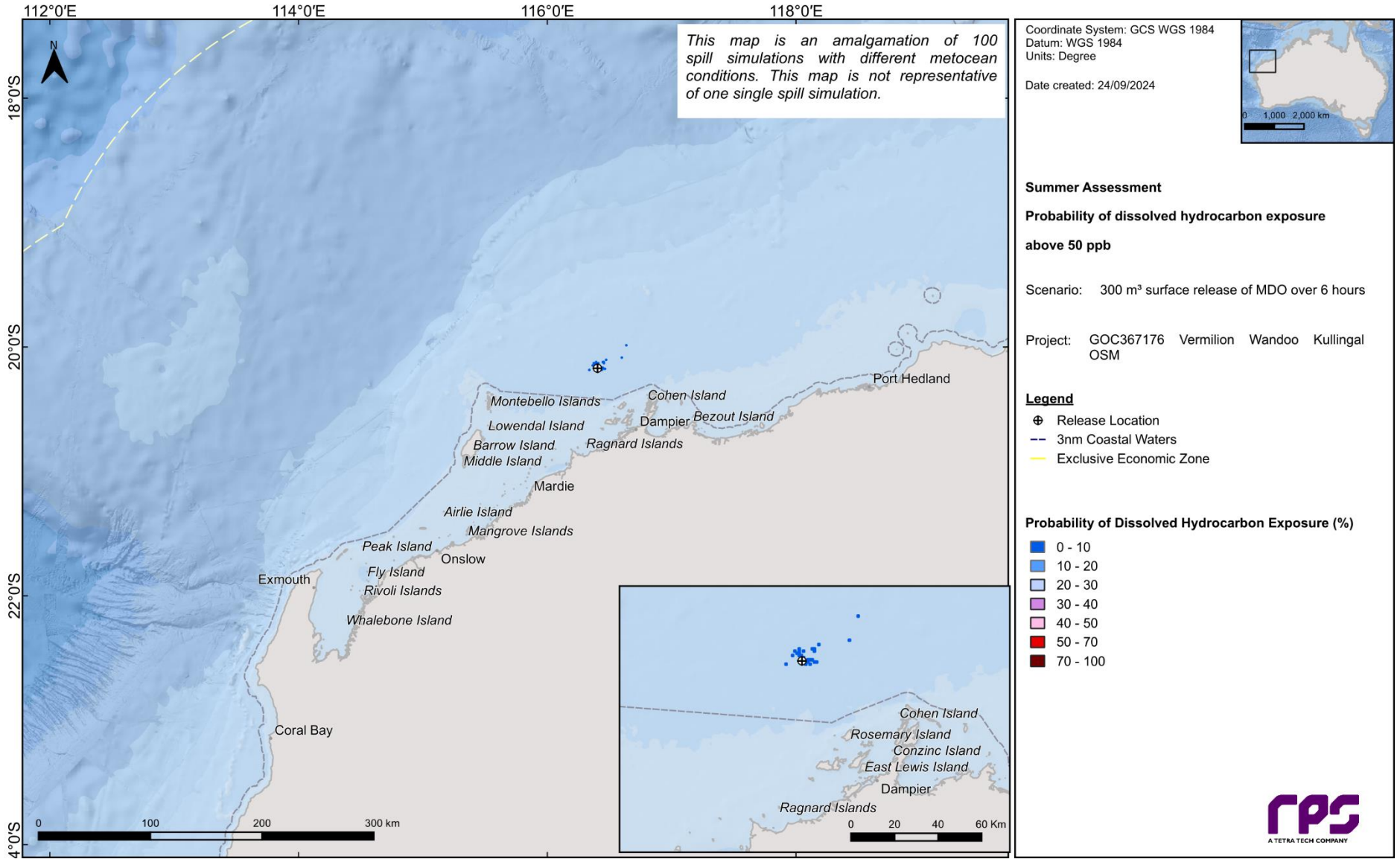


Figure 14.43 Probability of dissolved hydrocarbon exposure at, or above, 50 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

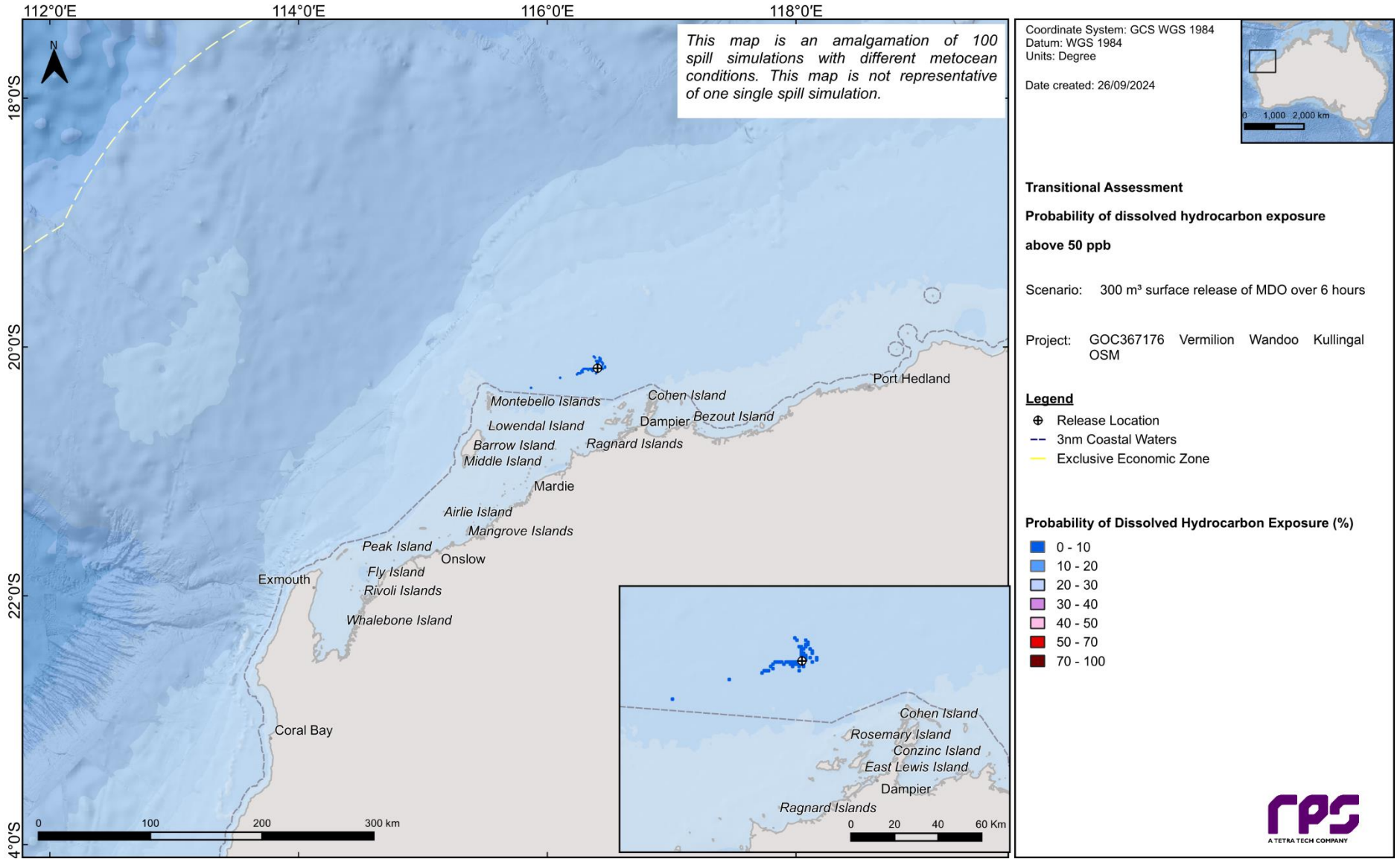


Figure 14.44 Probability of dissolved hydrocarbon exposure at, or above, 50 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

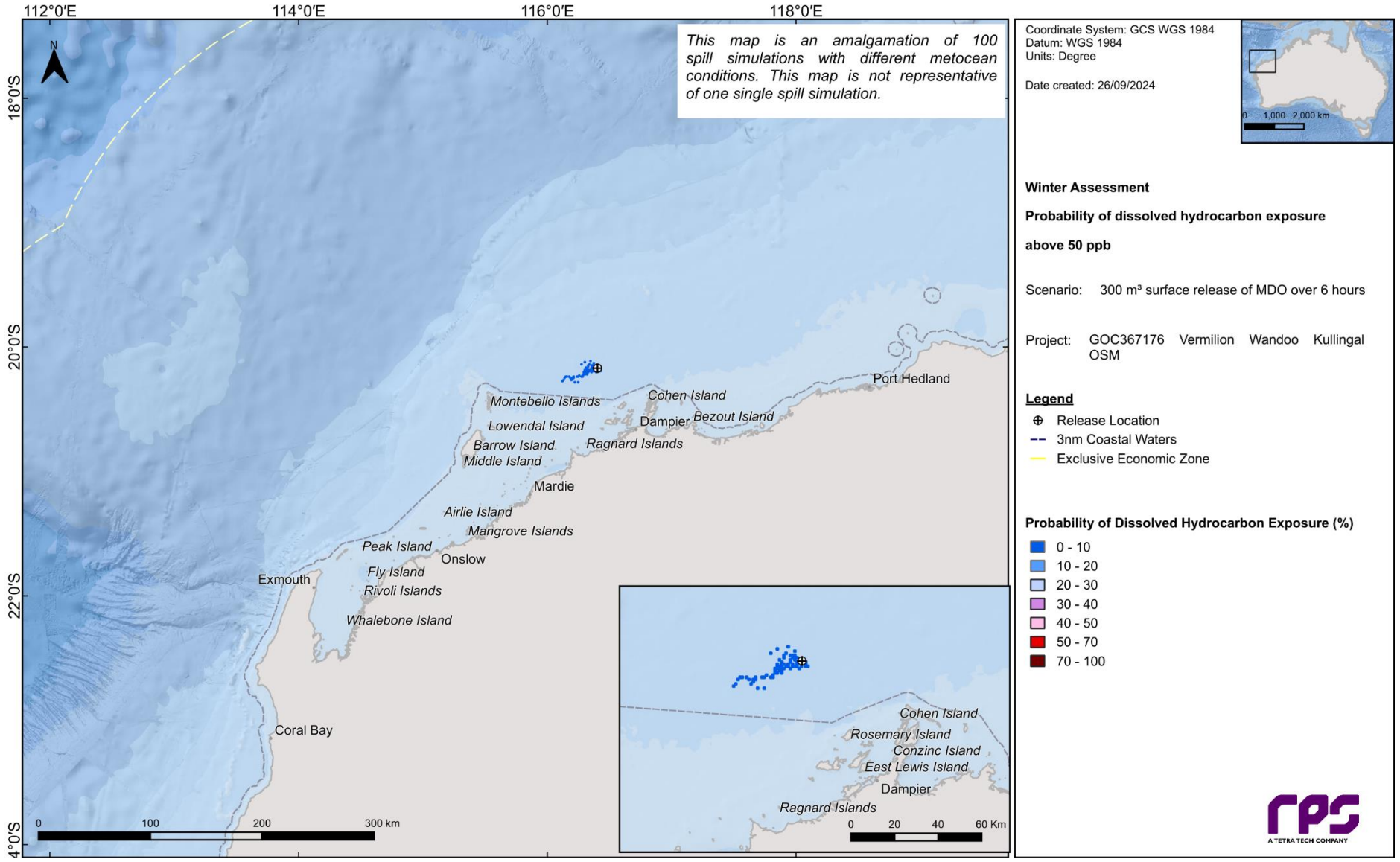


Figure 14.45 Probability of dissolved hydrocarbon exposure at, or above, 50 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

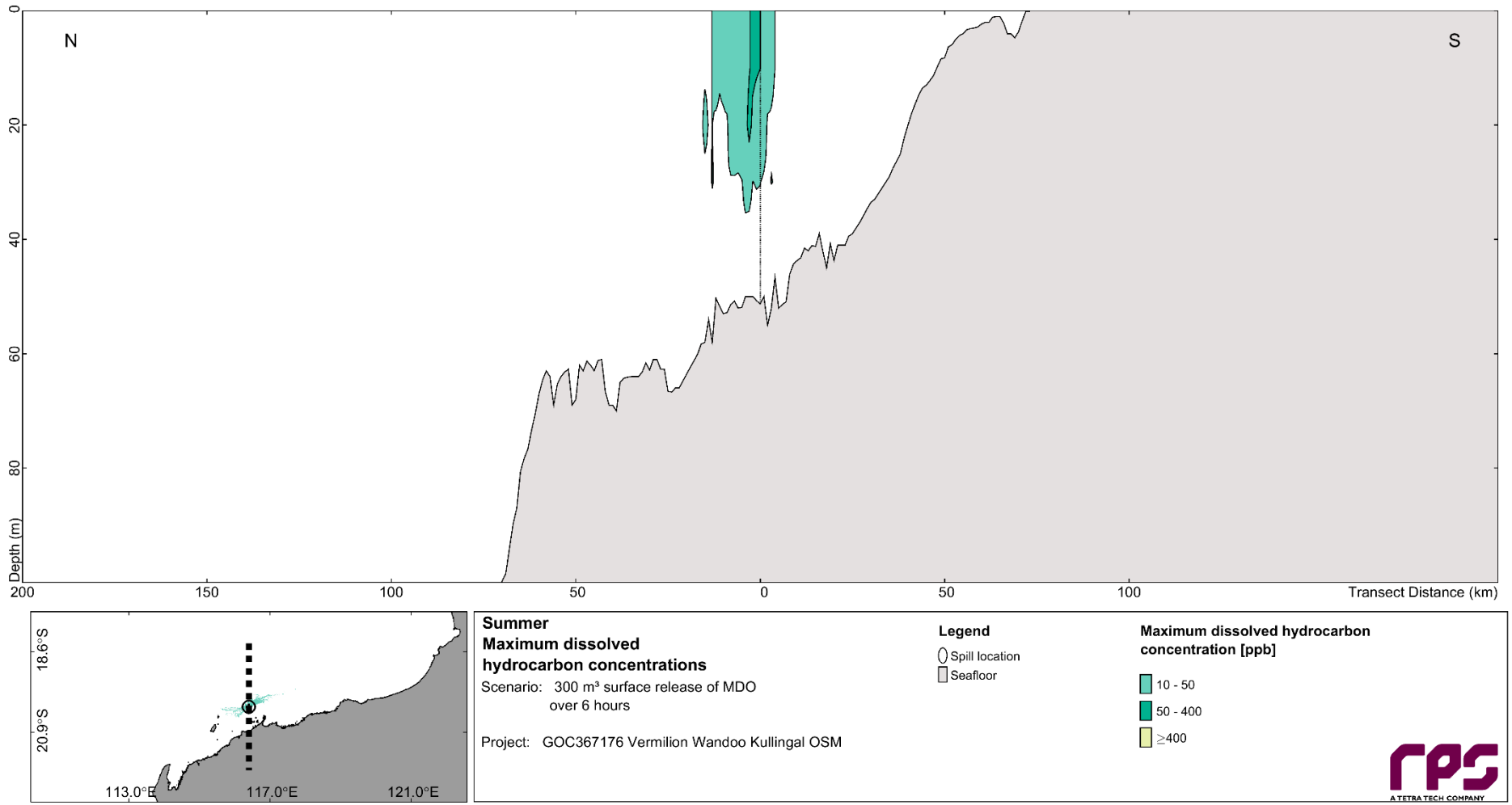


Figure 14.46 North-south cross-section transect of dissolved hydrocarbon concentrations exposure following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

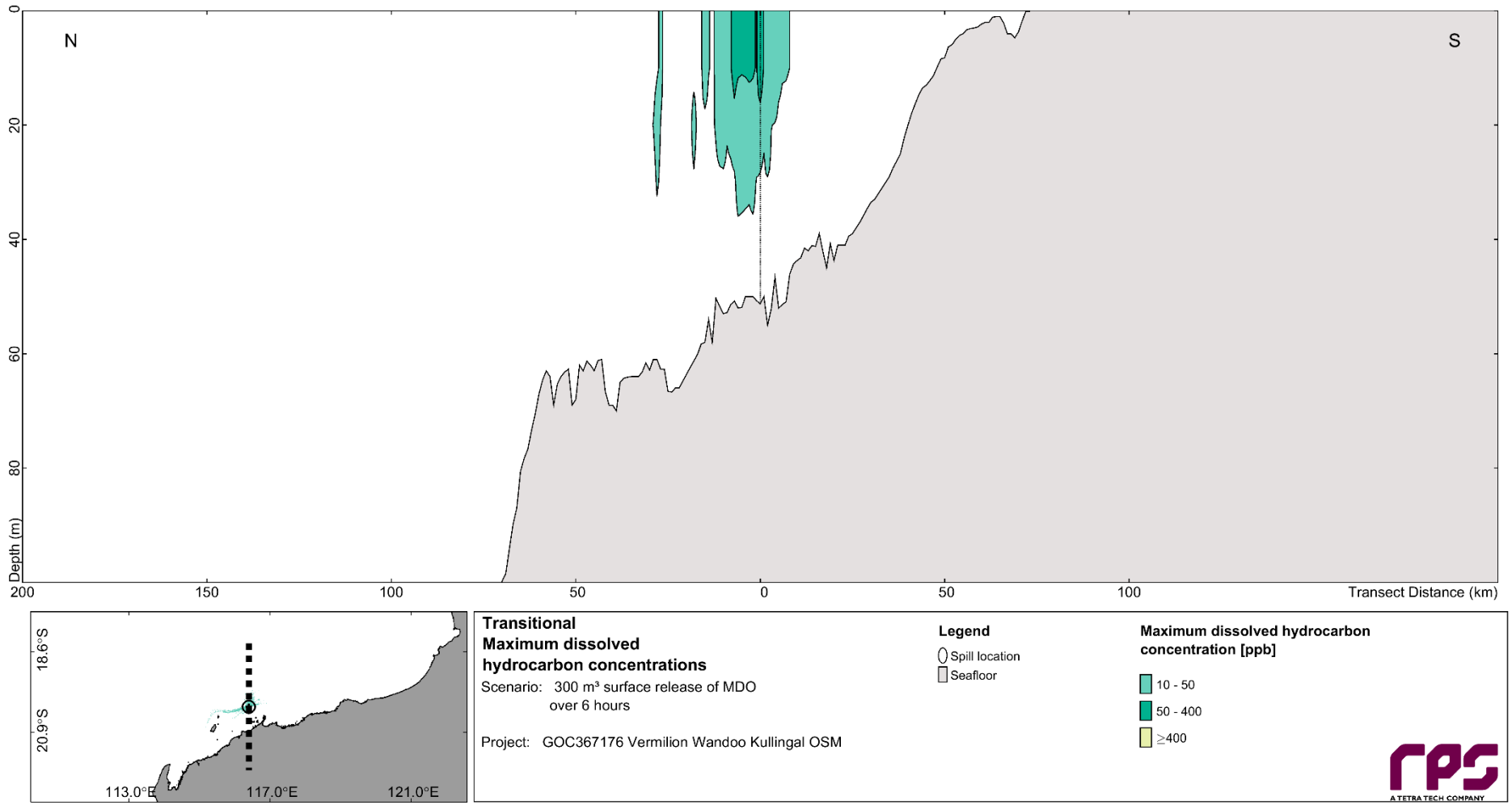


Figure 14.47 North-south cross-section transect of dissolved hydrocarbon concentrations exposure following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

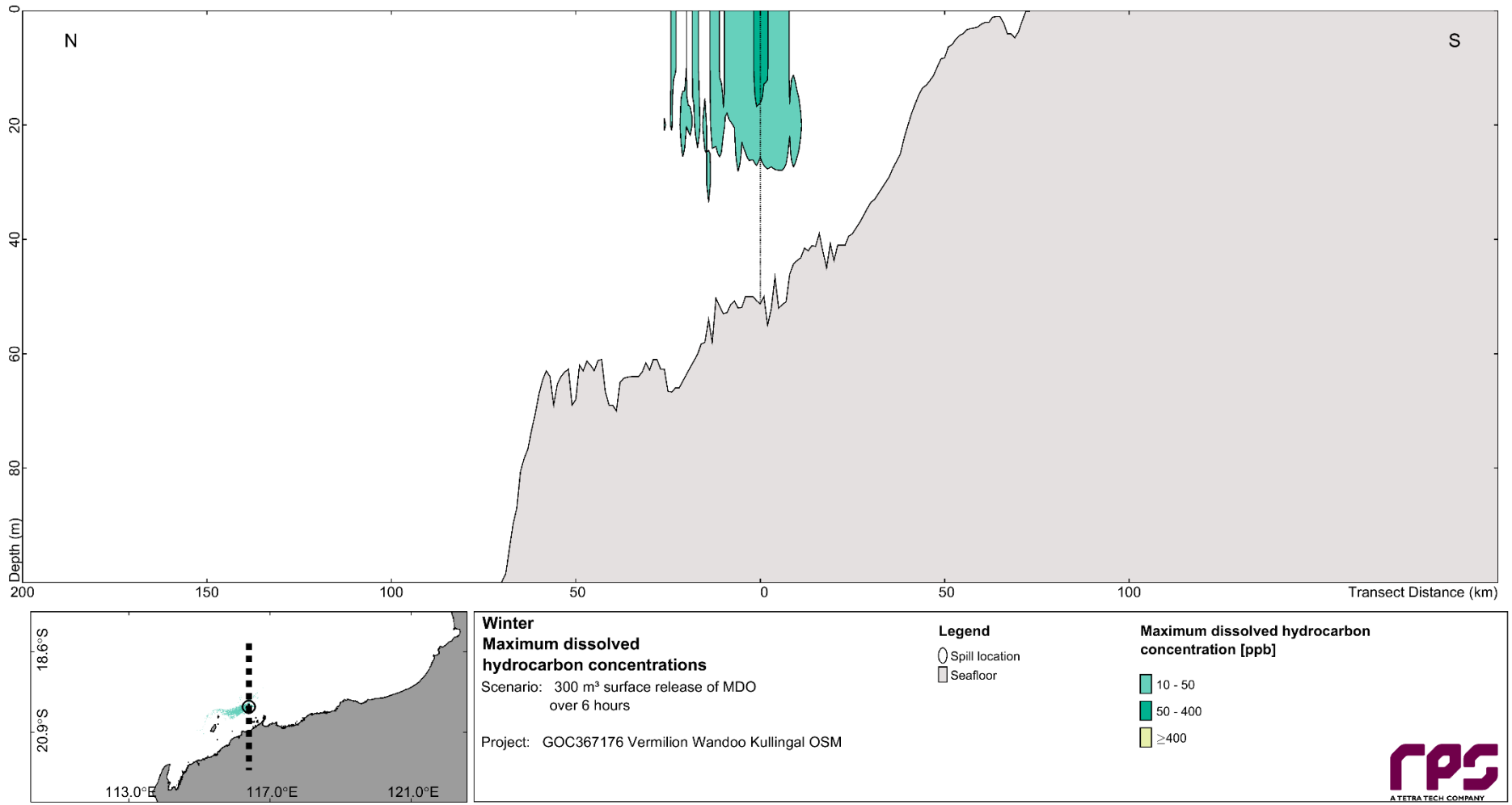


Figure 14.48 North-south cross-section transect of dissolved hydrocarbon concentrations exposure following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

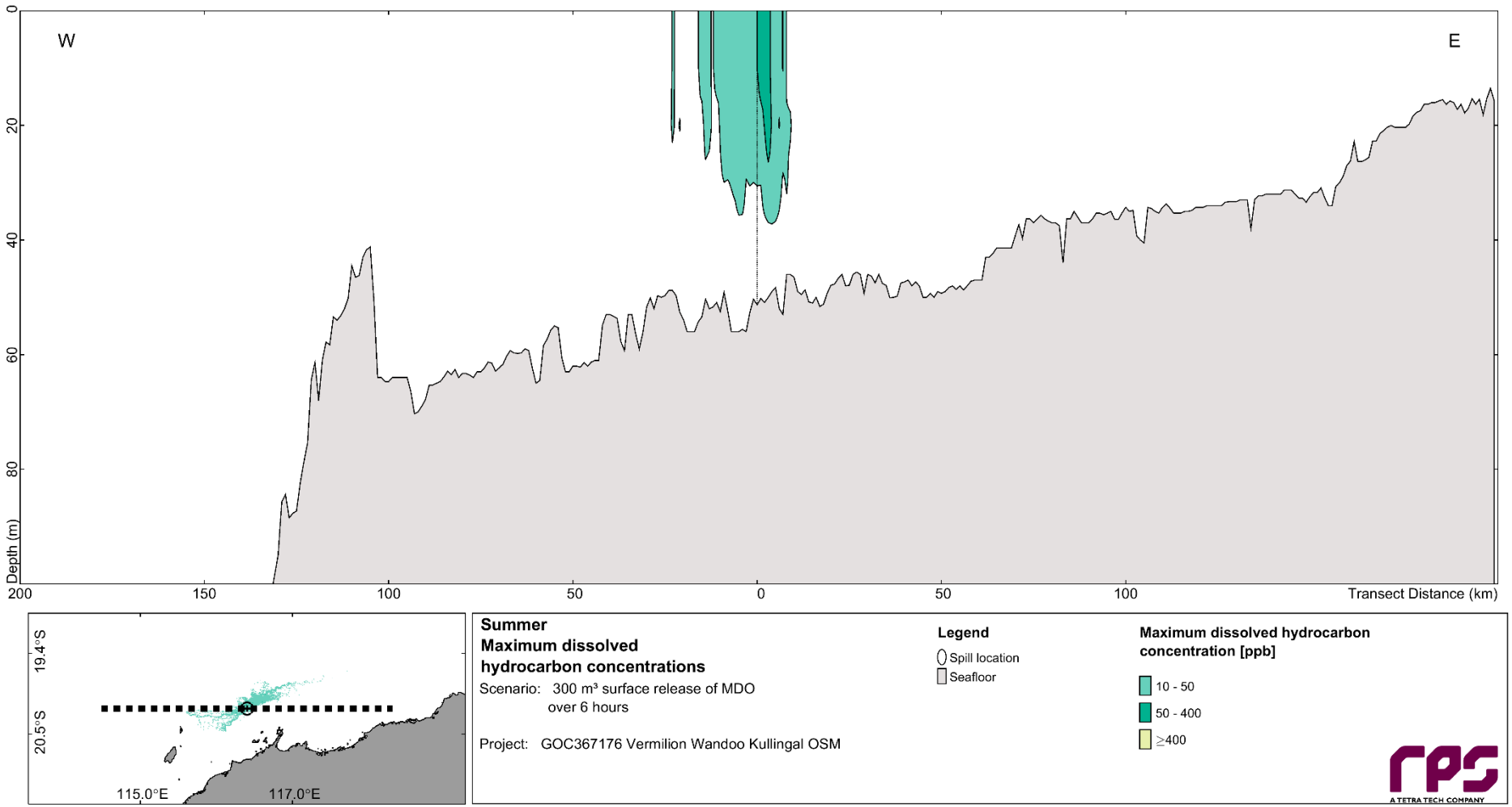


Figure 14.49 East-west cross-section transect of dissolved hydrocarbon concentrations exposure following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

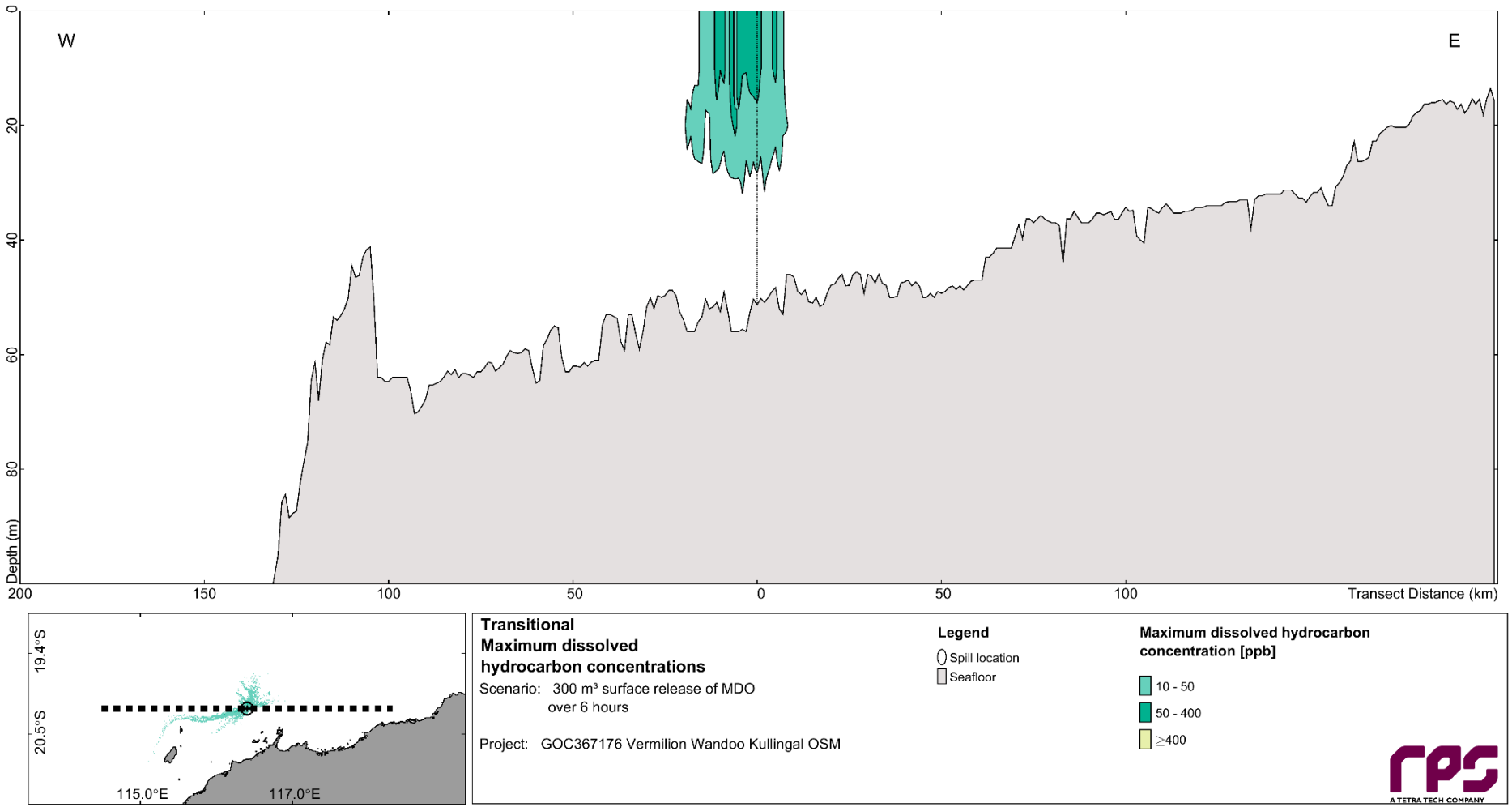


Figure 14.50 East-west cross-section transect of dissolved hydrocarbon concentrations exposure following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

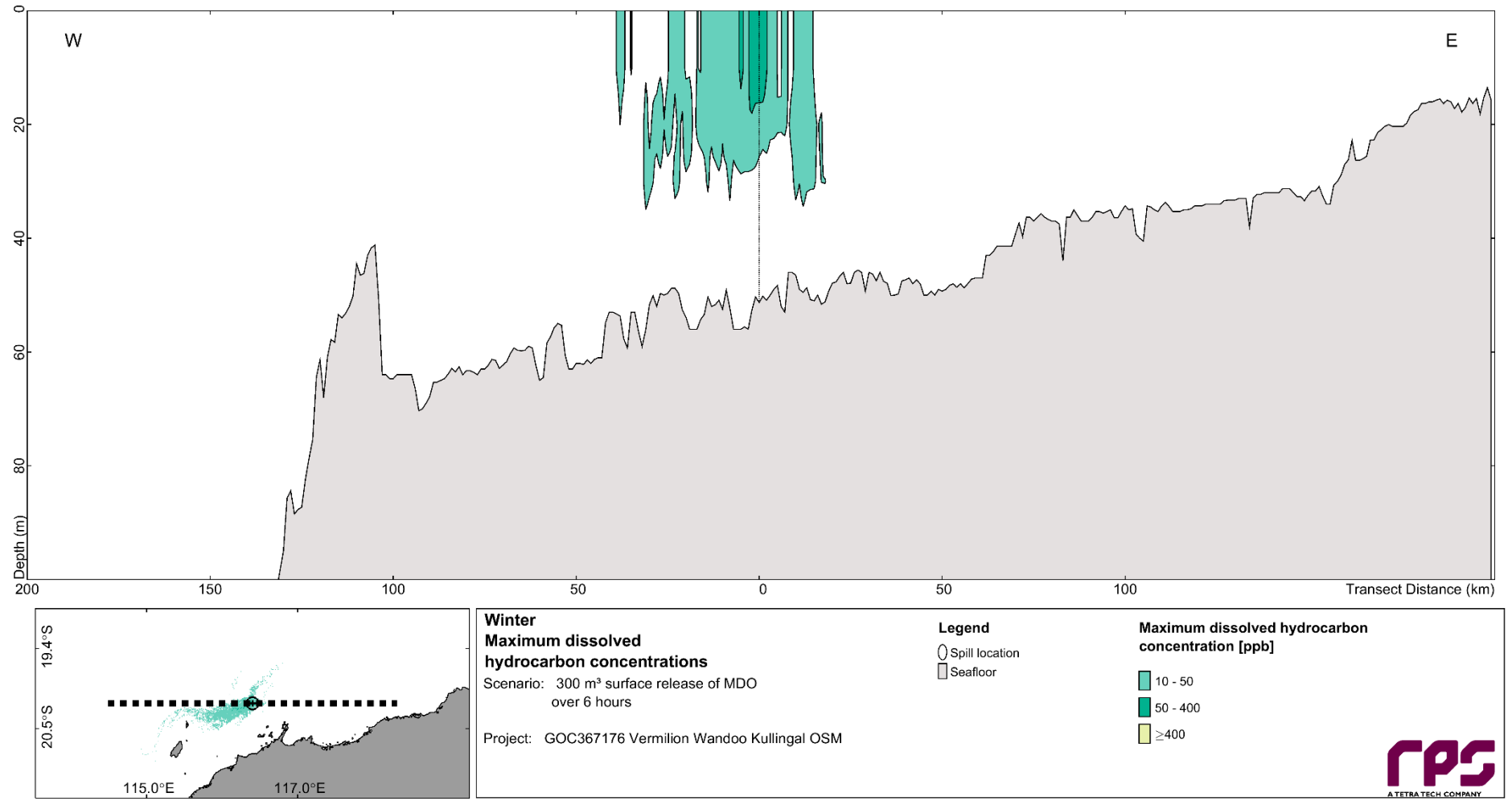


Figure 14.51 East-west cross-section transect of dissolved hydrocarbon concentrations exposure following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

14.1.4.2 Entrained Hydrocarbons

Table 14.8 summarises the maximum distances from the release location to entrained hydrocarbon thresholds for each season. Concentrations exceeding 10 ppb may potentially extend up to 494 km from the release location. As the threshold increases to 100 ppb, the maximum distance decreases to 237 km.

Table 14.9 summarises the receptors exposed to entrained hydrocarbons per season (either at, or above, receptors in the water column).

The Montebello AMP recorded the highest probability of exposure to concentrations at, or above, 10 ppb, during all seasonal conditions, specifically 23%, 51% and 54% during summer, transitional and winter conditions, respectively. The same receptor registered the quickest time to exposure during summer and winter conditions at 22 hours.

Figure 14.52 to Figure 14.54 illustrate the zones of exposure to entrained hydrocarbons for each season, whilst Figure 14.55 to Figure 14.66 display the minimum exposure times and the probability of exposure to these hydrocarbons.

Seasonal cross-sectional transects (north-south and east-west) of the maximum entrained hydrocarbons in the vicinity of the release site, are presented in Figure 14.67 to Figure 14.72.

Table 14.8 Maximum distances from the release location to entrained hydrocarbon exposure thresholds following a vessel collision at Kullingal. Results were calculated from 100 spill simulations per season.

Season	Distance and direction travelled	Entrained hydrocarbon exposure thresholds	
		10 ppb	100 ppb
Summer	Maximum distance (km) from release location	315	101
	Direction	Northeast	East
Transitional	Maximum distance (km) from release location	424	132
	Direction	Southwest	West
Winter	Maximum distance (km) from release location	494	237
	Direction	Southwest	Southwest

Table 14.9 Receptors predicted to be exposed by entrained hydrocarbons following a vessel collision at Kullingal. Results were calculated from100 spill simulations per season.

Category	Name	Summer						Transitional						Winter					
		Probability (%) of entrained hydrocarbon concentration		Minimum time to receptor waters (hours) at		Maximum entrained hydrocarbon concentration (ppb)		Probability (%) of entrained hydrocarbon concentration		Minimum time to receptor waters (hours) at		Maximum entrained hydrocarbon concentration (ppb)		Probability (%) of entrained hydrocarbon concentration		Minimum time to receptor waters (hours) at		Maximum entrained hydrocarbon concentration (ppb)	
		≥ 10 ppb	≥ 100 ppb	≥ 10 ppb	≥ 100 ppb	averaged over all replicate spills	in the worst replicate	≥ 10 ppb	≥ 100 ppb	≥ 10 ppb	≥ 100 ppb	averaged over all replicate spills	in the worst replicate	≥ 10 ppb	≥ 100 ppb	≥ 10 ppb	≥ 100 ppb	averaged over all replicate spills	in the worst replicate
AMP	Dampier	NC	NC	NC	NC	NC	NC	1	NC	268	NC	<1	27	NC	NC	NC	NC	NC	NC
	Gascoyne	NC	NC	NC	NC	NC	NC	4	NC	349	NC	2	23	13	NC	238	NC	4	46
	Montebello	23	3	22	23	12	307	51	22	25	26	57	430	54	24	22	24	62	560
KEF	Ancient coastline at 125 m depth contour	4	NC	153	NC	2	46	8	NC	197	NC	3	41	17	1	115	289	6	117
	Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	NC	NC	NC	NC	NC	NC	7	NC	262	NC	2	33	16	NC	174	NC	6	90
	Commonwealth waters adjacent to Ningaloo Reef	NC	NC	NC	NC	NC	NC	5	NC	352	NC	2	42	13	NC	226	NC	4	53

	Continental Slope Demersal Fish Communities	3	NC	284	NC	<1	18	6	NC	269	NC	2	35	11	NC	157	NC	4	57
	Exmouth Plateau	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	371	NC	<1	23
	Glomar Shoals	10	NC	87	NC	4	64	12	1	99	110	5	115	5	3	70	75	7	231
MP	Barrow Island	1	NC	251	NC	<1	21	6	NC	121	NC	2	43	13	1	86	183	6	104
	Montebello Islands	5	1	132	150	3	113	24	2	59	66	11	166	37	7	57	67	23	316
	Ningaloo	NC	NC	NC	NC	NC	NC	5	NC	352	NC	2	42	13	NC	226	NC	4	53
NR	Great Sandy Island	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	452	NC	<1	12
	Lowendal Islands	1	NC	298	NC	<1	22	2	NC	138	NC	<1	60	7	NC	161	NC	3	86
RSB	Barrow Island Reefs and Shoals	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	406	NC	<1	23
	Combe Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	366	NC	<1	15
	Dailey Shoal	NC	NC	NC	NC	NC	NC	3	NC	297	NC	<1	13	5	NC	210	NC	2	29
	Glomar Shoal	5	NC	228	NC	2	30	4	NC	141	NC	2	79	2	NC	117	NC	<1	68
	Hammersley Shoal	NC	NC	NC	NC	NC	NC	1	NC	314	NC	<1	18	NC	NC	NC	NC	NC	NC
	Madeleine Shoals	NC	NC	NC	NC	NC	NC	1	NC	267	NC	<1	27	NC	NC	NC	NC	NC	NC
	Montebello Shoals	3	NC	139	NC	<1	37	12	NC	141	NC	4	49	22	NC	81	NC	9	69
	Ningaloo Reef	NC	NC	NC	NC	NC	NC	2	NC	395	NC	<1	23	2	NC	512	NC	<1	22
	Otway Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	301	NC	<1	15

	Outtrim Patches	1	NC	474	NC	<1	12	4	NC	292	NC	2	25	10	NC	209	NC	3	31
	Penguin Bank	1	NC	217	NC	<1	25	4	NC	170	NC	2	21	6	NC	156	NC	4	64
	Poivre Reef	NC	NC	NC	NC	NC	NC	2	NC	141	NC	<1	18	7	NC	139	NC	3	79
	Rankin Bank	NC	NC	NC	NC	NC	NC	2	NC	310	NC	<1	22	3	NC	393	NC	2	32
	Ripple Shoals	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	459	NC	<1	13
	Rosily Shoals	1	NC	229	NC	<1	15	NC	NC	NC	NC	NC	NC	2	NC	169	NC	2	27
	Tryal Rocks	6	NC	180	NC	2	28	23	NC	76	NC	7	56	23	4	51	69	13	125
State and Territory Waters	WA	8	2	16	16	7	324	27	3	38	40	13	266	44	13	39	41	35	406

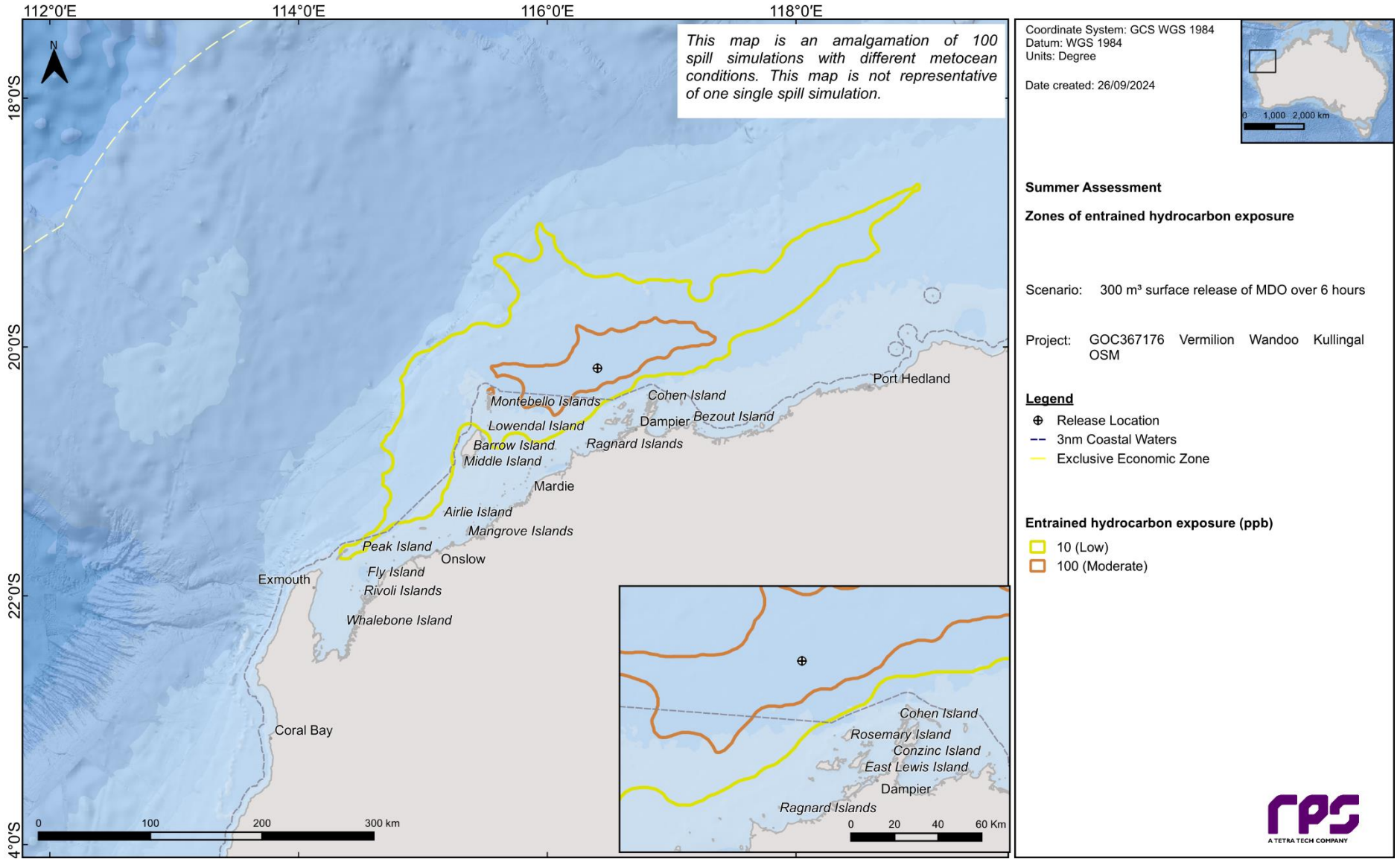


Figure 14.52 Predicted zones of entrained hydrocarbon exposure following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

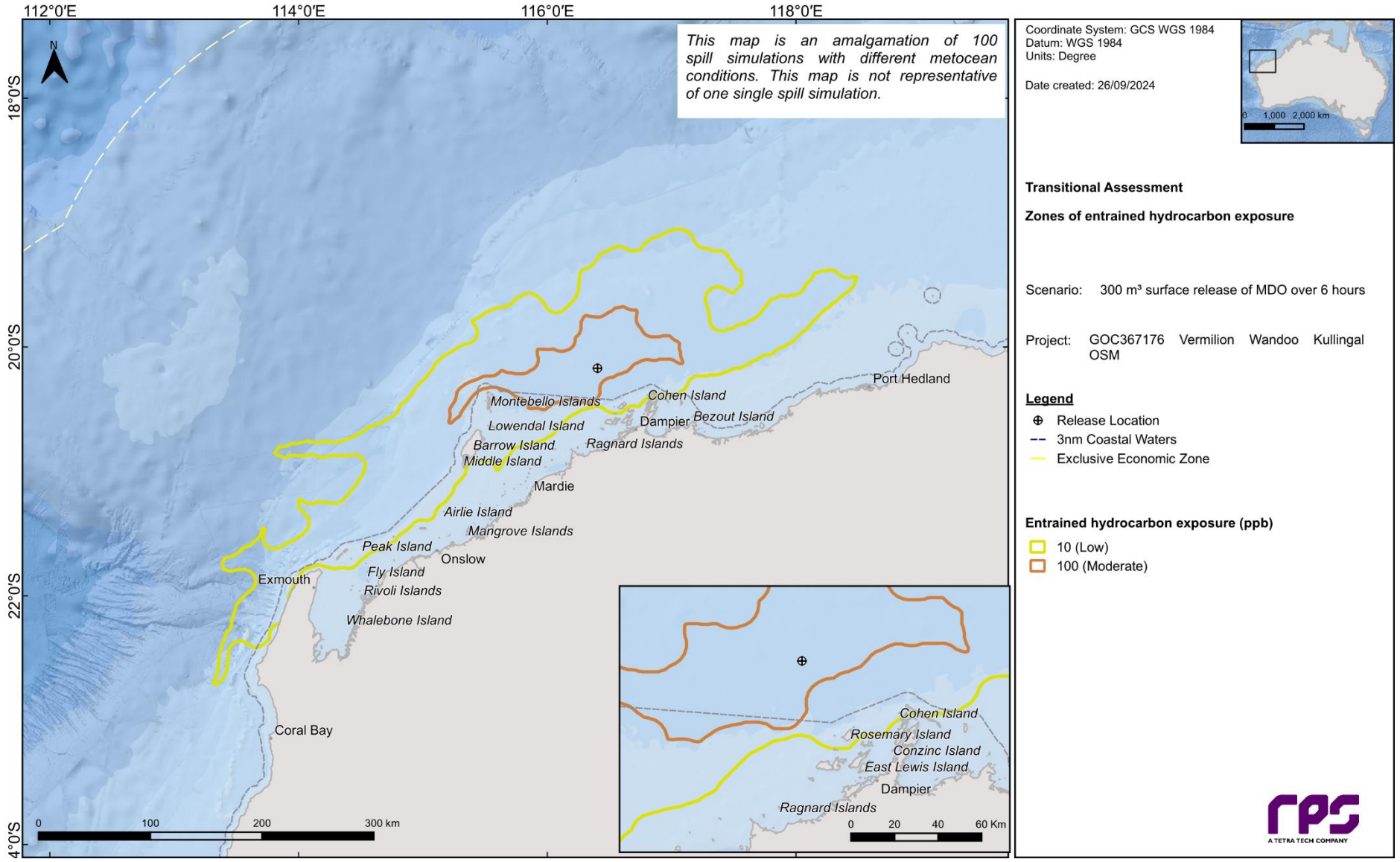


Figure 14.53 Predicted zones of entrained hydrocarbon exposure following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

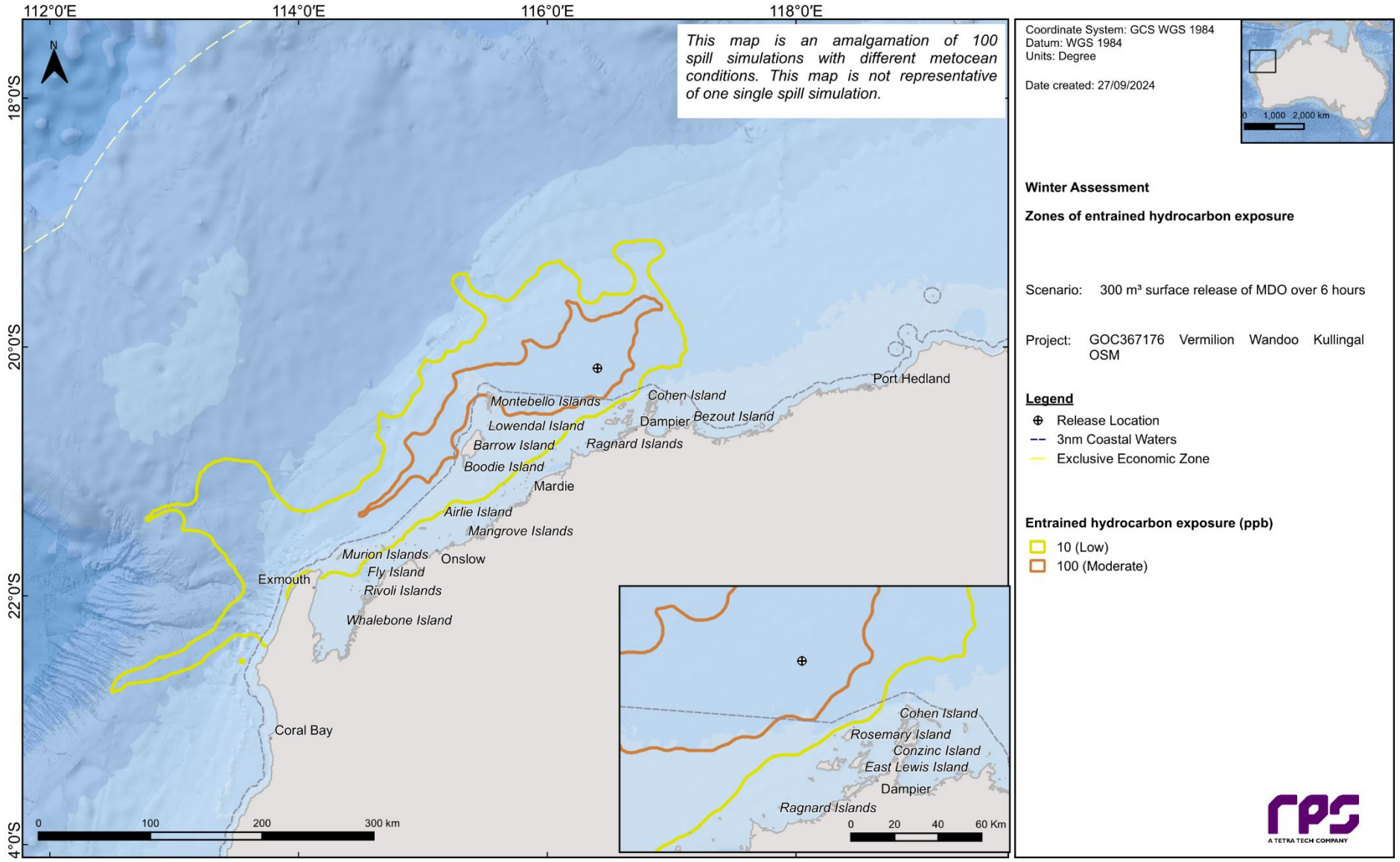


Figure 14.54 Predicted zones of entrained hydrocarbon exposure following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

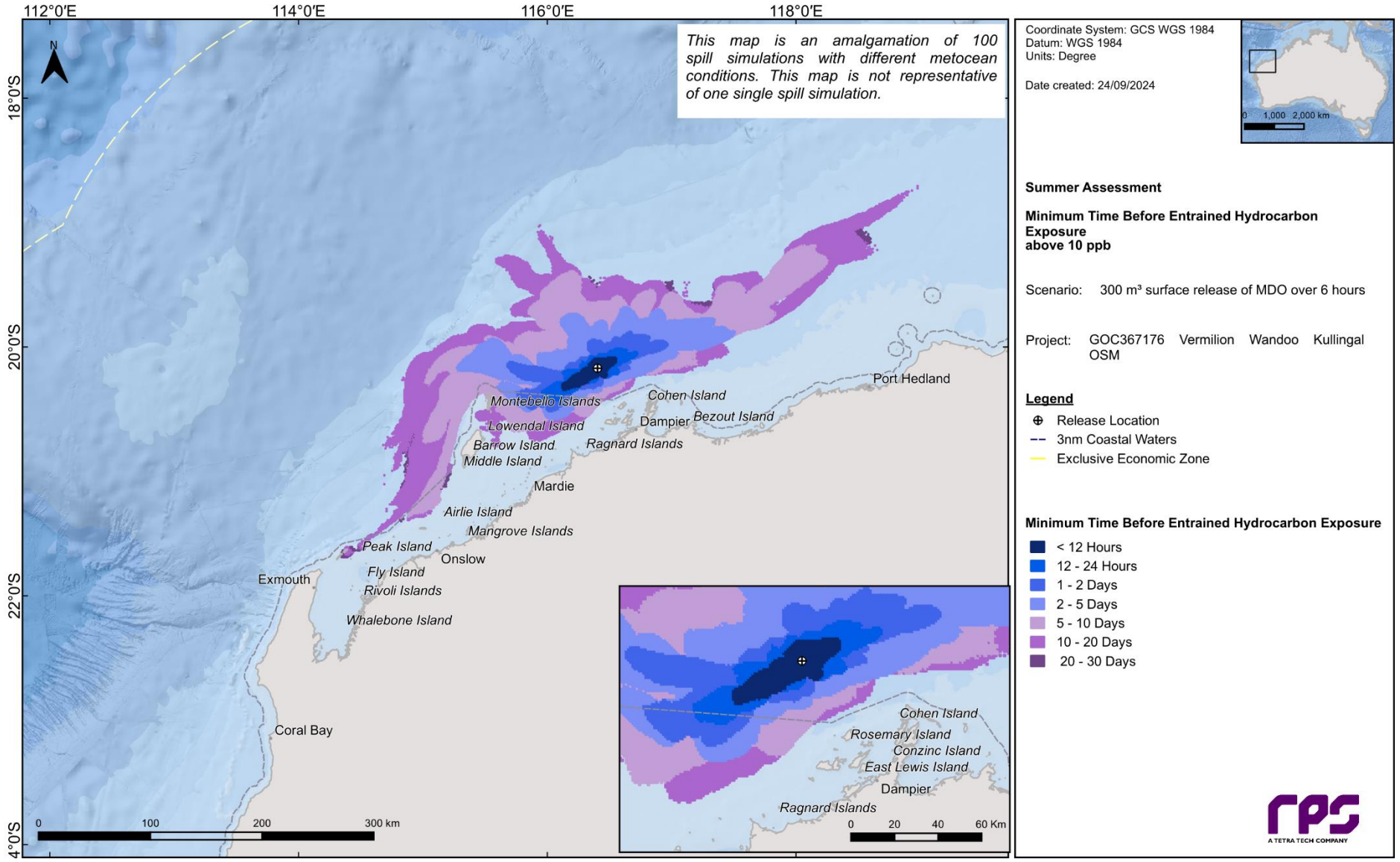


Figure 14.55 Minimum time before entrained hydrocarbon exposure at, or above, 10 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

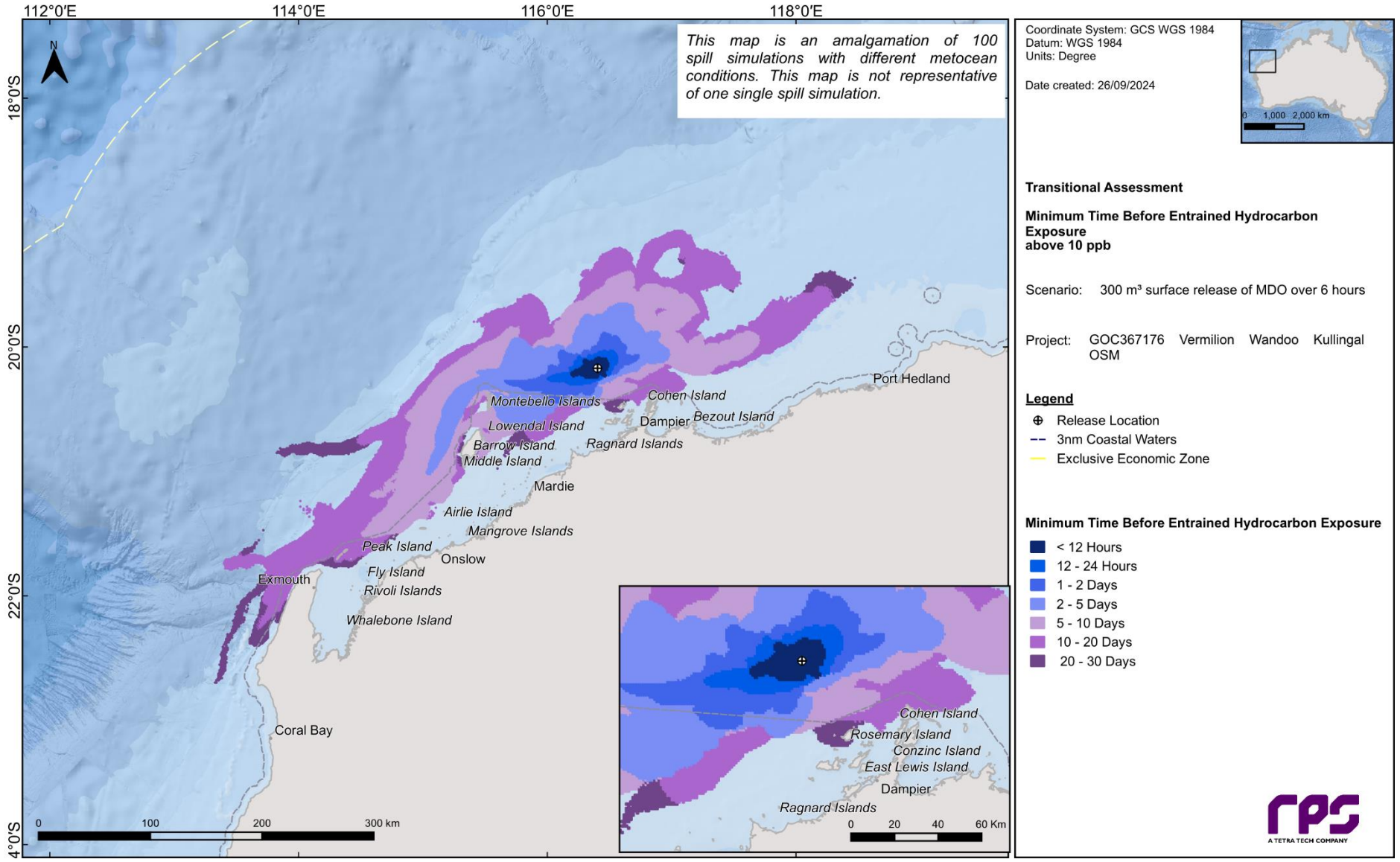


Figure 14.56 Minimum time before entrained hydrocarbon exposure at, or above, 10 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

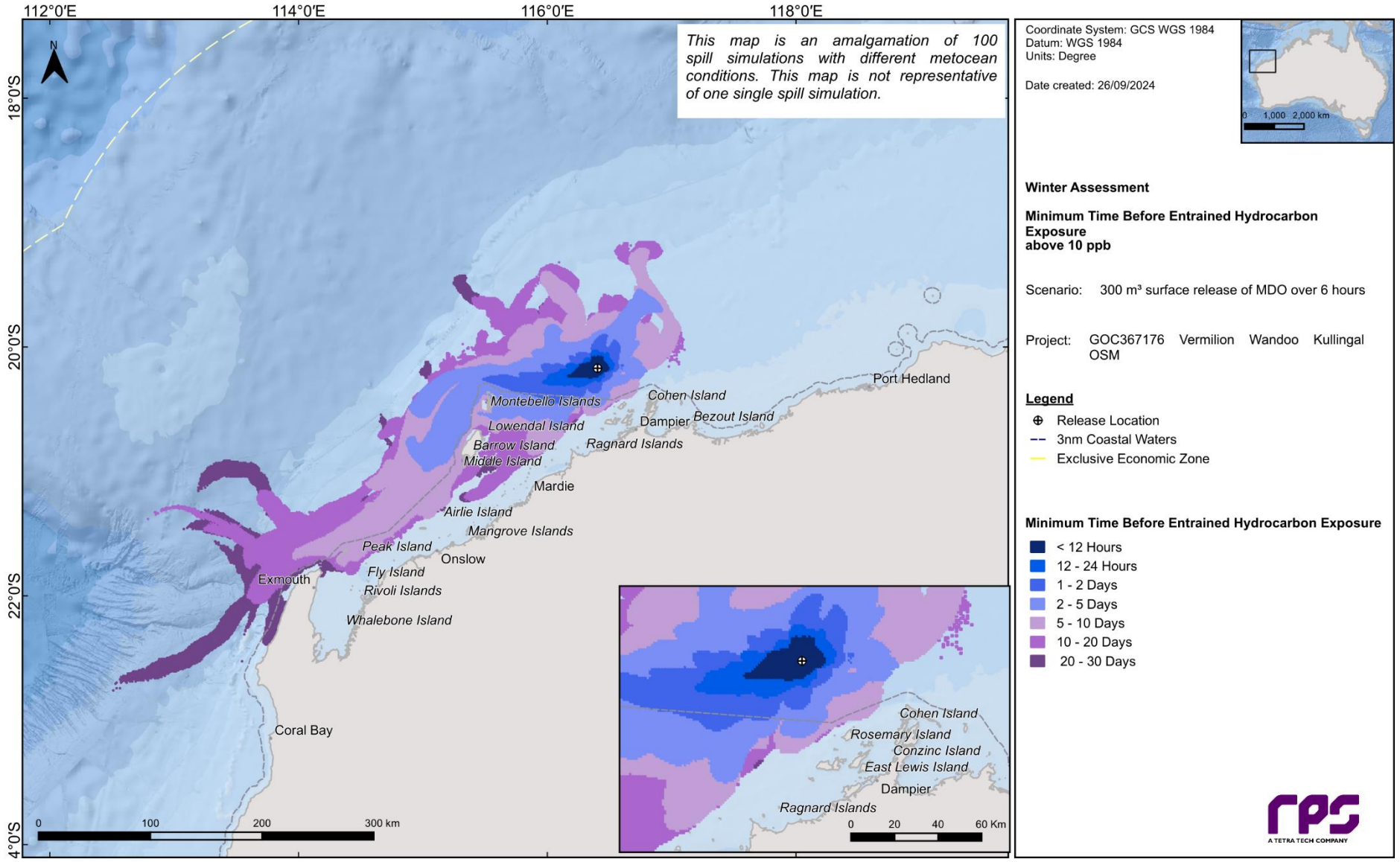


Figure 14.57 Minimum time before entrained hydrocarbon exposure at, or above, 10 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

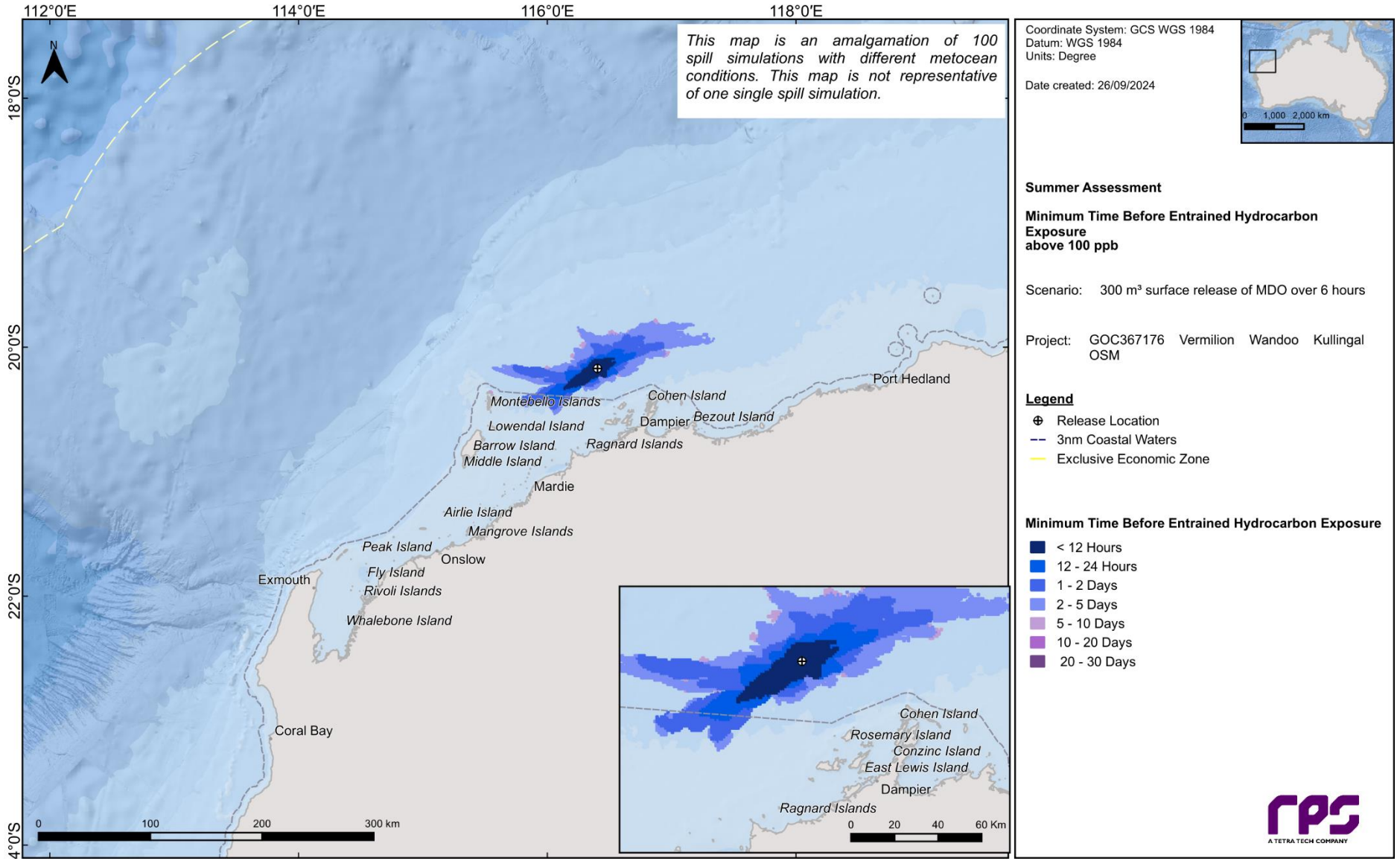


Figure 14.58 Minimum time before entrained hydrocarbon exposure at, or above, 100 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

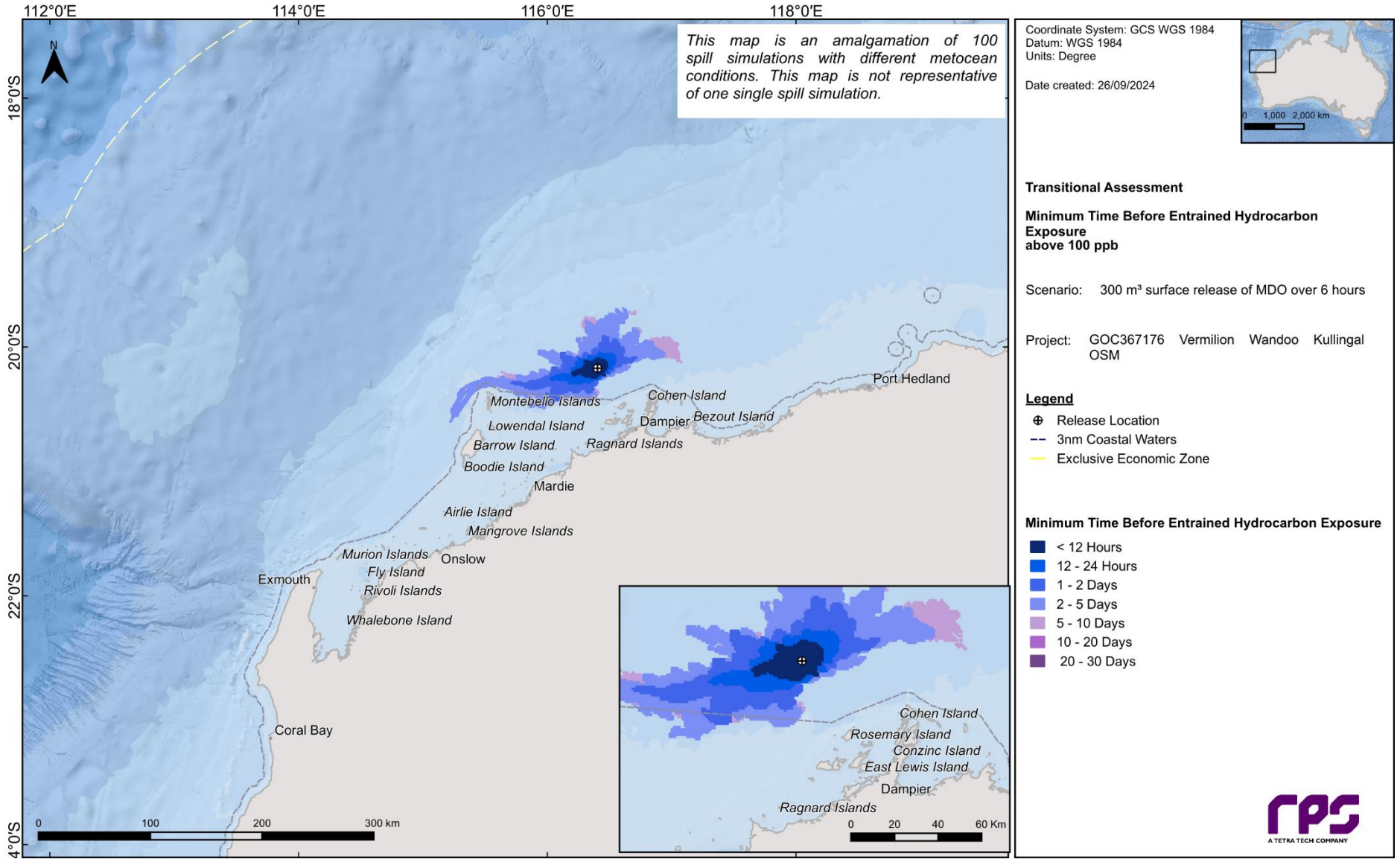


Figure 14.59 Minimum time before entrained hydrocarbon exposure at, or above, 100 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

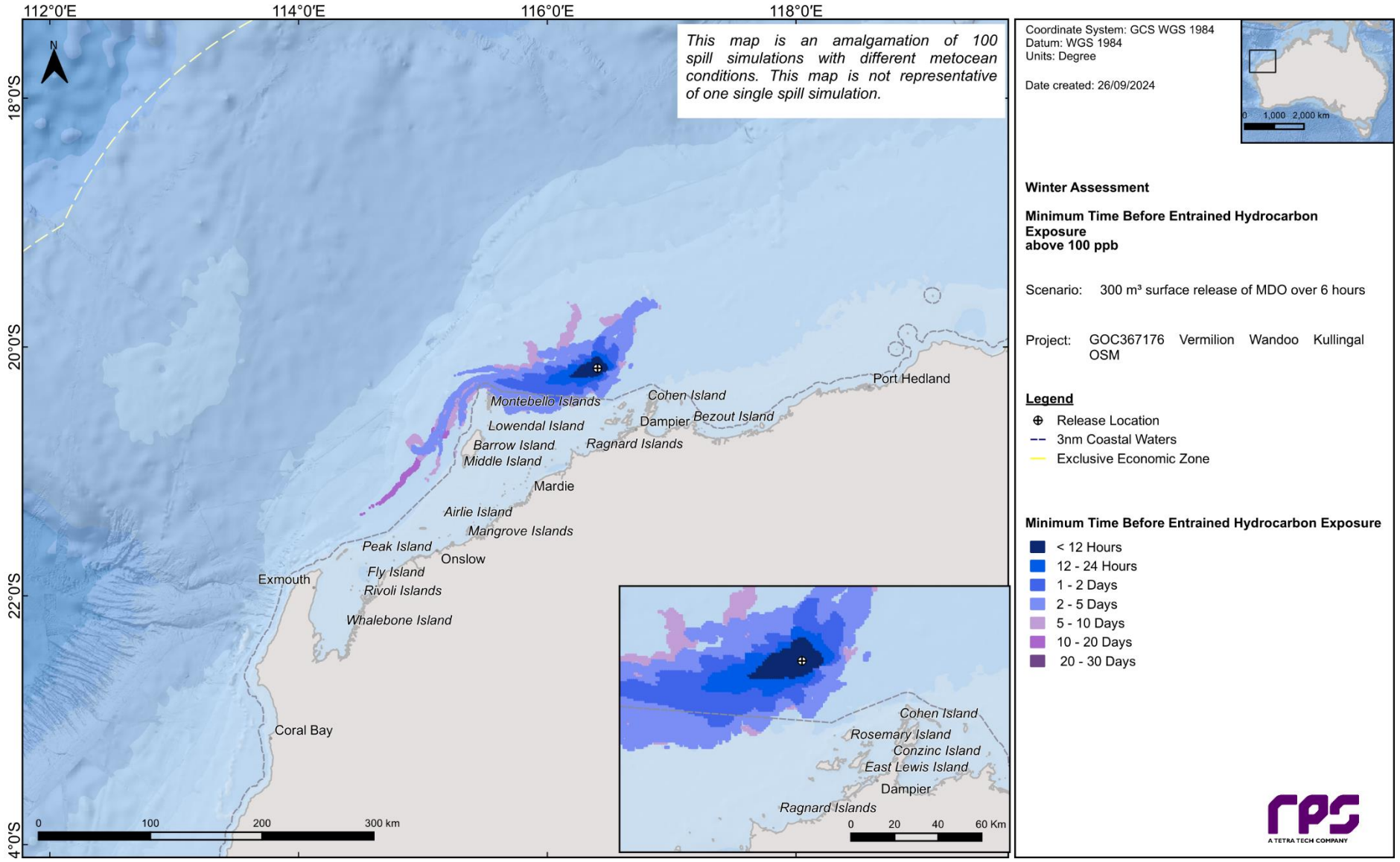


Figure 14.60 Minimum time before entrained hydrocarbon exposure at, or above, 100 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

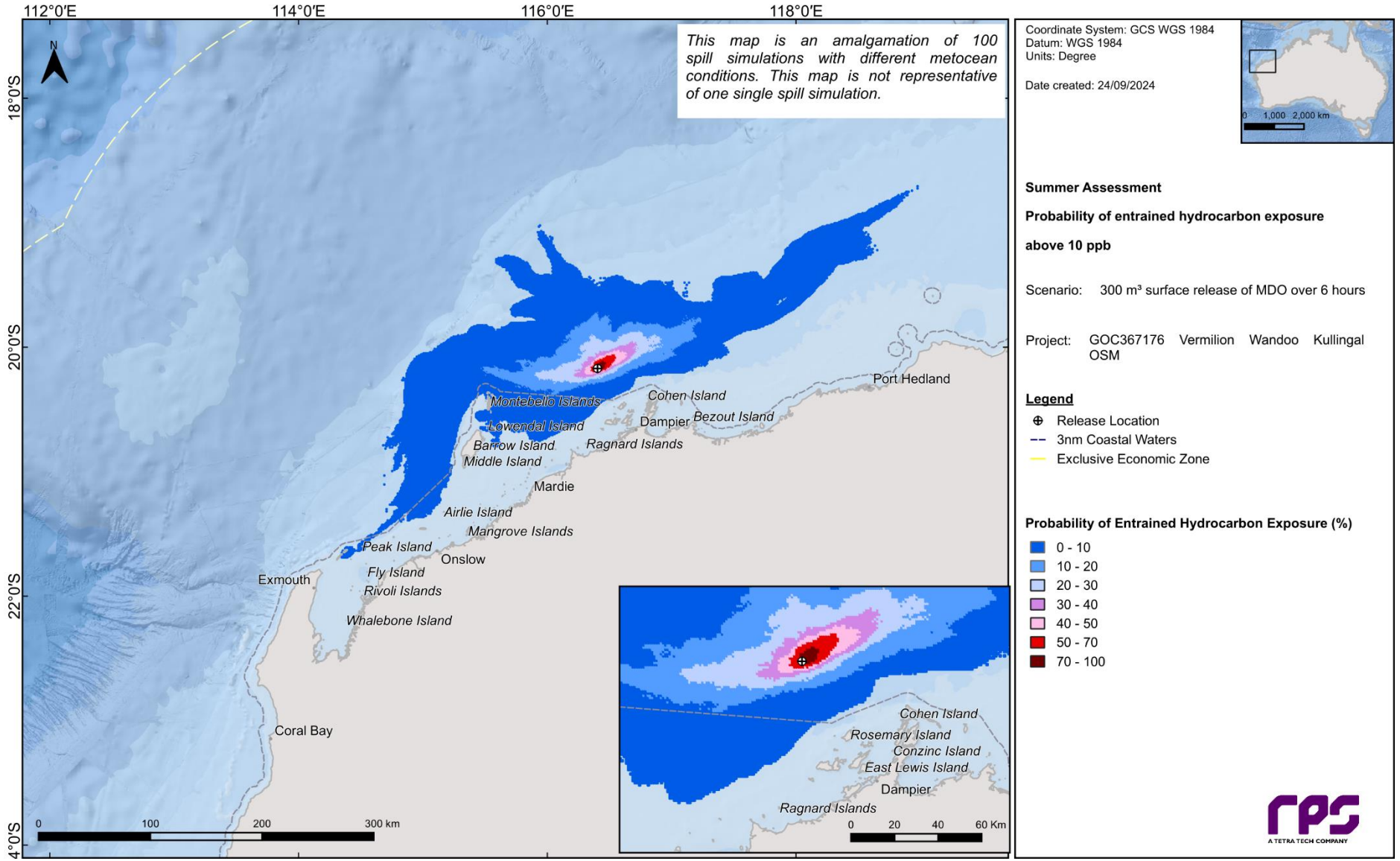


Figure 14.61 Probability of entrained hydrocarbon exposure at, or above, 10 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

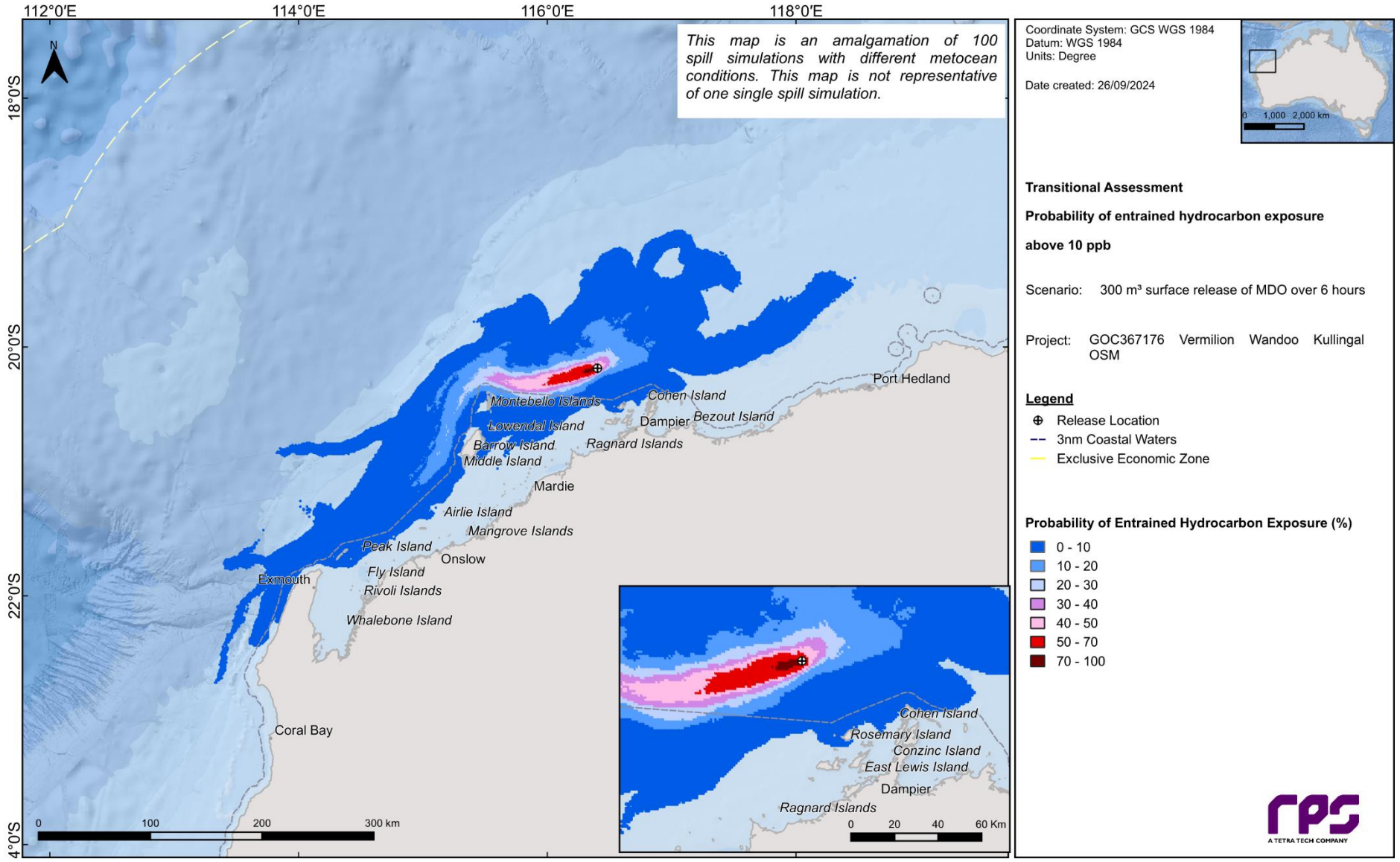


Figure 14.62 Probability of entrained hydrocarbon exposure at, or above, 10 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

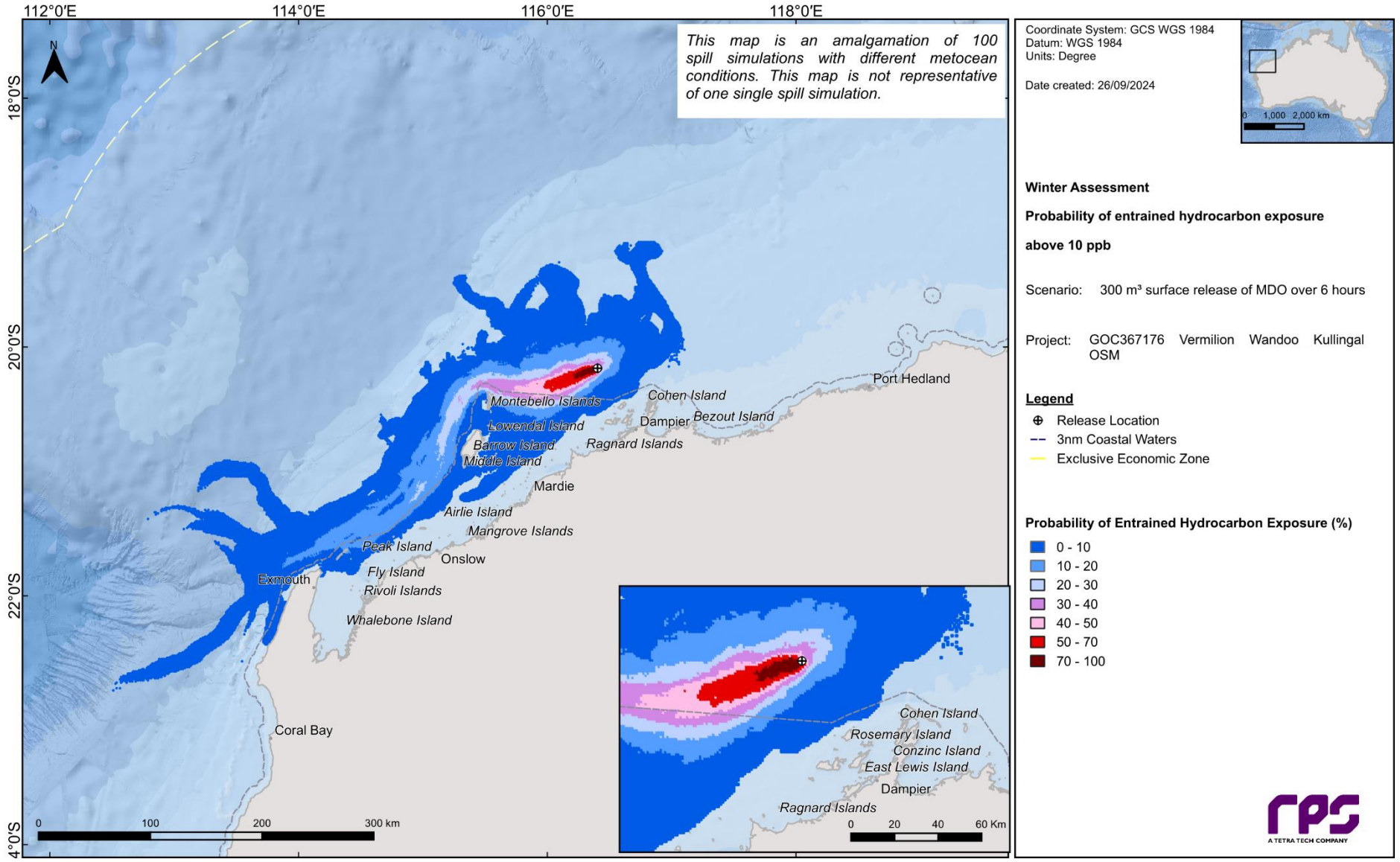


Figure 14.63 Probability of entrained hydrocarbon exposure at, or above, 10 ppb following a vessel collision at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

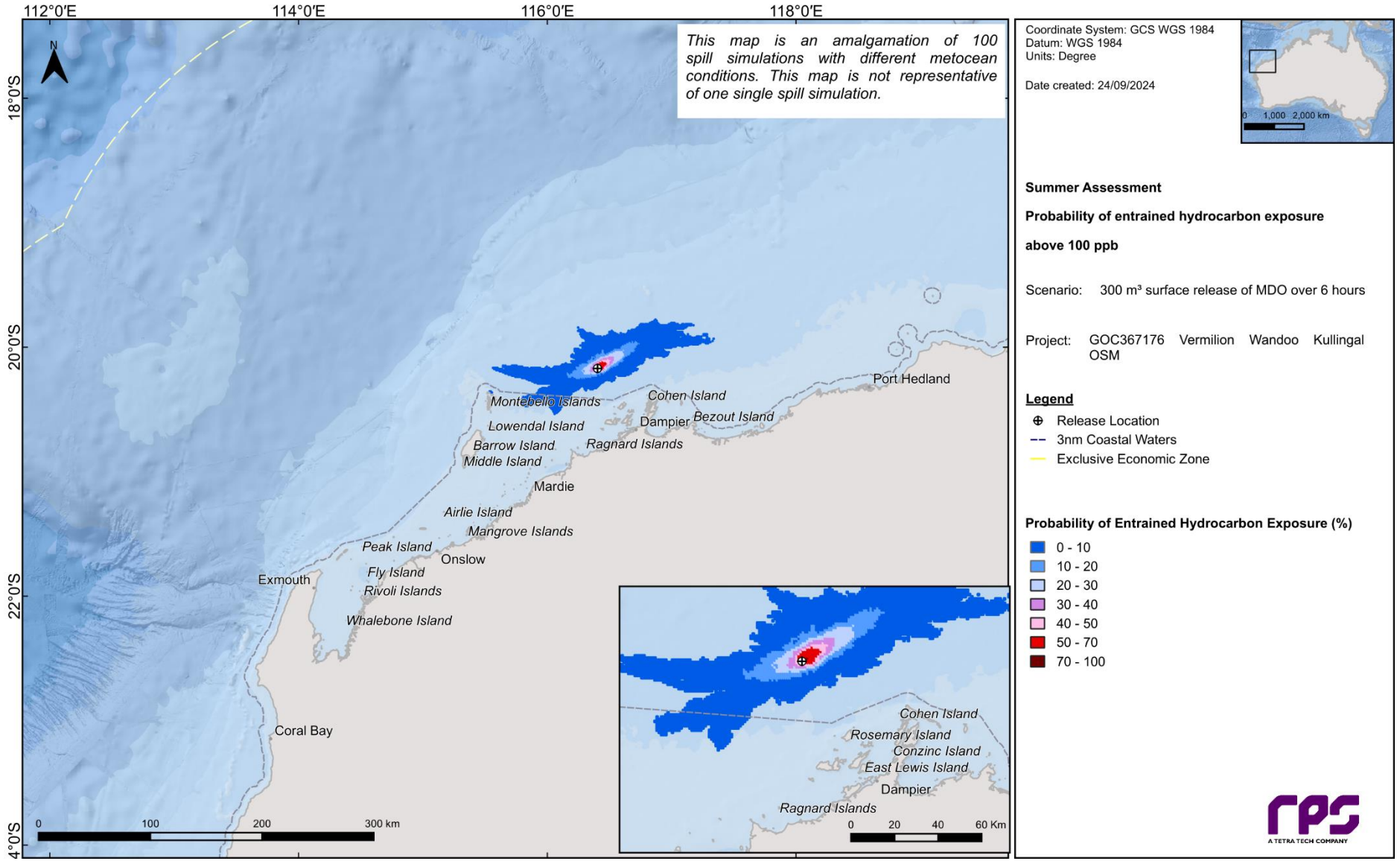


Figure 14.64 Probability of entrained hydrocarbon exposure at, or above, 100 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

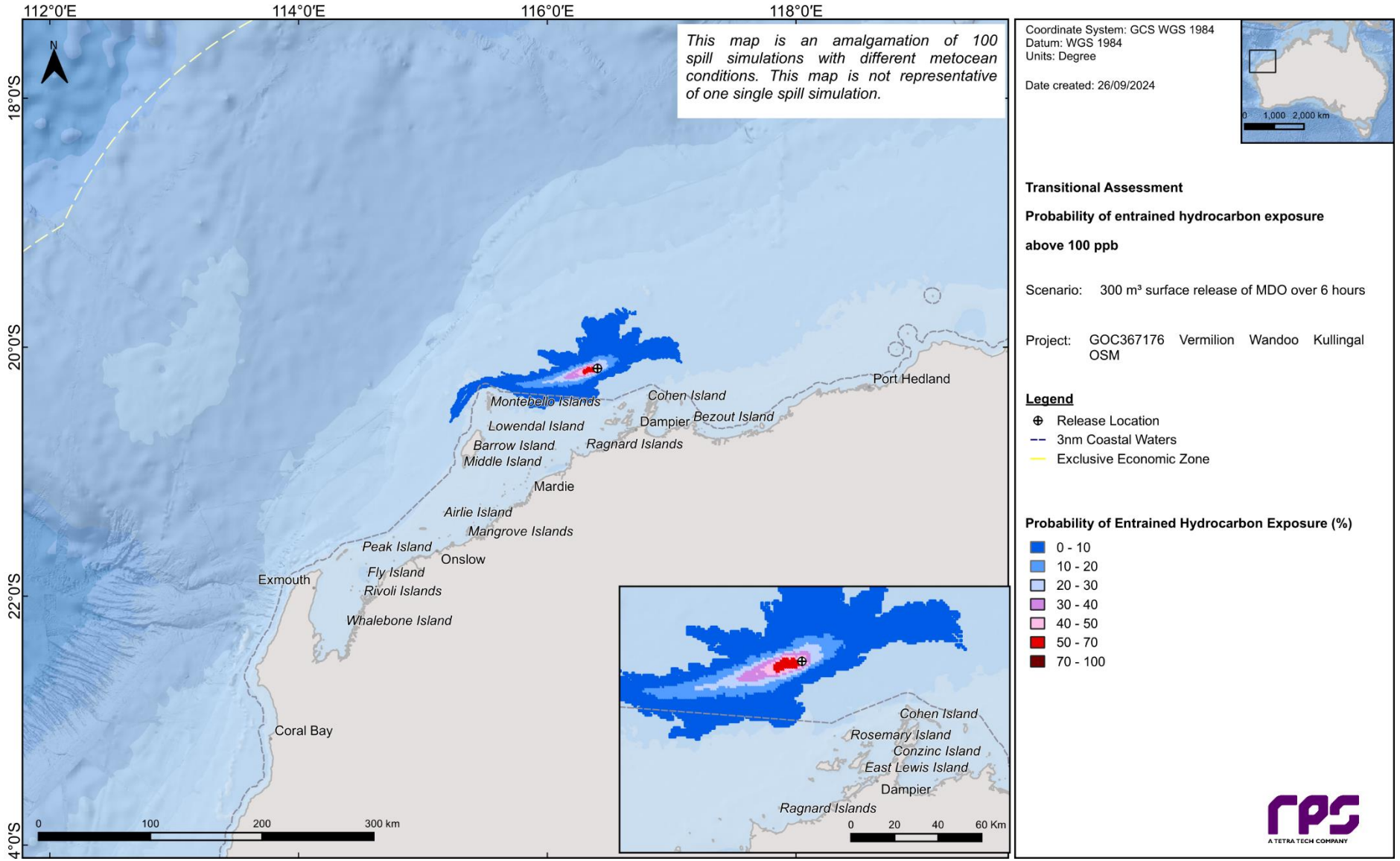


Figure 14.65 Probability of entrained hydrocarbon exposure at, or above, 100 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

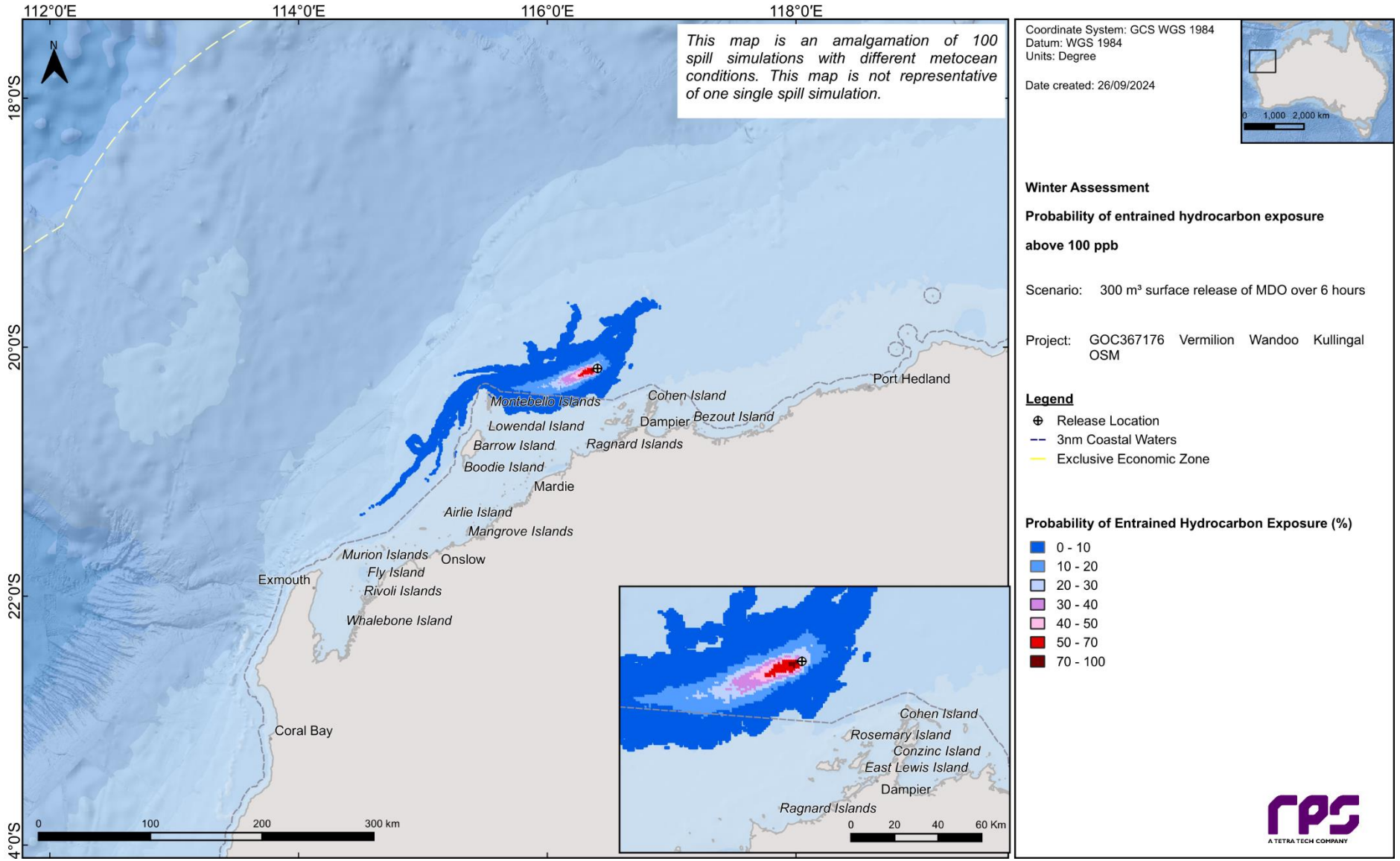


Figure 14.66 Probability of entrained hydrocarbon exposure at, or above, 100 ppb following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

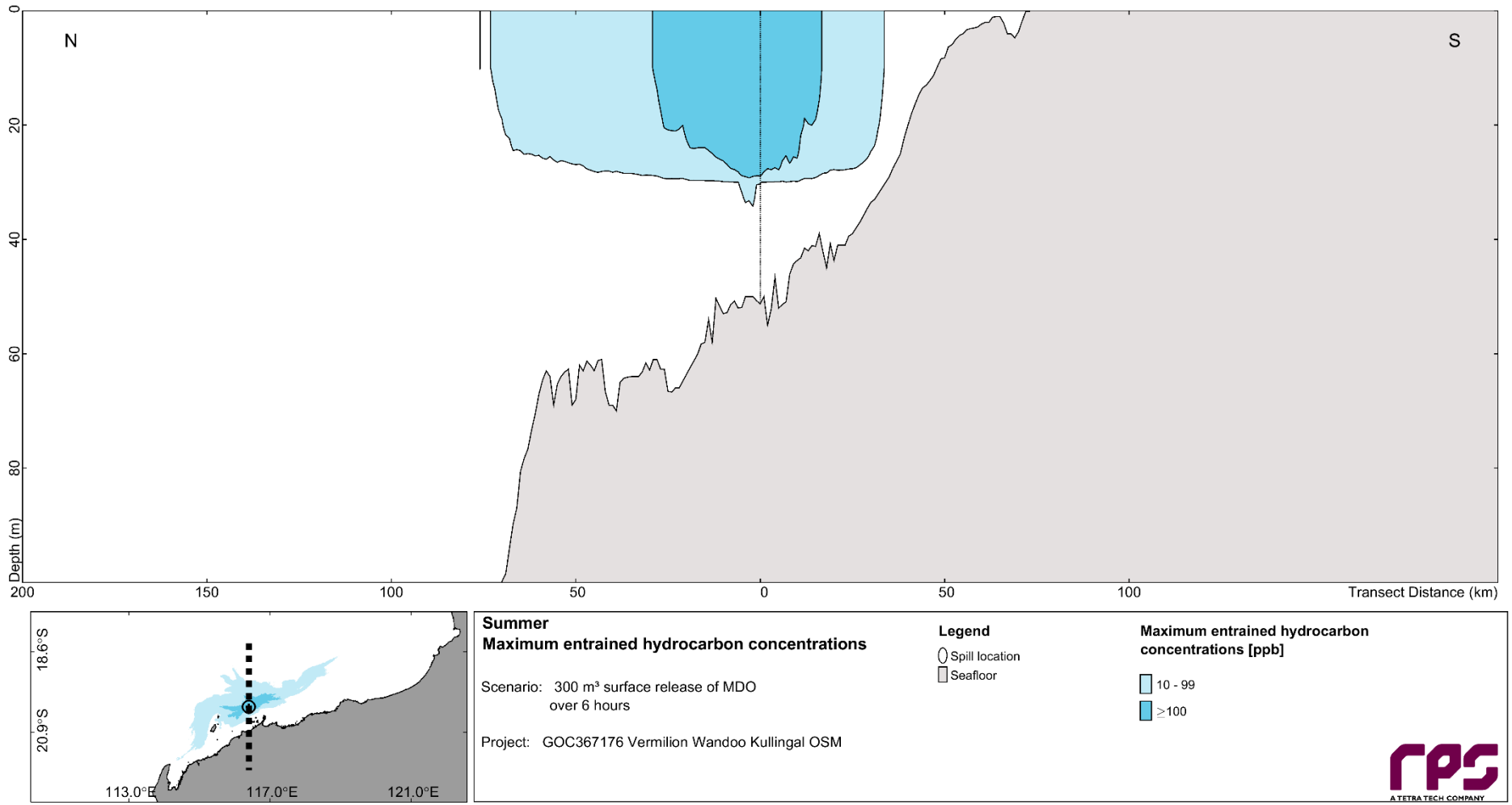


Figure 14.67 North-south cross-section transect of entrained hydrocarbon concentrations following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

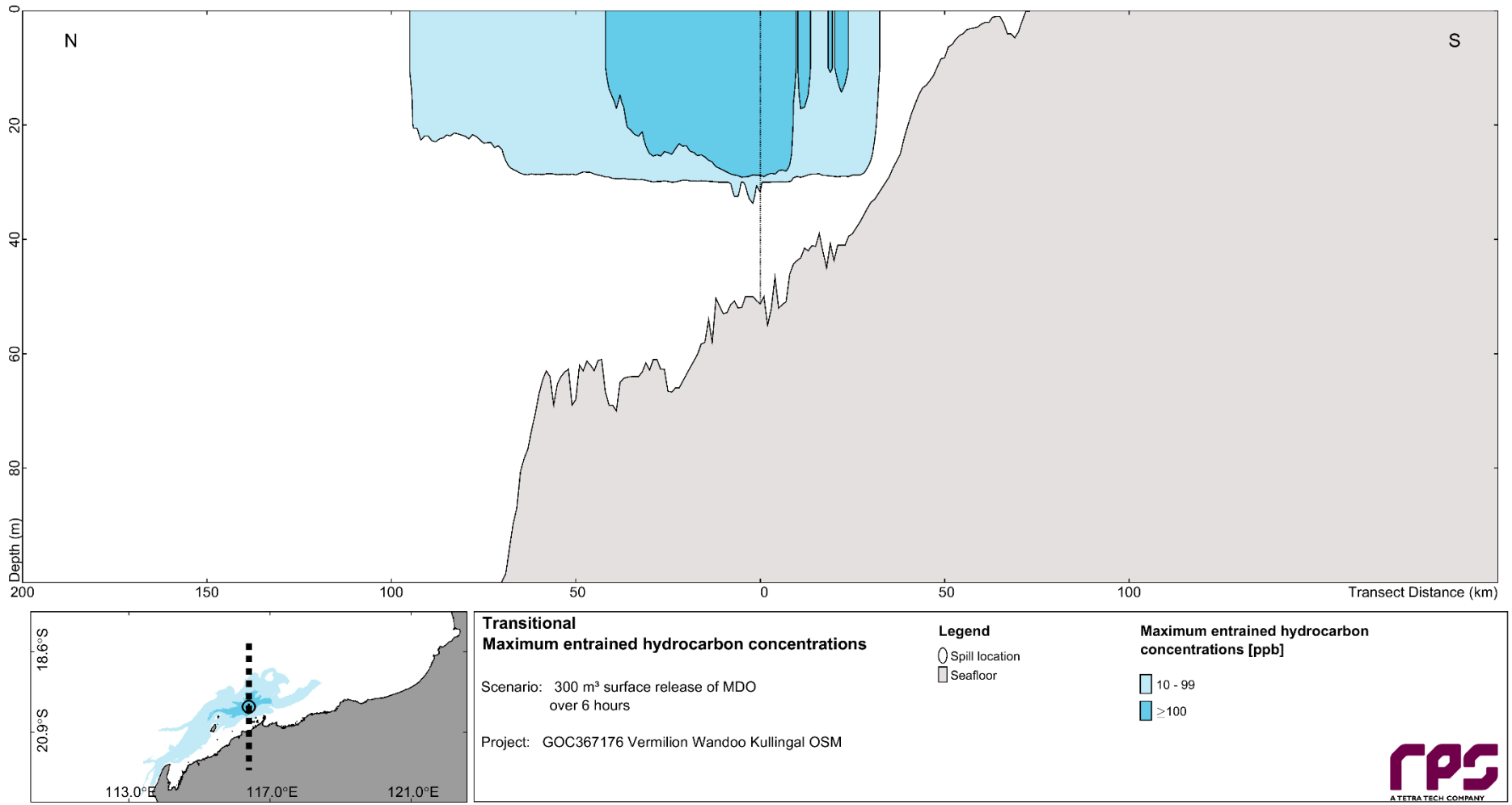


Figure 14.68 North-south cross-section transect of entrained hydrocarbon concentrations following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

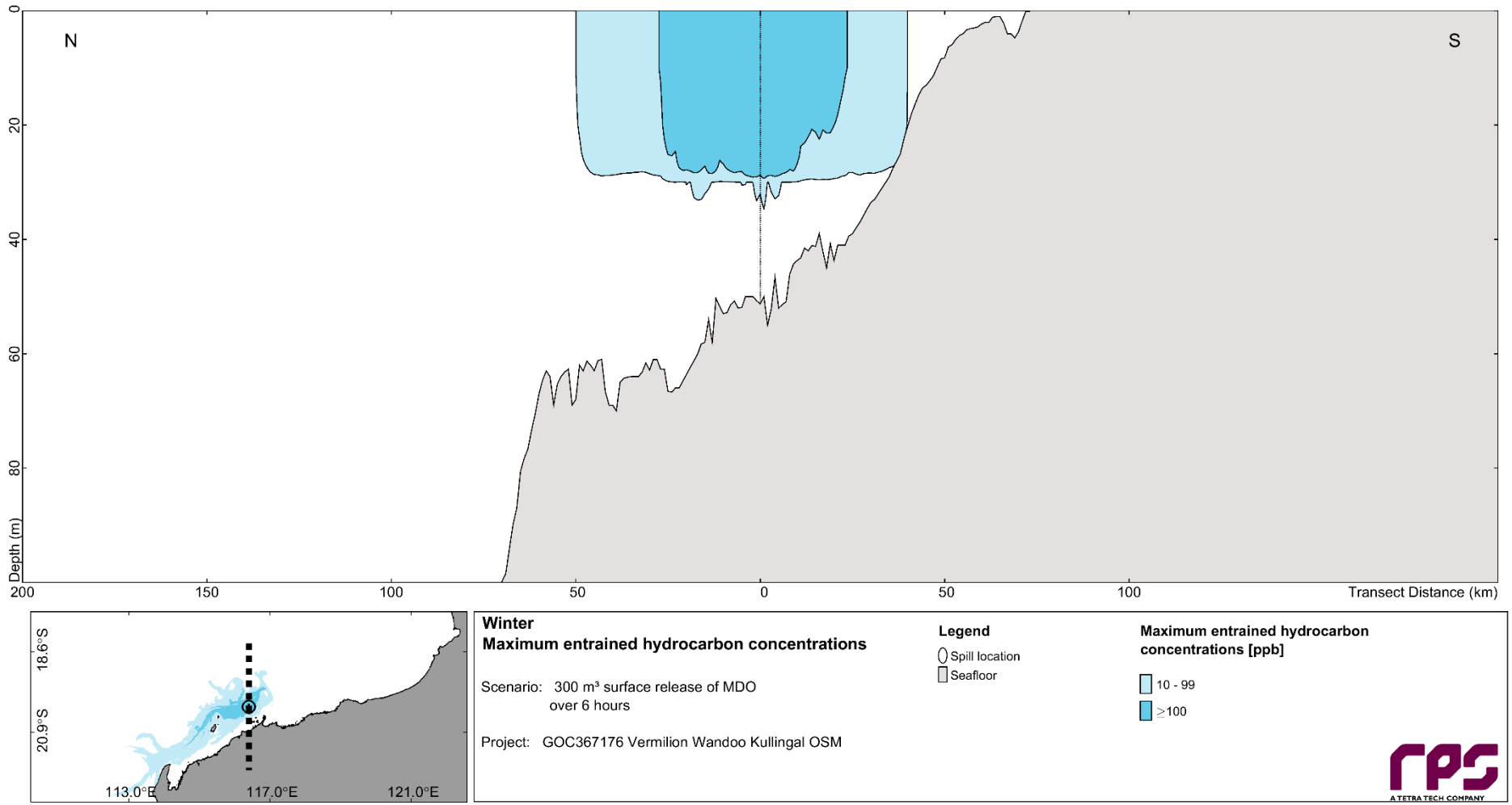


Figure 14.69 North-south cross-section transect of entrained hydrocarbon concentrations following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

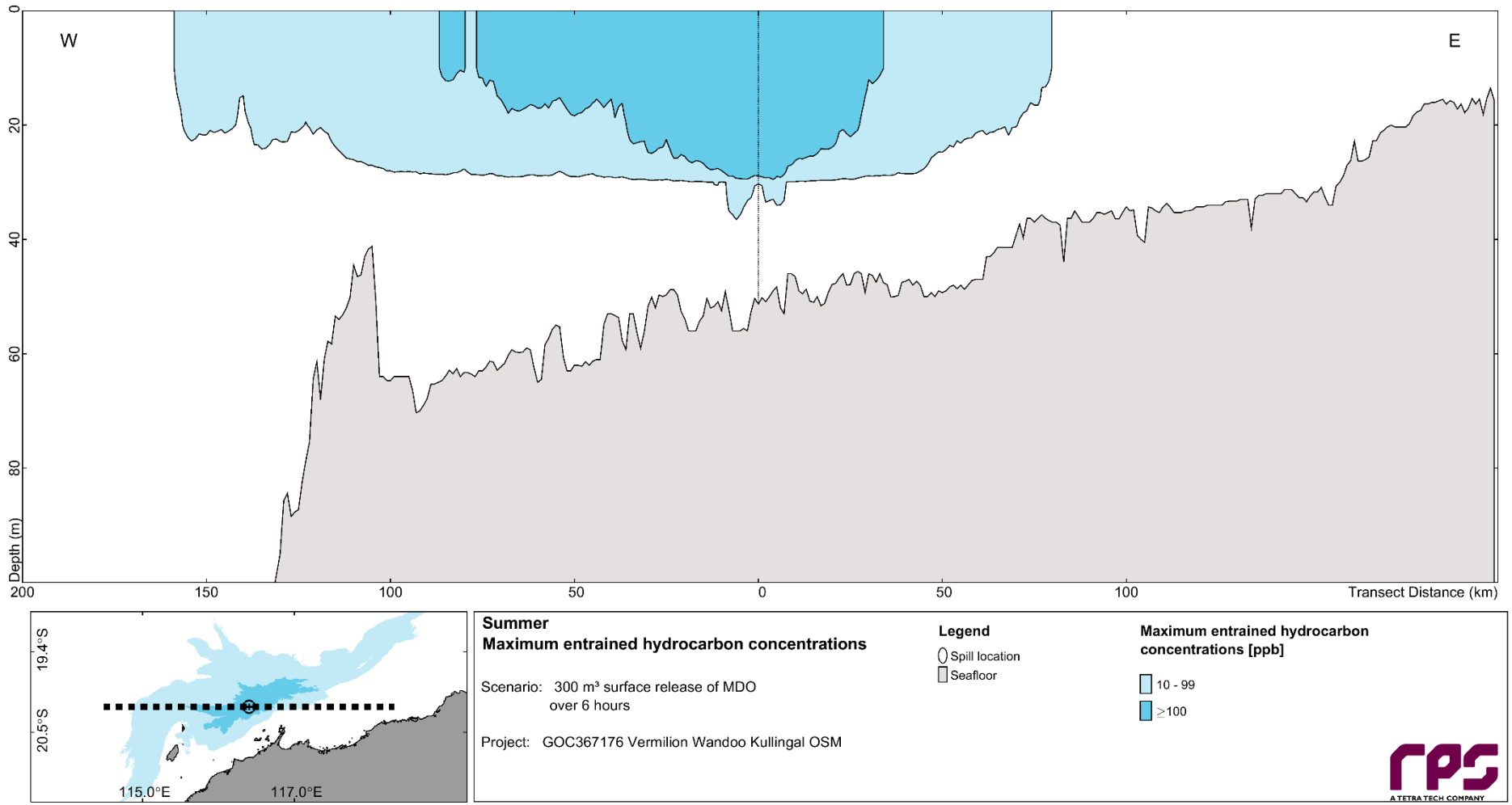


Figure 14.70 East-west cross-section transect of entrained hydrocarbon concentrations following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent summer conditions.

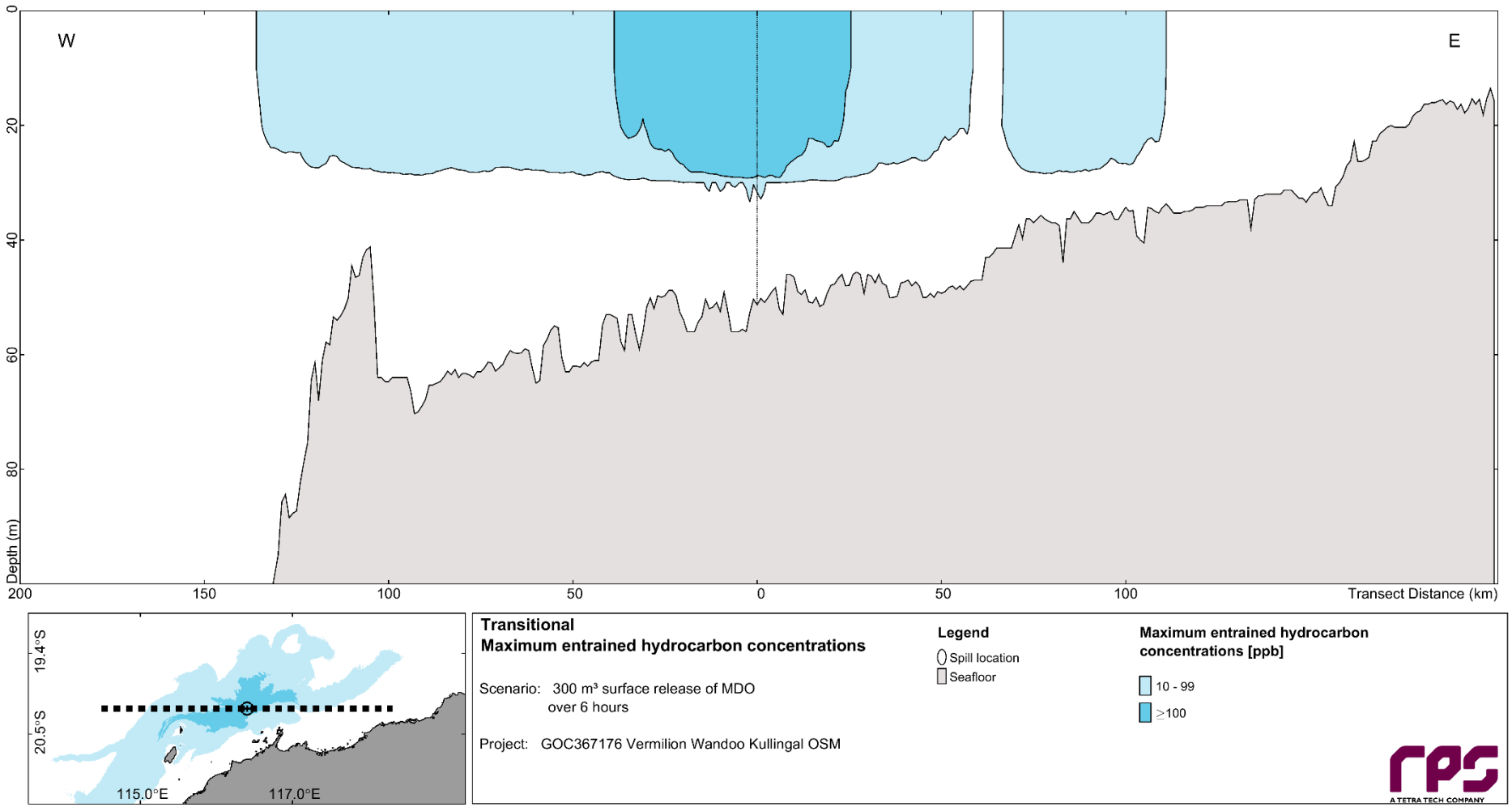


Figure 14.71 East-west cross-section transect of entrained hydrocarbon concentrations following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent transitional conditions.

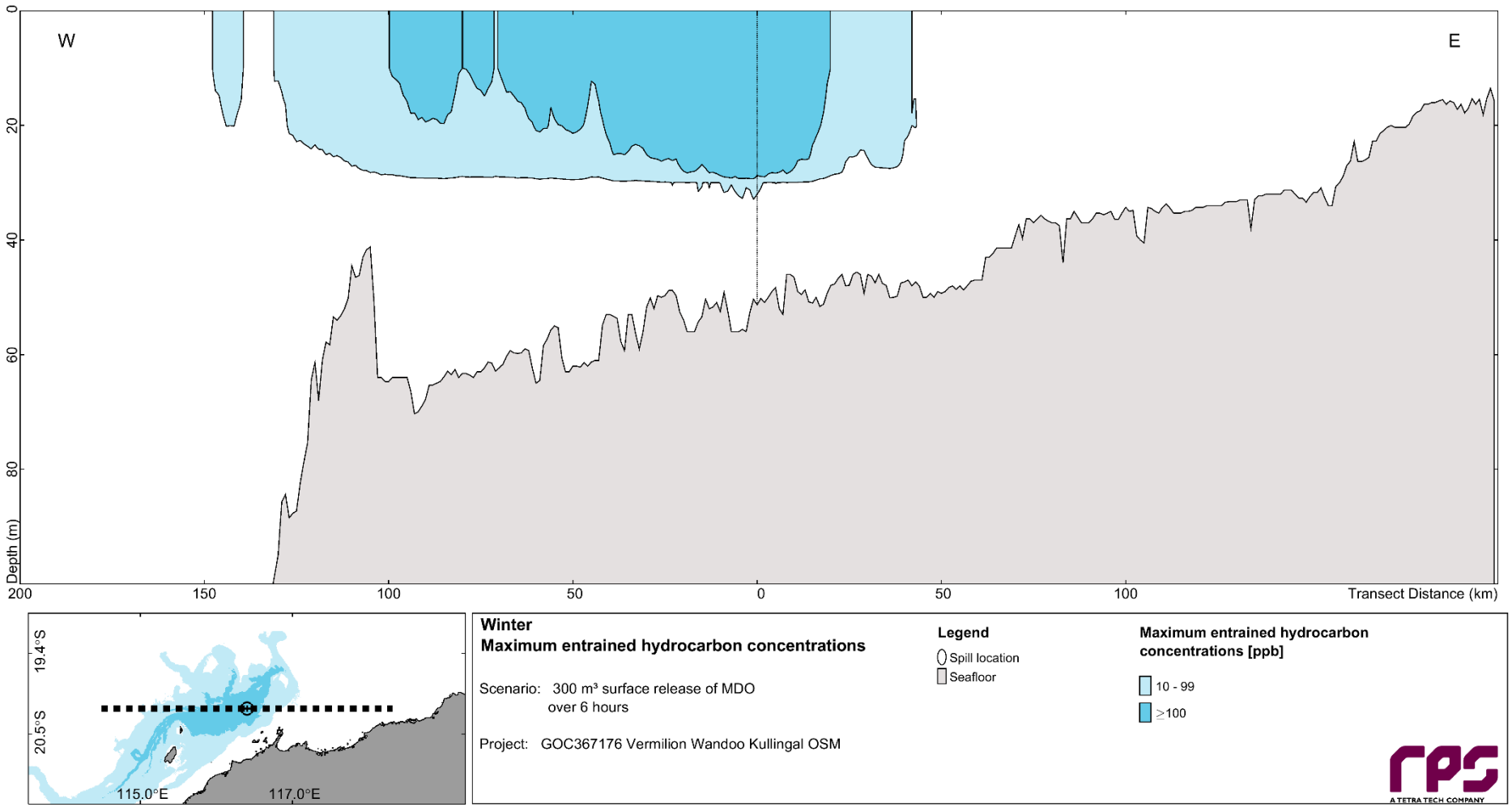


Figure 14.72 East-west cross-section transect of entrained hydrocarbon concentrations following a surface LOWC at Kullingal. The results were calculated from 100 spill simulations and represent winter conditions.

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TERMS AND ABBREVIATIONS

Term/Abbreviation	Meaning
Actionable oil	Oil which is thick enough for the effective use of mitigation strategies.
AMSA	Australian Maritime Safety Authority
API	American Petroleum Institute gravity. A measure of how heavy or light a petroleum liquid is compared to water.
Bonn Agreement	An agreement for cooperation in dealing with pollution of the North Sea by oil and other harmful substances, established 1983 includes: Governments of the Kingdom of Belgium, the Kingdom of Denmark, the French Republic, the Federal Republic of Germany, the Republic of Ireland, the Kingdom of the Netherlands, the Kingdom of Norway, the Kingdom of Sweden, the United Kingdom of Great Britain and Northern Ireland and the European Union.
BP	Boiling point. The temperature at which the vapor pressure of the liquid is equal to the pressure exerted on it by the surrounding atmosphere
BTEX	Benzene, toluene, ethylbenzene, and xylenes
Decay	The process where oil components are changed either chemically or biologically (biodegradation) to another compound. It includes breakdown to simpler organic carbon compounds by bacteria and other organisms, photo-oxidation by solar energy, and other chemical reactions.
Dynamic viscosity	The dynamic viscosity of a fluid expresses its resistance to shearing flows, where adjacent layers move parallel to each other with different speeds.
Floating oil exposure	Contact by floating oil on the sea surface at concentrations equal to or exceeding defined threshold concentrations. The consequence will vary depending on the threshold and the receptors
HYCOM	Hybrid Coordinate Ocean Model. A data-assimilative, three-dimensional ocean model
HYDROMAP	Advanced ocean/coastal tidal model used to predict tidal water levels, current speed and current direction.
MAHs	Monoaromatic hydrocarbons
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
PAH	Polynuclear aromatic hydrocarbons
Pour Point	The pour point of a liquid is the temperature below which the liquid loses its flow characteristics
Shoreline accumulation	Arrival of oil at or near shorelines at on-water concentrations equal to or exceeding defined threshold concentrations. Shoreline accumulation is judged for floating oil arriving within a 2 km buffer zone from any shoreline as a conservative measure.
SIMAP	Spill Impact Model Application Package. SIMAP is designed to simulate the fate and effects of spilled hydrocarbons for surface or subsea releases.
Stochastic (multiple) oil spill modelling	Stochastic oil spill modelling is created by overlaying and statistically analysing the outcomes of many single oil-spill simulations of a defined spill scenario, where each simulation was subject to a different sequence of metocean conditions, selected objectively (typically by random selection) from a long sequence of historic conditions for the study area. Analysis of this larger set of simulations provides a more accurate indication of the areas of potential exposure and indicates which locations are more likely to be exposed (as well as other statistics). Stochastic oil spill modelling avoids biases that affect single oil spill modelling (due to the reliance on only one possible sequence of conditions). However, when interpreting stochastic modelling, which is based on a wide range of potential conditions that might happen to occur, it is essential to understand that calculations will encompass a much larger area than could be affected in any single spill event, where a more limited set of conditions will occur. Consequently, it is misleading to imply that the region derived from stochastic modelling indicate the outcomes expected from a single spill event (NOPSEMA, 2018) Stochastic modelling is generally used for risk assessment and preparedness planning by indicating locations that could be exposed and may require response or subsequent impact assessment.

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EXECUTIVE SUMMARY

Background

Vermilion Oil and Gas Australia Pty Ltd (VOGA) operates the Wandoo field, located approximately 70 km northwest of Dampier, Western Australia, in waters approximately 50 m deep.

To support the preparation of the Wandoo Facility Environment Plan (EP) and Oil Pollution Emergency Plan (OPEP), a detailed oil spill modelling study was commissioned, which assessed the following hypothetical scenarios:

- **Scenario 1:** A 300 m^3 surface release of Wandoo crude from the offtake export system over 1 hour;
- **Scenario 2:** A 2,200 m^3 surface release of marine gas oil (MGO) from Wandoo B's shaft 2 over 12 hours; and
- **Scenario 3:** A 10,000 m^3 surface release of Wandoo crude over 24 hours from the tanker collision.

The potential exposure of surrounding waters and shorelines was assessed and presented for the three distinct seasons, summer (October to February), winter (April to July) and transitional (March, August and September). This approach provides a comprehensive understanding of potential risks and impacts across different seasons and varying environmental conditions.

It is important to note that this modelling study does not encompass any spill prevention, mitigation, or response strategies that would be implemented in the event of an actual spill.

Methodology

The modelling study was carried out in stages. Firstly, a 10-year wind and current dataset (2010–2019) that includes the combined influence of large-scale ocean and tidal currents was prepared. Secondly, the currents, local winds and the oil properties were input into the three-dimensional oil spill model (SIMAP) to model the movement, spreading, entrainment, weathering and potential shoreline accumulation over time.

A total of 300 spill simulations were modelled per season, comprising of 100 simulations per season (summer, winter and transitional conditions). Each scenario specific simulation had the same spill information, including spill volume, duration and hydrocarbon composition, however, random start times were used to capture a diverse range of wind and current conditions.

Once all 100 simulations were completed, the results were combined to assess the potential exposure to the surrounding waters, shorelines, and receptors. The assessment was based on the thresholds defined in the NOPSEMA Oil Spill Modelling Bulletin (NOPSEMA, 2019), along with the 1,000 ppb entrained hydrocarbon threshold.

Oil Properties

Wandoo Crude (API 19.4) was used for this oil spill modelling study. The unweathered mixture has a density of 937.7 g/cm^3 (at 16°C), a dynamic viscosity of 161 cP and a pour point of -24°C, which ensures that this crude will remain in a liquid state over the annual temperature range observed.

Wandoo Crude is composed of approximately 1.7% (by mass) of volatile hydrocarbons (Boiling point (BP) < 180°C) that will evaporate within the first 12 hours. A further 10.2% of the oil is characterised as the semi-volatile compounds (180°C < BP < 265°C) that will likely evaporate within the first 24 hours when on the surface and 33.1% represent the low volatiles (265°C < BP < 380°C), which typically evaporate over several weeks. A relatively high proportion (55%) of hydrocarbon compounds is persistent, which are unlikely to evaporate and will decay over time. According to AMSA (2023) classifications the crude is categorised as a Group IV persistent.

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MGO has an API of 37.6, which equates to a density of 829.1 kg/m^3 (at 25ºC) and a viscosity of 4.0 cP. The low viscosity (14.0 cP at 25ºC) indicates that this oil will spread quickly when released and will form a thin to low thickness film on the sea surface, increasing the rate of evaporation. In favourable evaporation conditions, about 6.0% of the oil mass should evaporate within the first 12 hours (BP < 180°C); a further 34.6% should evaporate within the first 24 hours (180°C < BP < 265°C); and a further 54.4% should evaporate over several days (265°C < BP < 380°C). Approximately 5.0% of the oil is shown to be persistent. It is categorised as a Group II oil (light-persistent) according to the AMSA (2023) classifications.

It's noteworthy that the heavier components of the Wandoo crude and MGO, specifically the low-volatile and residual (persistent) portions will have a strong tendency to become entrained into the water column in the presence of winds speeds above 7 knots and in turn breaking waves, however, it can re-surface under calm conditions (less than 7 knots).

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Key Results

A detailed summary of the results for the modelled scenario is provided in the table below.

		Scenario 1 – Export system	Scenario 2 – Wandoo B shaft 2	Scenario 3 – Tanker collision
Spill volume		300 m^3	2,200 m^3	10,000 m^3
Oil type		Wandoo crude	MGO	Wandoo crude
Release depth		0 m (surface)	0 m (surface)	0 m (surface)
Release duration		1 hour	12 hours	24 hours
Simulation length		30 days	50 days	50 days
Floating Oil Exposure	Maximum distances from the release location to floating oil exposure thresholds	Floating oil concentrations ≥1 g/m^2 could extend up to 347 km from the release location. The maximum distances reduced to 56 km and 20 km as the threshold increases to ≥10 g/m^2 and ≥50 g/m^2, respectively.	Floating oil concentrations ≥1 g/m^2 could extend up to 166 km from the release location. The maximum distances reduced to 33 km and 24 km as the threshold increases to ≥ 10 g/m^2 and ≥50 g/m^2, respectively.	Floating oil concentrations ≥1 g/m^2 could extend up to 728 km from the release location. The maximum distances reduced to 367 km and 129 km as the threshold increases to ≥ 10 g/m^2 and ≥50 g/m^2, respectively.
	Highest probability of floating oil exposure to a receptor at, or above, 1 g/m^2	Montebello AMP, 5% during transitional conditions	Montebello AMP, 1% during summer and winter conditions	Montebello AMP, 69% during winter conditions
	Quickest time before exposure to a receptor at, or above, 1 g/m^2	Montebello AMP, 1 day 13 hours during winter conditions	Montebello AMP, 2 day 3 hours during winter conditions	Montebello AMP, 1 day 2 hours during summer conditions.
Shoreline Oil Accumulation	Probability of oil accumulation on **any** shoreline at, or above, 10 g/m^2	66% during winter conditions	34% during winter conditions	99% during winter conditions
	Maximum volume of oil ashore from a single spill simulation at, or above, 10 g/m^2	62.8 m^3 during winter conditions	15 m^3 during winter conditions	3,595.4 m^3 during summer conditions
	Absolute minimum time for oil to accumulate on a shoreline cell at ,or above, 10 g/m^2	WA11.West (318) - Barrow Island and Montebello Islands (A), 2 days 20 hours during winter conditions	WA11.West (318) - Barrow Island and Montebello Islands (A), 3 days 22 hours during winter conditions	WA11.West (318) - Barrow Island and Montebello Islands (A), 2 days 22 hours during winter conditions
	Highest probability of oil accumulation for a shoreline cell at, or above, 10 g/m^2	WA11.West (326) - Baresand Point - Entrance Point E, 43% during winter conditions	WA11.West (318) - Barrow Island and Montebello Islands (A), 21% during winter conditions	WA11.West (326) - Baresand Point - Entrance Point E, 73% during winter conditions
	Maximum volume of oil ashore from a single spill simulation for a shoreline cell at, or above, 10 g/m^2	47 m^3, WA11.West (318) - Barrow Island and Montebello Islands (A), during winter conditions	15 m^3, WA11.West (318) - Barrow Island and Montebello Islands (A), during winter conditions	2,312 m^3, WA11.West (318) - Barrow Island and Montebello Islands (A), during winter conditions
Dissolved Hydrocarbons	Maximum distances from the release location to dissolved	Concentrations ≥10 ppb threshold may extend up to 45 km from the release location. No	Concentrations ≥10 ppb threshold may extend up to 307 km from the release location. As the threshold	Concentrations exceeding 10 ppb may potentially extend up to 1,043 km from the release location. As the

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	hydrocarbon exposure thresholds	exposure was predicted above 50 ppb.	increases to 50 ppb and 400 ppb, the maximum distance decreases to 180 km and 30 km, respectively.	threshold increases to above 50 ppb, the maximum distance decreases to 423 km. No exposure was predicted at, or above, 400 ppb.
	Highest probability of dissolved hydrocarbon exposure to a receptor at, or above, 10 ppb	NC	Montebello AMP, 15% during winter conditions	Montebello AMP, 40% during winter conditions
	Quickest time before exposure to a receptor at, or above, 10 ppb	NC	Montebello AMP, 1 day during summer conditions	Montebello AMP, 23 hours during summer conditions
Entrained Hydrocarbons	Maximum distances from the release location to entrained hydrocarbons exposure thresholds	Concentrations ≥10 ppb threshold may extend up to 504 km from the release location. As the threshold increases to 100 ppb and 1,000 ppb, the maximum distance decreases to 326 km and 56 km, respectively.	Concentrations ≥10 ppb threshold may extend up to 729 km from the release location. As the threshold increases to 100 ppb and 1,000 ppb, the maximum distance decreases to 452 km and 175 km, respectively.	Concentrations exceeding 10 ppb may potentially extend up to 1,319 km from the release location. As the threshold increases above 100 ppb and 1,000 ppb, the maximum distance decreases to 599 km and 399 km, respectively.
	Highest probability of entrained hydrocarbon exposure to a receptor at, or above, 10 ppb	Montebello AMP, 63% during winter conditions	Montebello AMP, 72% during winter conditions	Montebello AMP, 92% during winter conditions
	Quickest time before exposure to a receptor at, or above, 10 ppb	Montebello AMP, 18 hours during winter conditions	Montebello AMP, 20 hours during summer conditions	Montebello AMP, 21 hours during summer conditions

NC: No contact to receptor predicted for specified threshold.

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1 INTRODUCTION

1.1 Background

Vermilion Oil and Gas Australia Pty Ltd (VOGA) operates the Wandoo field, located approximately 70 km northwest of Dampier, Western Australia, in waters approximately 50 m deep.

To support the preparation of the Wandoo Facility Environment Plan (EP) and Oil Pollution Emergency Plan (OPEP), a detailed oil spill modelling study was commissioned. This study assessed the following hypothetical scenarios:

- **Scenario 1:** A 300 m^3 surface release of Wandoo crude from the offtake export system over 1 hour;
- **Scenario 2:** A 2,200 m^3 surface release of marine gas oil (MGO) from Wandoo B's shaft 2 over 12 hours; and
- **Scenario 3:** A 10,000 m^3 surface release of Wandoo crude over 24 hours from the tanker collision

The release location coordinates are presented in Table 1-1 and illustrated graphically in Figure 1.1. The potential exposure of surrounding waters and shorelines was assessed and presented for the distinct seasons, summer (October to February), winter (April to July) and transitional (March, August and September).

The spill modelling was performed using an advanced three-dimensional trajectory and fates model; Spill Impact Model Application Package (SIMAP). The SIMAP model calculates the transport, spreading, entrainment and evaporation of spilled hydrocarbons over time, based on the prevailing wind and current conditions and the physical and chemical properties. The modelling does not take into consideration any of the spill prevention, mitigation and response capabilities that would be implemented in response to the spill.

The hydrocarbon spill model, the method and analysis applied herein use modelling algorithms which have been peer reviewed and published in international journals. Further, RPS warrants that this work meets and exceeds the American Society for Testing and Materials (ASTM) Standard F2067-22 "*Standard Practice for Development and Use of Oil Spill Models*".

Table 1-1 Coordinates of the oil spill modelling release locations.

Scenario	Description	Latitude*	Longitude*	Water Depth (m)
1	Surface release of Wandoo crude from offtake export system	20° 7' 2.0" S	116° 26' 2" E	50
2	Surface release of MGO from Wandoo B's shaft 2	20° 7' 43" S	116° 26' 4" E	50
3	Surface release of Wandoo crude from the tanker collision	20° 6' 57.43"	116° 26' 06.51"	50

*Datum: WGS 1984

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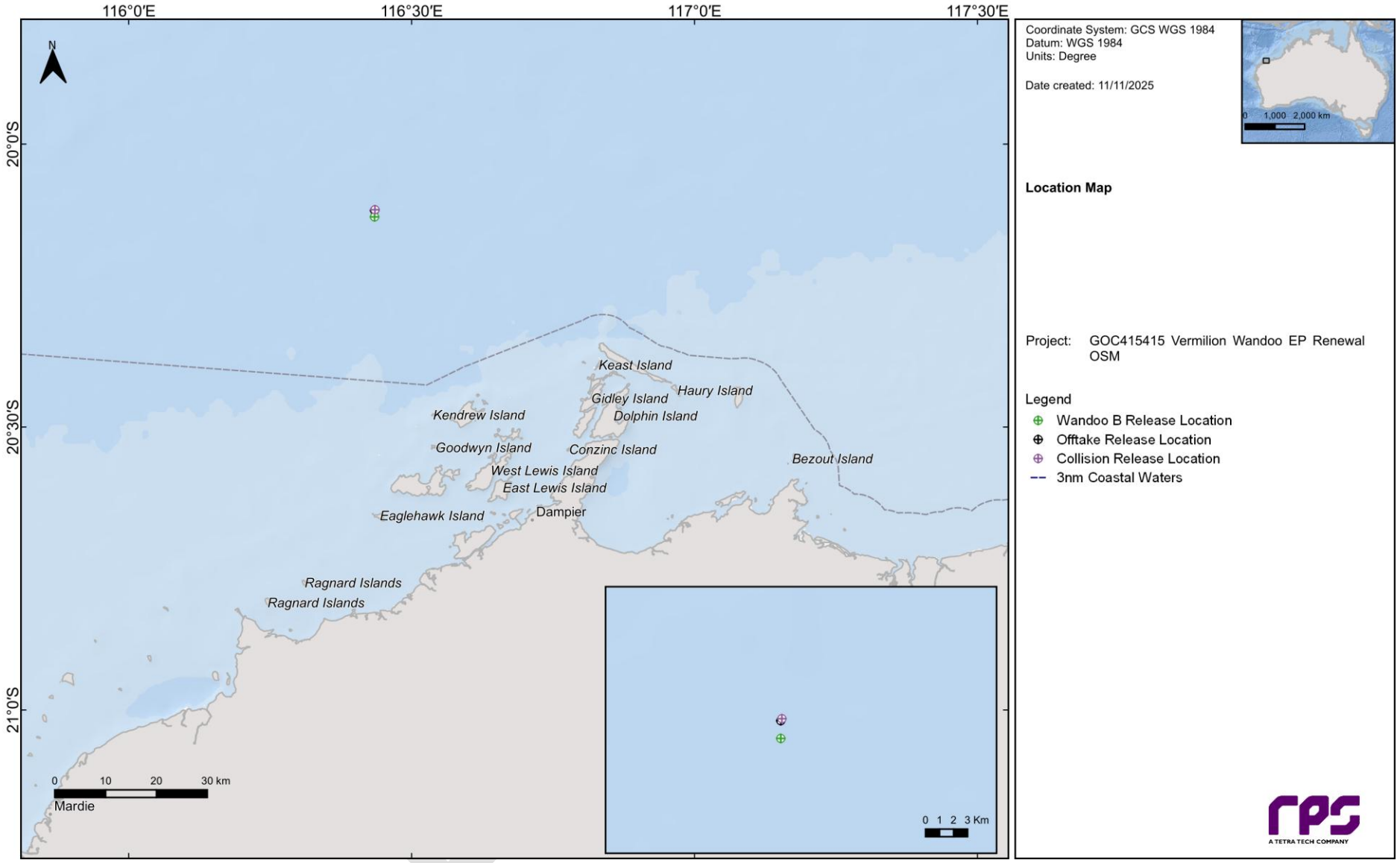


Figure 1.1 Map of the oil spill modelling release locations.

What is Oil Spill Modelling?

1.1.1 Stochastic Modelling (Multiple Spill Simulations)

Stochastic oil spill modelling is created by overlaying a great number (often hundreds) of individual, computer-simulated hypothetical spills (NOPSEMA, 2018; Figure 1.2).

Stochastic modelling is a common means of assessing the potential risks from oil spills related to new projects and facilities. Stochastic modelling typically utilises hydrodynamic data for the location in combination with historic wind data. Typically, 100 simulations are run, which sufficiently samples the historic dataset that is most relevant to the season or timing of the project.

The outcomes are often presented as a probability of exposure and are primarily used for risk assessment purposes in view to understand the range of environments that may be affected or impacted by a spill. Elements of the stochastic modelling can also be used in oil spill preparedness and planning.

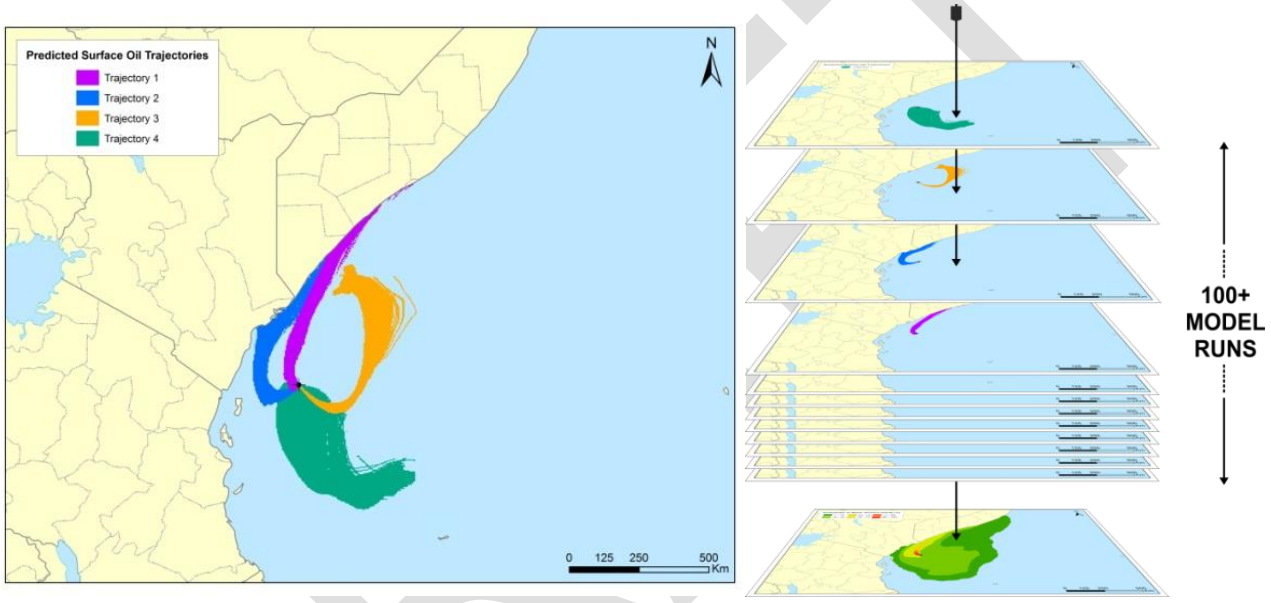


Figure 1.2 Examples of four individual spill trajectories (four replicate simulations) predicted by SIMAP for a spill scenario (left pane). The frequency of contact for given locations is used to calculate the probability of impacts during a spill. Essentially, all model runs are overlain (shown as the stacked runs on the right) and the number of times that trajectories contact a given location at a concentration is used to calculate the probability.

2 SCOPE OF WORK

The scope of work included the following components:

1. Generate 10 years (2010 to 2019 (inclusive)) of wind and current data. The three-dimensional current data include the combined influence of ocean and tidal currents;
2. Include the wind data, current data and hydrocarbon properties as input into the three-dimensional oil spill model; SIMAP, to model the movement, spreading, entrainment, weathering and potential shoreline accumulation over time;
3. A total of 300 spill simulations were modelled per scenario, comprising of 100 simulations per season (summer (December to February), winter (April to August) and transitional (March and September to November)). Each simulation had the same spill information (spill volume, duration and oil properties) but different start times to ensure a range of wind and current conditions were assessed; and
4. Combine the results from the 100 spill simulations per season for each scenario to determine the potential exposure to the surrounding waters, shorelines and sensitive receptors based on the thresholds outlined in the NOPSEMA Oil Spill Modelling Bulletin (NOPSEMA, 2019), along with the 1,000 ppb entrained hydrocarbon threshold.
5. Combine the results for all 300 simulations per scenario to generate the socio-economic and ecological Environments that May Be Affected (EMBAs) and scientific monitoring planning area (SMPA) based on the appropriate oil phase thresholds.

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3 REGIONAL CURRENTS

The area of interest for this study is typified by strong tidal flows over the shallower regions, particularly along the inshore region of the North West Shelf and among the island groups stretching from the Dampier Archipelago to the North West Cape. However, the offshore regions with water depths exceeding 100 m – 200 m experience significant large-scale drift currents. These drift currents can be relatively strong (1 knot – 2 knots) and complex, manifesting as a series of eddies, meandering currents, and connecting flows. These offshore drift currents also tend to persist longer (days to weeks) than tidal current flows (hours between reversals) and thus will have greater influence upon the net trajectory of slicks over time scales exceeding a few hours.

Wind shear on the water surface also generates local-scale currents that can persist for extended periods (hours to days) and result in long trajectories. Hence, the current-induced transport of oil can be variably affected by combinations of tidal, wind-induced, and density-induced drift currents. Depending on their local influence, it is critical to consider all these potential advective mechanisms to rigorously understand patterns of potential transport from a given spill location. A comprehensive description of the circulation patterns of the North West Shelf is provided in a review by Condie & Andrewartha (2008).

A schematic of the ocean currents along the North West Australian continental shelf is shown in Figure 3.1.

While the tidal currents are generally weaker in the deeper waters, their influence is greatest along the near shore, coastal passage regions and, in and around islands. Therefore, to accurately account for the movement of an oil spill, which can move between the nearshore and offshore region, ocean and tidal currents were combined as part of the study.

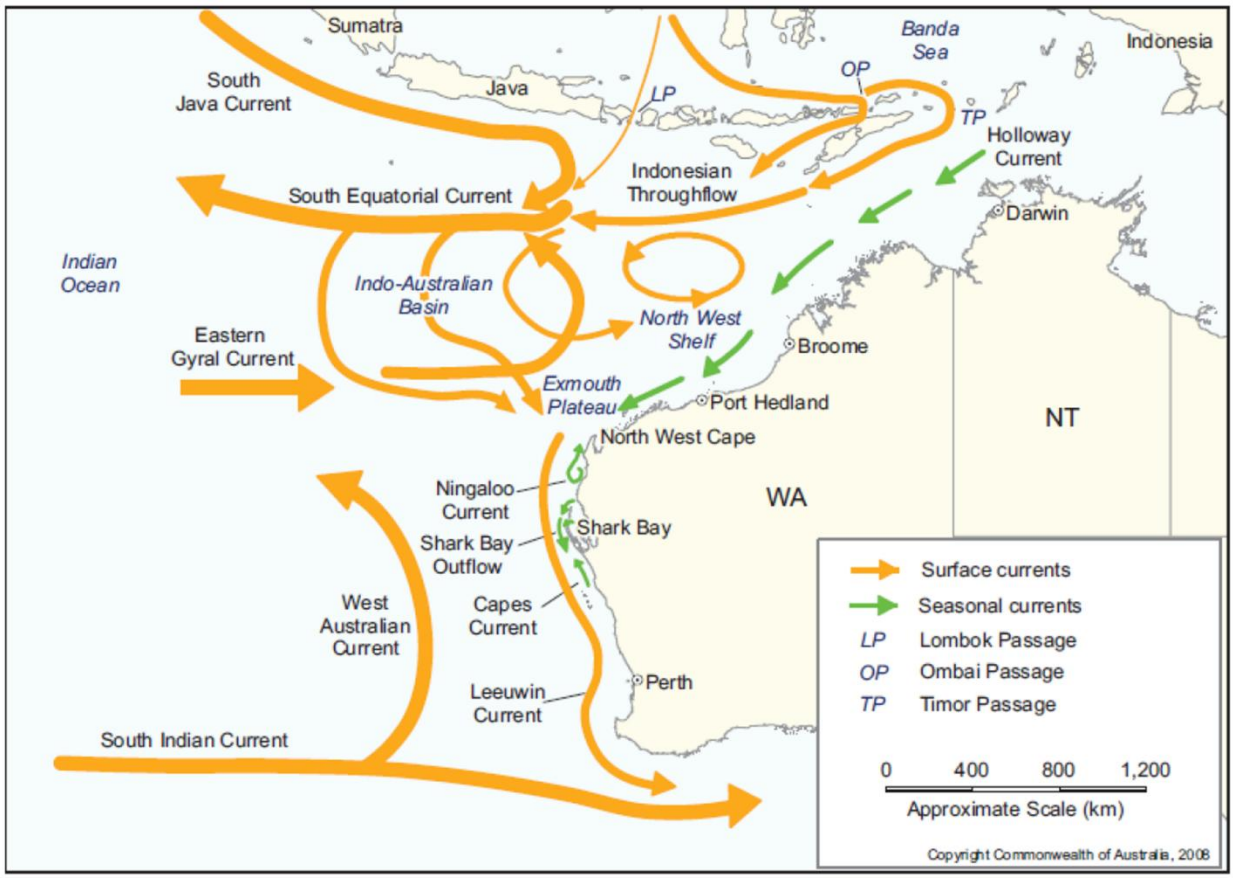


Figure 3.1 Schematic of ocean currents along the northwestern Australian continental shelf. Image adapted from DEWHA (2008).

3.1 Tidal Currents

The effects of tides were generated using RPS's advanced ocean/coastal model, HYDROMAP. The HYDROMAP model has been thoroughly tested and verified through field measurements throughout the world for over 35 years (Isaji and Spaulding, 1984; Isaji et al., 2001; Zigic et al., 2003; Makarynskyy et al., 2010), whilst being used for a wide variety of disciplines within marine environments (e.g. Zigic et al., 2003; Talouli et al., 2009; Zigic et al., 2009; King et al., 2010; Makarynskyy et al., 2010; 2015). In fact, HYDROMAP tidal current data have been used as input for the OILMAP hydrocarbon spill modelling system, which forms part of the Incident Management System (IMS) operated by Maritime New Zealand (MNZ), Australian Maritime Safety Authority (AMSA) and the United Kingdom Maritime and Coastguard Agency, as well as several major oil and gas companies.

HYDROMAP employs a sophisticated sub-gridding strategy, which supports up to six levels of spatial resolution, halving the grid cell size as each level of resolution is employed. The sub-gridding allows for higher resolution of currents within areas of greater bathymetric and coastline complexity, and/or of particular interest to a study.

The numerical solution methodology follows that of Davies (1977a and 1977b) with further developments for model efficiency by Owen (1980) and Gordon (1982). A more detailed presentation of the model can be found in Isaji and Spaulding (1984) and Isaji et al. (2001).

3.1.1 Grid Setup

The tidal model domain has been sub-gridded to a resolution of 500 m for shallow and coastal regions, starting from an offshore (or deep water) resolution of 8 km. The finer grids were allocated in a step-wise fashion to resolve flows more accurately along the coastline, around islands and over regions with more complex bathymetry. Figure 3.2 shows the tidal model grid resolutions.

A combination of datasets was used and merged to describe the shape of the seabed within the grid domain (Figure 3.3). These included spot depths and contours which were digitised from nautical charts released by the hydrographic offices as well as Geoscience Australia database, and depths extracted from the Shuttle Radar Topography Mission (SRTM30_PLUS) Plus dataset (see Becker et al., 2009).

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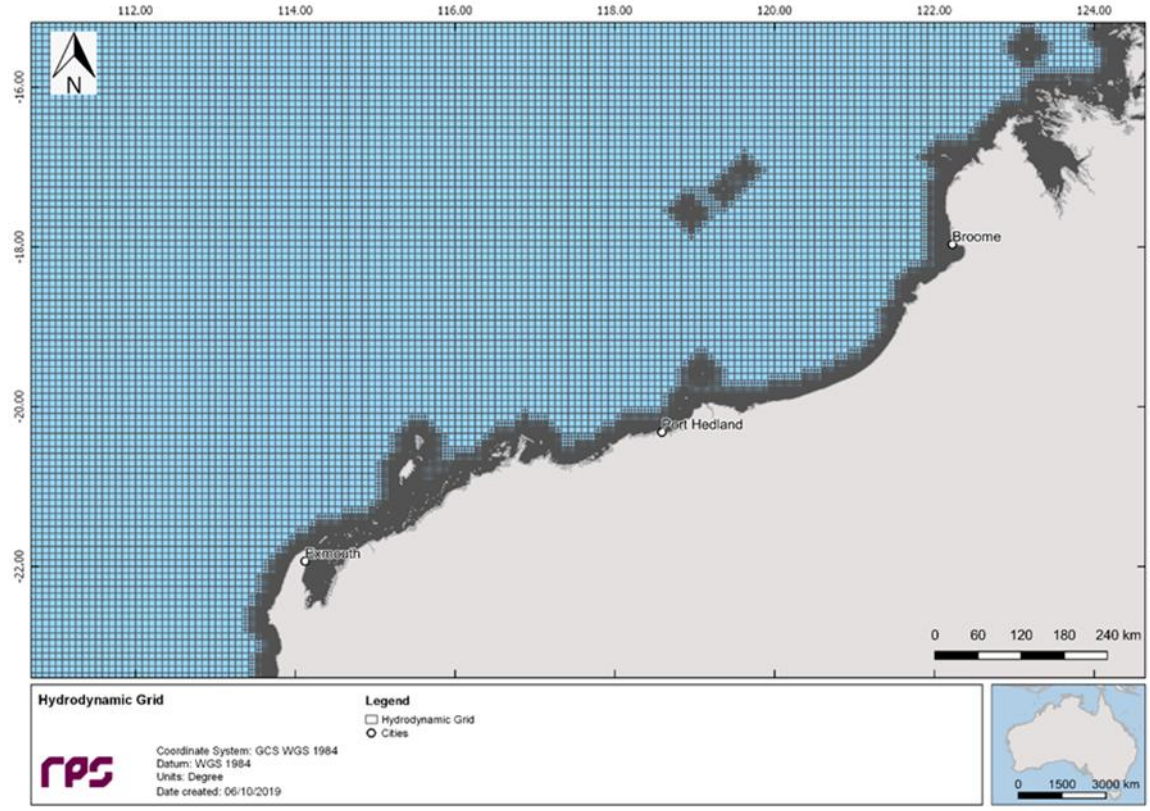


Figure 3.2 Zoomed in view of the model grid used to generate the tidal currents for the study region. Higher resolution areas are shown by the denser mesh.

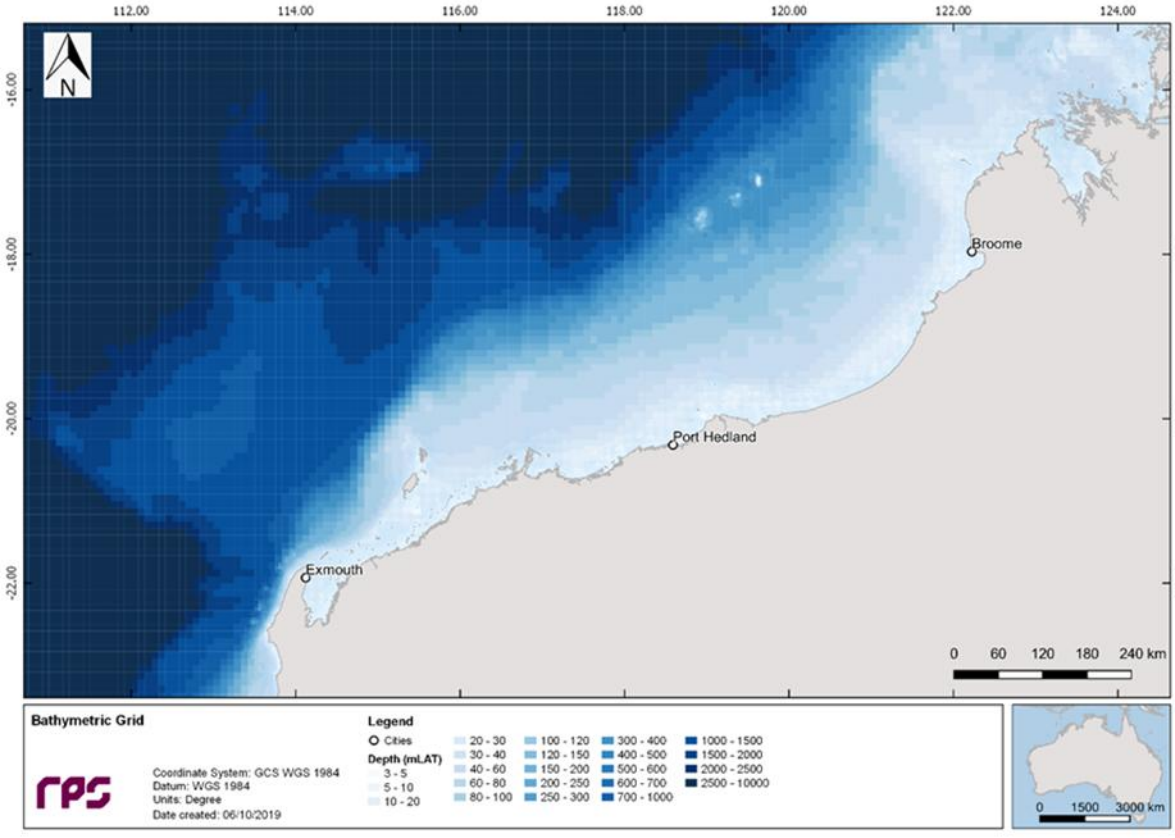


Figure 3.3 Bathymetry defined throughout the tidal model domain.

3.1.2 Tidal Conditions

The ocean boundary data for the regional model was obtained from satellite measured altimetry data (TOPEX/Poseidon 7.2) which provided estimates of the eight dominant tidal constituents at a horizontal scale of approximately 0.25 degrees. The eight major tidal constituents used were K_2, S_2, M_2, N_2, K_1, P_1, O_1 and Q_1. Using the tidal data, surface heights were firstly calculated along the open boundaries, at each time step in the model.

The TOPEX/Poseidon satellite data have a global resolution of 0.25 degrees and is produced and quality controlled by NASA (National Aeronautics and Space Administration). The satellites equipped with two highly accurate altimeters and capable of taking sea level measurements with an accuracy of ± 5 cm measured oceanic surface elevations (and the resultant tides) for over 13 years (1992–2005). In total, these satellites carried out 62,000 orbits of the planet.

The Topex-Poseidon tidal data have been extensively reported and utilised within the oceanographic community (e.g. Andersen, 1995; Ludicone et al., 1998; Matsumoto et al., 2000; Kostianoy et al., 2003; Yaremchuk and Tangdong, 2004; Qiu and Chen 2010; Amores et al., 2019; Sagnieres et al., 2020; Veng et al., 2021; Zeitlhöfler et al., 2023). As such the Topex/Poseidon tidal data is considered suitably accurate for this study.

3.2 Ocean Currents

Data describing the flow of ocean currents were obtained from HYCOM (Hybrid Coordinate Ocean Model, (Chassignet et al., 2007), which is operated by the HYCOM Consortium, sponsored by the National Ocean Partnership Program (NOPP), as part of the U.S. Global Ocean Data Assimilation Experiment (GODAE). HYCOM is a data-assimilative, three-dimensional ocean model that is run as a hindcast (for a past period), assimilating time-varying observations of sea surface height, sea surface temperature and in-situ temperature and salinity measurements (Chassignet et al., 2009). The HYCOM predictions for drift currents are produced at a horizontal spatial resolution of approximately 8.25 km ($1/12^{th}$ of a degree) over the region, at a frequency of every 3 hours. HYCOM uses isopycnal layers in the open, stratified ocean, but uses the layered continuity equation to make a dynamically smooth transition to a terrain following coordinate in shallow coastal regions, and to z-level coordinates in the mixed layer and/or unstratified seas.

For this study, the HYCOM hindcast currents were obtained for the years 2010 to 2019 (inclusive).

3.3 Surface Currents

Figure 3.4 and Figure 3.5 present the monthly and seasonal current rose plots, respectively, for surface waters adjacent to the release locations.

Note the convention for defining current direction throughout this report is the direction the current flows towards. Each branch of the current rose distribution represents the currents flowing to that direction, with north to the top of the diagram. The branches are divided into segments of different colour, which represent the current speed ranges for each direction. Speed intervals of 0.2 m/s are typically used in these current roses. The length of each coloured segment within a branch is proportional to the frequency of currents flowing within the corresponding speed and direction.

The average and maximum monthly current speeds were 0.24 m/s and 2.08 m/s, respectively. Throughout the year, the dominant current directions were northwest and southeast, primarily driven by tidal currents rather than ocean currents, given the proximity of the release locations to shore and shallow waters.

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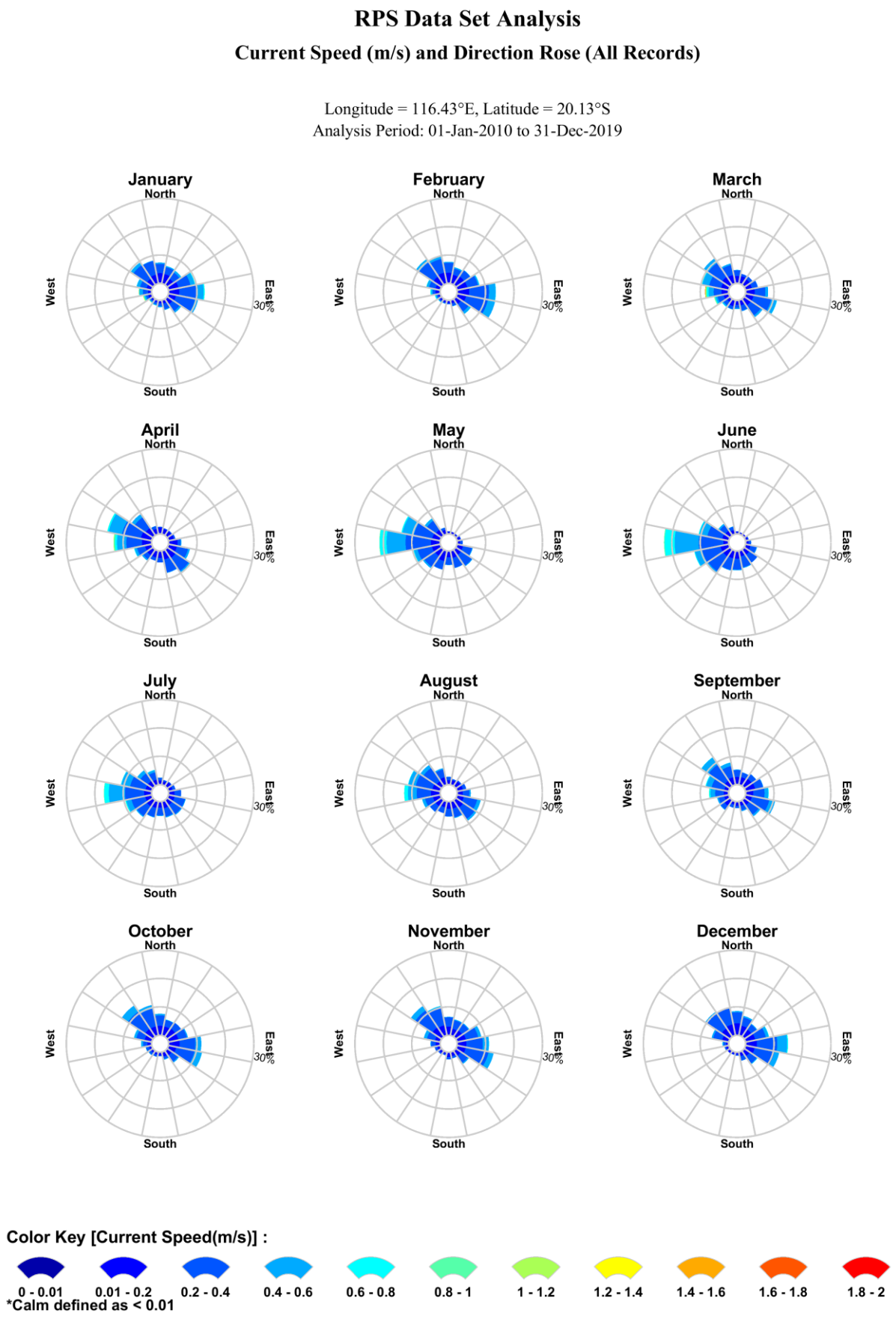


Figure 3.4 Monthly surface current rose plots adjacent to the release location, derived from the 2010 to 2019 modelled dataset.

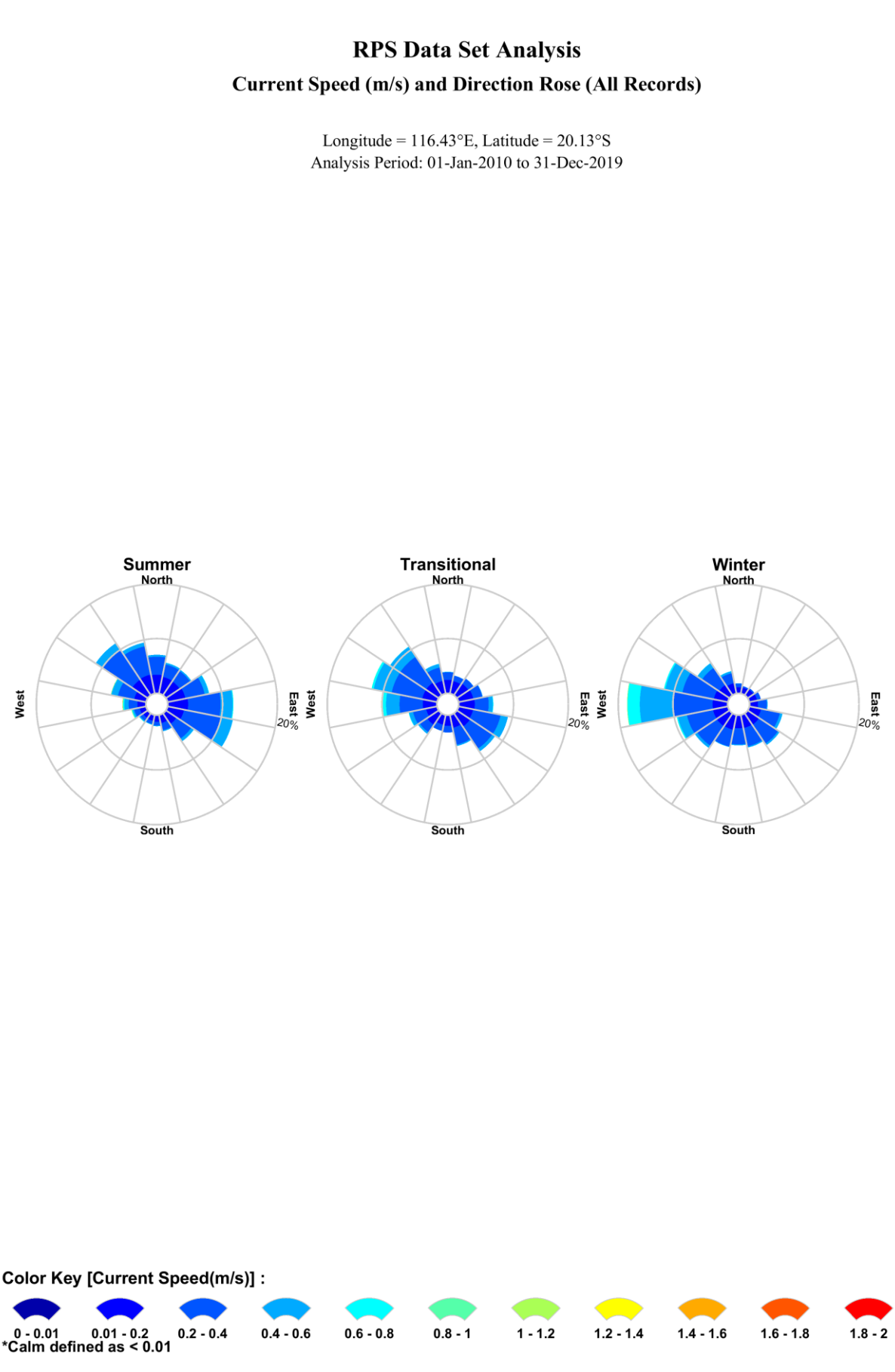


Figure 3.5 Seasonal surface current rose plots adjacent to the release location, derived from the 2010 to 2019 modelled dataset.

4 WIND DATA

To account for the influence of the wind on the floating oil, wind data from 2010 to 2019 (inclusive) was sourced from the National Centre for Environmental Prediction (NCEP) Climate Forecast System Reanalysis (CFSR; see Saha et al., 2010). The CFSR wind model includes observations from many data sources; surface observations, upper-atmosphere air balloon observations, aircraft observations and satellite observations. The model is capable of accurately representing the interaction between the earth's oceans, land and atmosphere. The gridded wind data output is available at ¼ of a degree resolution (~33 km) and 1-hourly time intervals. Figure 4.1 shows the spatial resolution of the wind field used as input into the oil spill model.

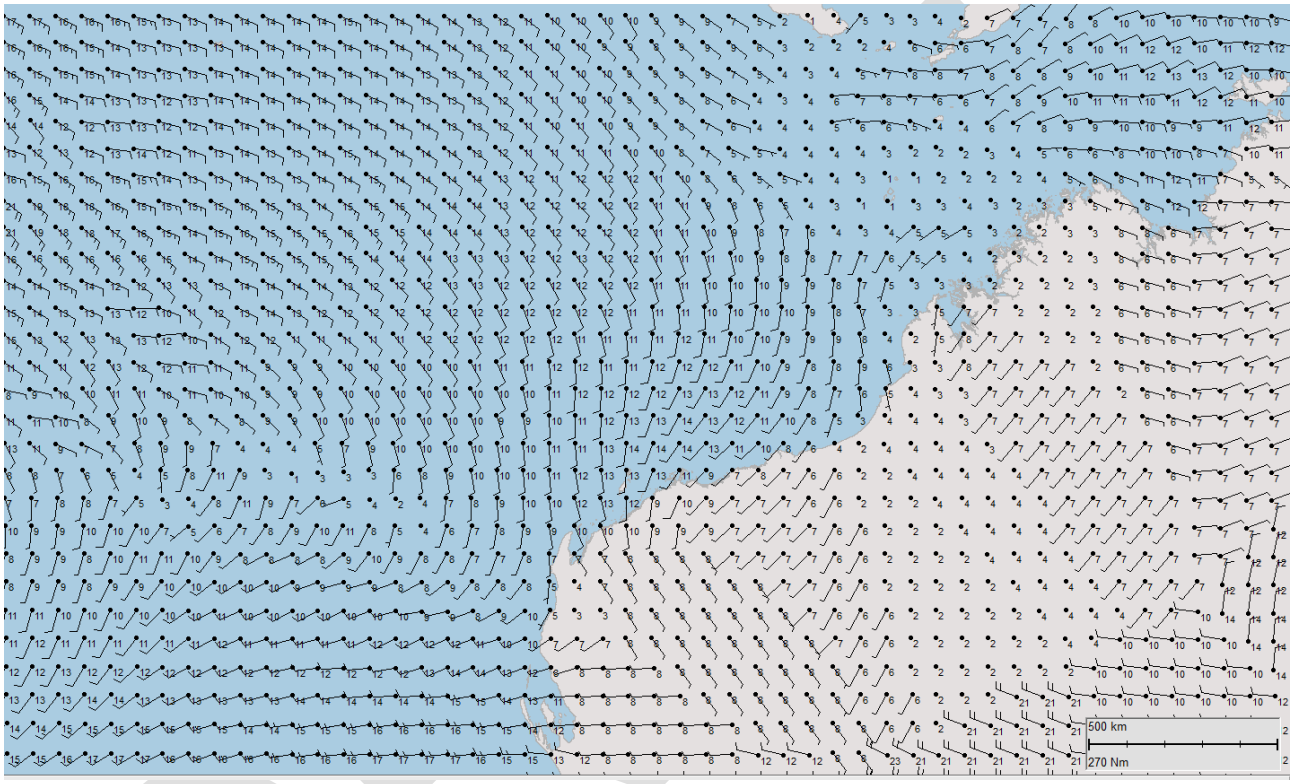


Figure 4.1 Spatial resolution of the CFSR modelled wind data used as input into the oil spill model. Note, for ease viewing only every second wind vector is displayed on the map.

Figure 4.2 and Figure 4.3 illustrate the monthly and seasonal wind rose plots, respectively, adjacent to the release location.

Note that the atmospheric convention for defining wind direction, that is, the direction the wind blows from, is used to reference wind direction throughout this report. Each branch of the rose represents wind coming from that direction, with north to the top of the diagram. Sixteen directions are used. The branches are divided into segments of different colour, which represent wind speed ranges from that direction. Speed ranges of 5 knot intervals are typically used in these wind roses. The length of each segment within a branch is proportional to the frequency of winds blowing within the corresponding range of speeds from that direction.

The average and maximum wind speeds were 12.2 knots and 52.3 knots, respectively. Winds typically blow from the west-southwest during the summer months, while in winter, they predominantly come from the east.

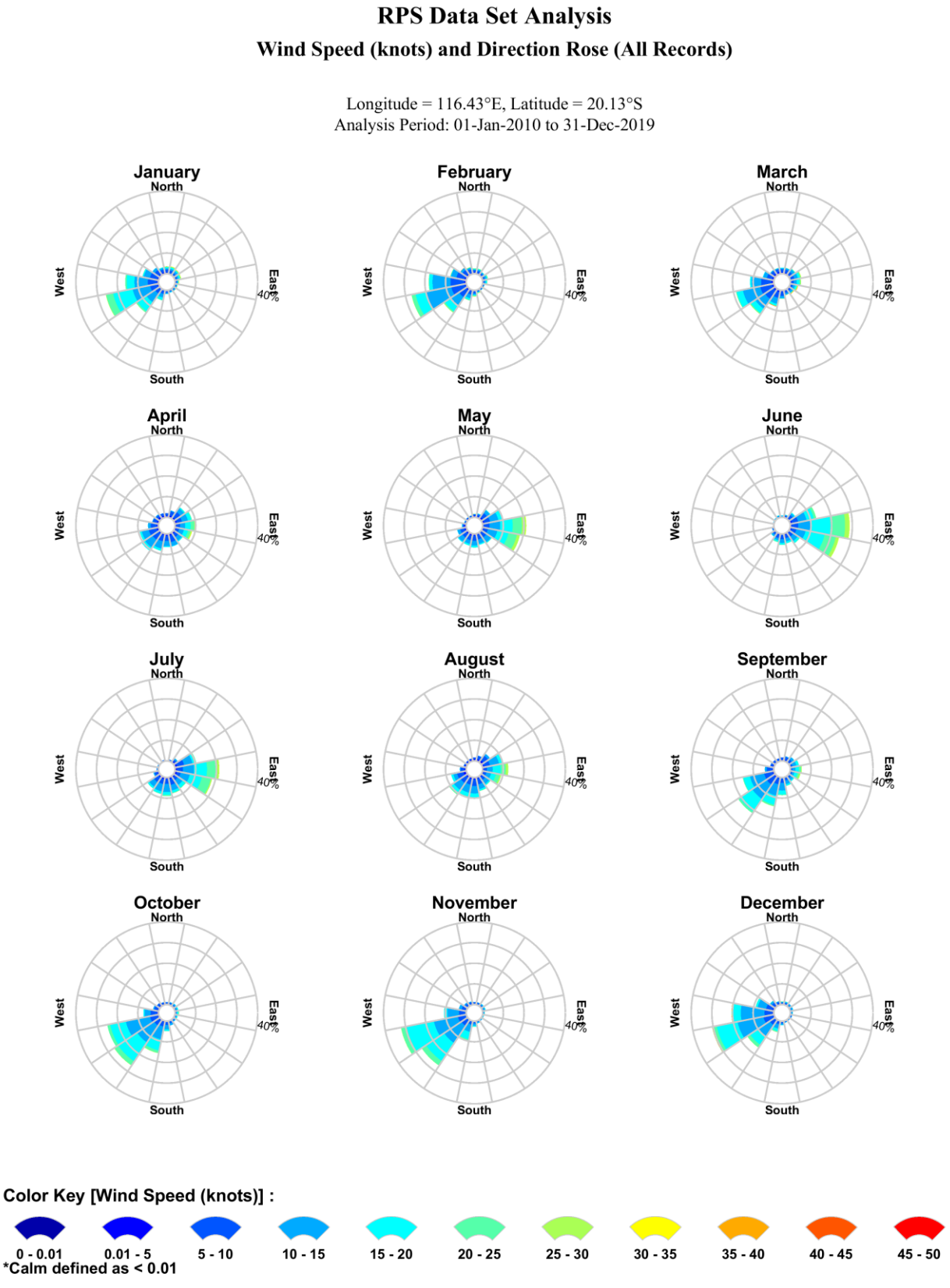


Figure 4.2 Monthly wind rose plots adjacent to the release location, derived from the 2010 to 2019 modelled dataset.

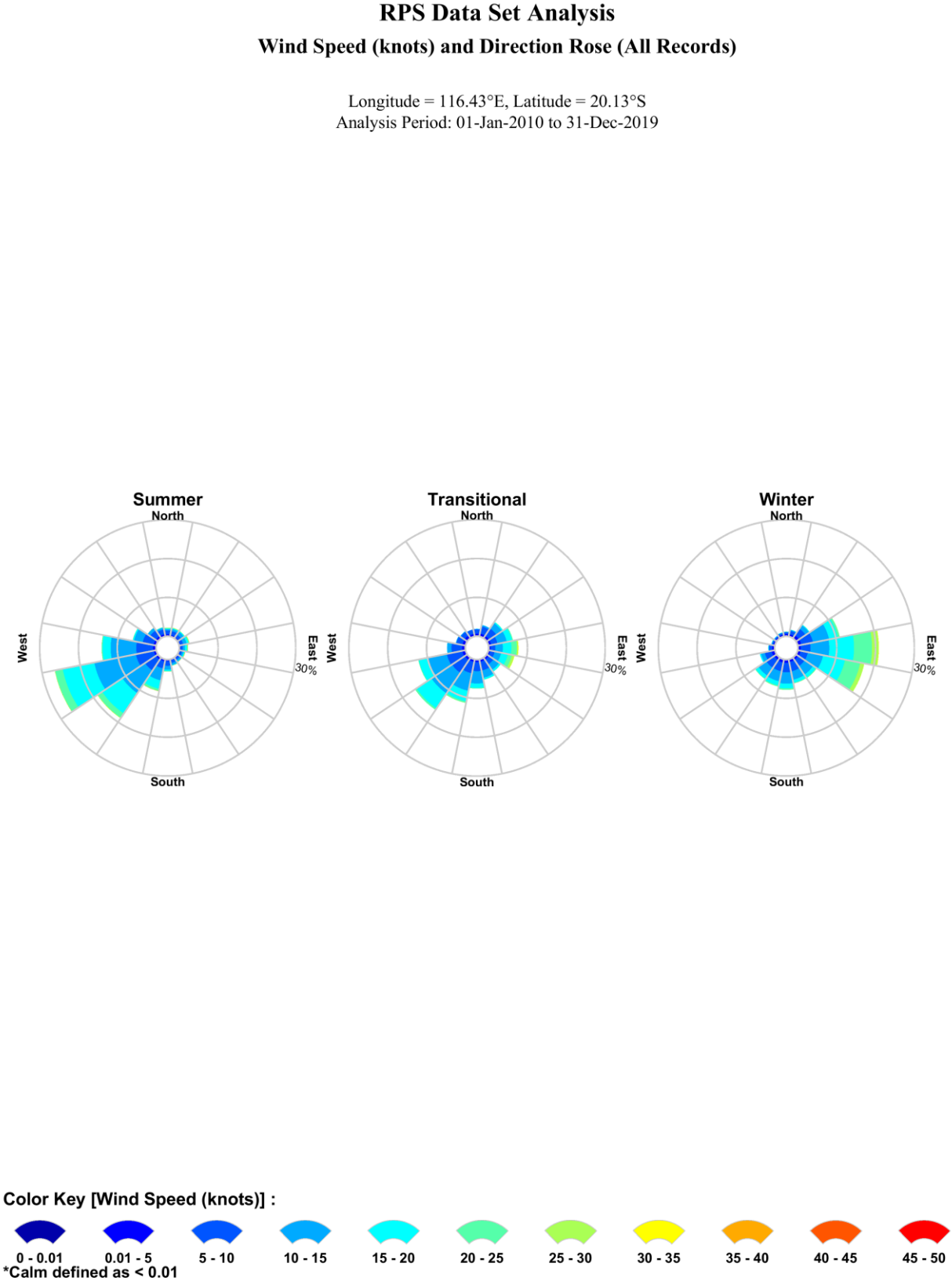


Figure 4.3 Seasonal wind rose plot adjacent to the release location, derived from the 2010 to 2019 modelled dataset.

5 WATER TEMPERATURE AND SALINITY

The monthly depth-varying water temperature and salinity profiles adjacent to the release locations was obtained from HYCOM (see Section 3.2). The data are used to inform the weathering, movement and evaporative loss of hydrocarbon spills in the surface and subsurface layers.

Table 5-1 shows that the monthly average sea surface (0-2 m depth layer) temperatures ranged from 24.0°C (September) to 29.6°C (March). Salinity remained consistent throughout the year ranging between 35.2 ppt and 35.4 ppt.

Figure 5.1 presents monthly temperature and salinity profiles throughout the water column in the vicinity of the release locations.

Table 5-1 Monthly average sea surface (0-2 m depth layer) temperature and salinity in the vicinity of the release locations.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Temperature (°C)	27.5	27.5	29.6	28.2	28.1	26.4	24.7	24.3	24.0	25.8	26.8	27.8
Salinity (psu)	35.3	35.3	35.2	35.2	35.4	35.4	35.2	35.2	35.2	35.2	35.3	35.2

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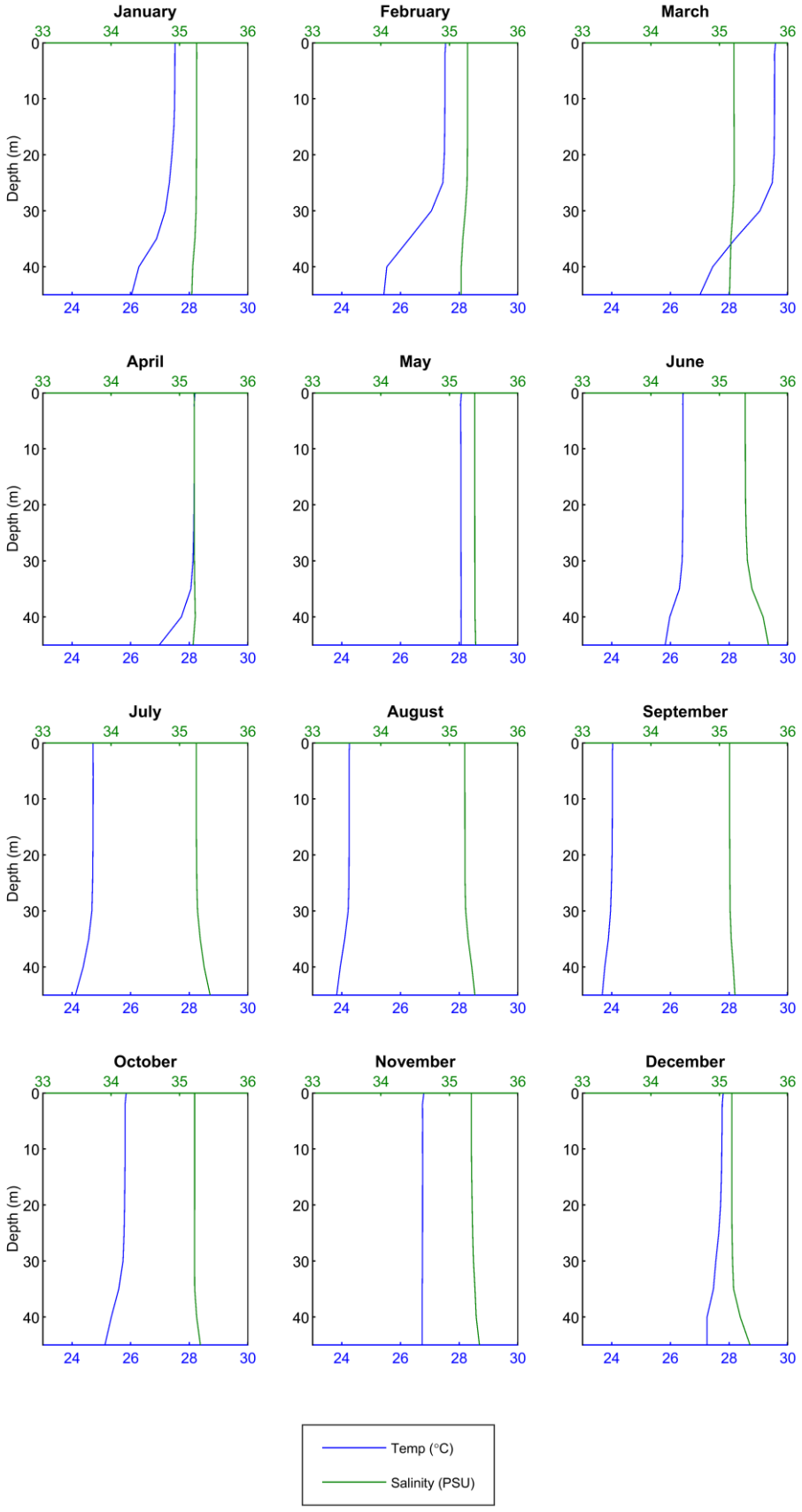


Figure 5.1 Monthly temperature and salinity profiles throughout the water column in the vicinity of the release location.

6 OIL SPILL MODEL SIMAP

The spill modelling was carried out using a purpose-developed oil spill trajectory and fates model, SIMAP (e.g., Spaulding et al., 1994; French et al., 1999; French-McCay, 2003, 2004; French-McCay et al., 2004; 2021; 2022a; 2022b). This model is designed to simulate the transport and weathering processes that affect the outcomes of hydrocarbon spills to the sea, accounting for the specific oil type, spill scenario, and prevailing wind and current circulation patterns.

SIMAP is the evolution of the United States Environmental Protection Agency (US EPA) Natural Resource Damage Assessment model (French et al., 1999) and is designed to simulate the fate and effects of spilled oils and fuels for both the surface slick and the three-dimensional plume that is generated in the water column. SIMAP includes algorithms to account for both physical transport and weathering processes. The latter are important for accounting for the partitioning of the spilled mass over time between the water surface (surface slick), water column (entrained oil and dissolved compounds), atmosphere (evaporated compounds) and land (stranded oil). The model also accounts for the interaction between weathering and transport processes.

The physical algorithms calculate transport and spreading by physical forces, including surface tension, gravity and wind and current forces for both surface slicks and oil within the water column. The fates algorithms calculate all the weathering processes known to be important for oil spilled to marine waters. These include droplet and slick formation, entrainment by wave action, emulsification, dissolution of soluble components, sedimentation, evaporation, bacterial and photo-chemical decay and shoreline interactions. These algorithms account for the specific oil type being considered.

Entrainment is the physical process where globules of oil are transported from the sea surface into the water column by wind and wave-induced turbulence or be generated subsea by a pressurised discharge at depth. It has been observed that entrained oil is broken into droplets of varying sizes. Small droplets spread and diffuse into the water column, while larger ones rise rapidly back to the surface (Delvigne and Sweeney, 1988; Delvigne, 1991).

Dissolution is the process by which soluble hydrocarbons enter the water from a surface slick or from entrained droplets. The lower molecular weight hydrocarbons tend to be both more volatile and more soluble than those of higher molecular weight.

The formation of water-in-oil emulsions, or mousse, which is termed ‘emulsification’, depends on oil composition and sea state. Emulsified oil can contain as much as 80% water in the form of micrometre-sized droplets dispersed within a continuous phase of oil (Daling and Brandvik, 1991; Bobra, 1991; Daling et al., 1997; Fingas, 1995, 1997).

Entrainment, dissolution and emulsification rates are correlated to wave energy, which is accounted for by estimating wave heights from the sustained wind speed, direction and fetch (i.e. distance downwind from land barriers) at different locations in the domain. Dissolution rates are dependent upon the proportion of soluble, short-chained hydrocarbon compounds, and the surface area at the oil/water interface of slicks. Dissolution rates are also strongly affected by the level of turbulence. For example, dissolution rates will be relatively high at the site of the release for a deep-sea discharge at high pressure.

Evaporation can result in the transfer of large proportions of spilled oil from the sea surface to the atmosphere, depending on the type of oil. Evaporation rates vary over space and time dependent on the prevailing sea temperatures, wind and current speeds, the surface area of the slick and entrained droplets that are exposed to the atmosphere as well as the state of weathering of the oil. Evaporation rates will decrease over time, depending on the calculated rate of loss of the more volatile compounds. By this process, the model can differentiate between the fates of different oil types.

Decay (degradation) of hydrocarbons may occur as the result of photolysis, which is a chemical process energised by ultraviolet light from the sun, and by biological breakdown, termed biodegradation. Many types of marine organisms ingest, metabolise and utilise oil as a carbon source, producing carbon dioxide and water as by-products.

The SIMAP weathering algorithms include terms to represent these dynamic processes. Technical descriptions of the algorithms used in SIMAP and validations against real spill events are provided in French et al., (1999) and French-McCay (2004).

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Input specifications for oil types include density, viscosity, pour-point, distillation curve (volume of oil distilled off versus temperature) and the aromatic/aliphatic component ratios within given boiling point ranges. The model calculates a distribution of the oil by mass into the following components:

- Surface-bound or floating oil;
- Entrained oil (non-dissolved oil droplets that are physically entrained by wave action);
- Dissolved hydrocarbons (principally the aromatic and short-chained aliphatic compounds);
- Evaporated hydrocarbons;
- Sedimented hydrocarbons; and
- Decayed hydrocarbons.

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7 THRESHOLDS

The SIMAP model will track oil concentrations to very low levels. Hence, it is useful to define meaningful threshold concentrations for the recording of contact by oil components and determining the probability of exposure at a location (calculated from the number of replicate simulations in which this contact occurred).

The judgement of meaningful levels is complicated and will depend upon the mode of action, sensitivity of the biota contacted, the duration of the contact and the toxicity of the compounds that are represented in the oil. The latter factor is further complicated by the change in the composition of an oil type over time due to weathering processes. Without specific testing of the oil types, at different states of weathering against a wide range of the potential local receptors, such considerations are beyond the scope of this investigation.

It is important to note that the thresholds herein are based on the thresholds outlined in the NOPSEMA Oil Spill Modelling Bulletin (NOPSEMA, 2019), which are summarised in Table 7-1, along with the 1,000 ppb entrained exposure threshold, which was based on the study by French-McCay (2023). Their relationship to exposure for the sea surface, shoreline, and water column (entrained and dissolved hydrocarbons) are presented in Sections 7.1 to 7.3. Supporting justifications of the adopted thresholds applied during the study and additional context relating to the area of exposure are also provided.

Table 7-1 Summary of the thresholds applied in this study.

Floating Oil Concentration (g/m^2)	Shoreline Oil Accumulation (g/m^2)	Entrained Hydrocarbons Concentration (ppb)	Instantaneous Dissolved Hydrocarbons (ppb)
1	10	10	10
10	100	100	50
50	1,000	1,000	400

7.1 Floating Oil

Floating oil concentrations are relevant to describing the risks of oil coating emergent reefs, vegetation in the littoral zone and shoreline habitats, as well as the risk to wildlife found on the water surface, such as marine mammals, reptiles, and birds. Floating oil is also visible at relatively low concentrations (> ~0.05 g/m^2). Hence, the area affected by visible oil, which might trigger social or economic impacts, will be larger than the area where biological impacts might be expected.

The low threshold for floating oil exposure was set to 1 g/m^2, which equates approximately to an average thickness of 1 µm. It represents the practical limit of observing hydrocarbon sheens in the marine environment. This threshold is considered below levels which would cause environmental harm and is more indicative of the areas perceived to be affected due to its visibility on the sea-surface and potential to trigger temporary closures of areas (i.e., fishing grounds) as a precautionary measure.

Oil of this thickness is described as rainbow sheen in appearance, according to the Bonn Agreement Oil Appearance Code (Bonn Agreement, 2009; AMSA, 2014) (see Table 7-2). Figure 7.1 shows photographs highlighting the difference in appearance between a silvery sheen, rainbow sheen and metallic sheen.

Ecological impact has been estimated to occur at 10 g/m^2 (a film thickness of approximately 10 µm or 0.01 mm) (French et al.,1996; French-McCay 2009) as this level of fresh oiling has been observed to mortally impact some birds through adhesion of oil to their feathers, exposing them to secondary effects such as hypothermia. The appearance of oil at this average thickness has been described as a metallic sheen (Bonn Agreement, 2009). Concentrations above 10 g/m^2 are also considered the lower actionable threshold, where oil may be thick enough for containment and recovery as well as dispersant treatment (AMSA, 2023).

Oil concentrations on the sea surface of 25 g/m^2 (or greater) would be harmful for all birds that have landed in an oil film due to potential contamination of their feathers, with secondary effects such as loss of temperature regulation and ingestion of oil through preening (Scholten et al., 1996; Koops et al., 2004). The appearance of oil at this thickness is also described as metallic sheen (Bonn Agreement, 2009). For this study the high exposure threshold was set to 50 g/m^2 and above based on NOPSEMA (2019). This threshold can also be used to inform response planning. Table 7-3 is a summary of each threshold.

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Table 7-2 The Bonn Agreement Oil Appearance Code.

Code	Description Appearance	Layer Thickness Interval (g/m^2 or µm)	Litres per km^2
1	Sheen (silvery/grey)	0.04 – 0.30	40 – 300
2	Rainbow	0.30 – 5.0	300 – 5,000
3	Metallic	5.0 – 50	5,000 – 50,000
4	Discontinuous True Oil Colour	50 – 200	50,000 – 200,000
5	Continuous True Oil Colour	≥ 200	≥ 200,000

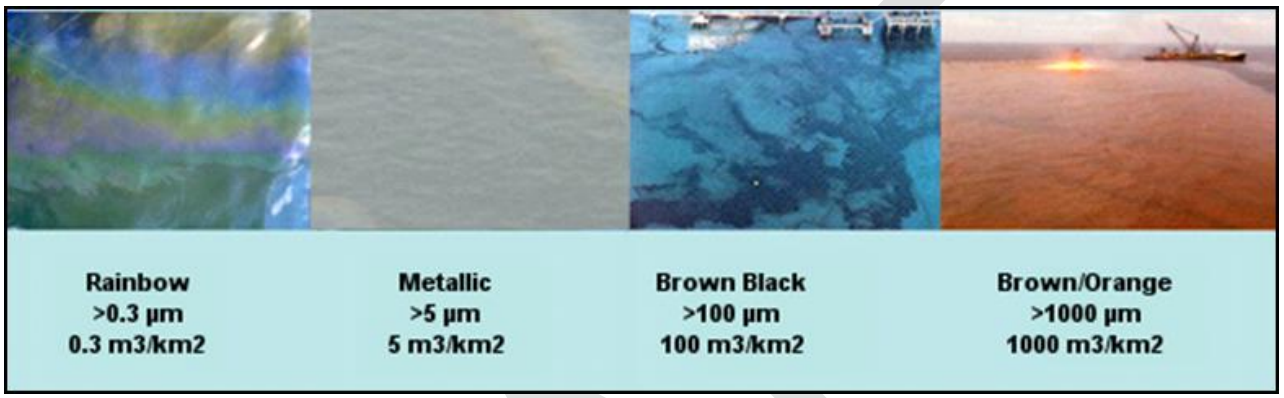


Figure 7.1 Photographs showing the difference between oil colour and thickness on the sea surface (source: adapted from Oil Spill Solutions, 2015).

Table 7-3 Floating oil exposure thresholds used in the oil spill modelling study (in alignment with NOPSEMA, 2019).

Threshold level	Floating oil (g/m^2)	Description
Low	1	Approximates range of socio-economic effects and establishes planning area for scientific monitoring
Moderate	10	Approximates lower limit for harmful exposures to birds and marine mammals
High	50*	Approximates surface oil slick and informs response planning

* 50 g/m^2 also used to define the threshold for actionable floating oil.

7.2 Shoreline Oil Accumulation

There are many different types of shorelines, ranging from cliffs, rocky beaches, sandy beaches, mud flats and mangroves, and each of these influences the volume of oil that can remain stranded ashore and its thickness before the shoreline saturation point occurs. For instance, a sandy beach may allow oil to percolate through the sand, thus increasing its ability to hold more oil ashore over tidal cycles and various wave actions than an equivalent area of water; hence oil can increase in thickness onshore over time. A sandy beach shoreline was assumed as the default shoreline type for the modelling in this study, as it allows for the highest carrying capacity of oil (of the available open/exposed shoreline types).

In, previous risk assessment studies, a threshold of 10 g/m^2 was used to assess the potential for shoreline accumulation (French-McCay et al.,2005a; 2005b). This is a conservative threshold used to define regions of socio-economic impact, such as triggering temporary closures of adjoining fisheries or the need for shore clean-up on beaches or man-made features/amenities (breakwaters, jetties, marinas, etc.). It would equate

to approximately 2 teaspoons of hydrocarbon per square meter of shoreline accumulation. The appearance is described as a stain/film. On that basis, the 10 g/m^2 has been selected to define the low threshold.

French et al. (1996) and French-McCay (2009) define a shoreline oil accumulation threshold of 100 g/m^2, or above, would potentially harm shorebirds and wildlife (fur-bearing aquatic mammals and marine reptiles on or along the shore) based on studies for sub-lethal and lethal impacts. This threshold has been used in previous environmental risk assessment studies (see French-McCay, 2003; French-McCay et al., 2004, French-McCay et al., 2011; 2012; NOAA, 2013). Additionally, this threshold is also recommended in AMSA's foreshore assessment guide as the acceptable minimum thickness that does not inhibit the potential for recovery and is best remediated by natural coastal processes alone (AMSA, 2023). This threshold equates to approximately ½ a cup of oil per square meter of shoreline accumulation and is described as a thin oil coat. The 100 g/m^2 has been selected to define the moderate threshold.

Observations by Lin & Mendelssohn (1996) demonstrated that loadings of more than 1,000 g/m^2 of hydrocarbon during the growing season would be required to impact marsh plants significantly. Similar thresholds have been found in studies assessing hydrocarbon impacts on mangroves (Grant et al., 1993; Suprayogi & Murray, 1999). This loading equates to approximately 1 litre of hydrocarbon per square meter of shoreline accumulation and the appearance is described as a hydrocarbon cover. A loading of 1,000 g/m^2 has been selected to define high threshold.

Table 7-4 is a summary of each threshold.

Table 7-4 Shoreline accumulation thresholds used in oil spill modelling study (in alignment with NOPSEMA, 2019).

Threshold level	Shoreline loading(g/m^2)	Description
Low	10	Predicts potential for some socio-economic impact
Moderate	100*	Loading predicts area likely to require clean-up effort
High	1,000	Loading predicts area likely to require intensive clean-up effort

* 100 g/m^2 also used to define the threshold for actionable shoreline oil.

7.3 In-water

Oil is a mixture of thousands of hydrocarbons of varying physical, chemical, and toxicological characteristics, and therefore, demonstrates varying fates and impacts on organisms. As such, for in-water exposure, the SIMAP model provides separate outputs for dissolved and entrained hydrocarbons from oil droplets. The consequences of exposure to dissolved and entrained components will differ because they have different modes and magnitudes of effect.

Entrained hydrocarbon concentrations were calculated based on oil droplets that are suspended in the water column, though not dissolved. The composition of this oil would vary with the state of weathering (oil age) and may contain soluble hydrocarbons when the oil is fresh. Calculations for dissolved hydrocarbons specifically calculates oil components which are dissolved in water, which are known to be the primary source of toxicity exerted by oil.

A complicating factor that should be considered when assessing the consequence of dissolved and entrained oil distributions is that there will be some areas where both physically entrained oil droplets and dissolved hydrocarbons co-exist. Higher concentrations of each will tend to occur close to the source where sea conditions can force mixing of relatively unweathered oil into the water column, resulting in more rapid dissolution of soluble compounds.

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7.3.1 Dissolved Hydrocarbons

Laboratory studies have shown that dissolved hydrocarbons exert most of the toxic effects of oil on aquatic biota (Carls et al., 2008; Nordtug et al., 2011; Redman, 2015). The mode of action is a narcotic effect, which is positively related to the concentration of soluble hydrocarbons in the body tissues of organisms (French-McCay, 2002). Dissolved hydrocarbons are taken up by organisms directly from the water column by absorption through external surfaces and gills, as well as through the digestive tract. Thus, soluble hydrocarbons are termed “bioavailable”.

Hydrocarbon compounds vary in water-solubility and the toxicity exerted by individual compounds is inversely related to solubility, however bioavailability will be modified by the volatility of individual compounds (Nirmalakhandan & Speece, 1988; Blum & Speece, 1990; McCarty, 1986; McCarty et al., 1992a; 1992b; McCarty & Mackay, 1993; Verhaar et al., 1992; 1999; Swartz et al., 1995; French-McCay, 2002; McGrath & Di Toro, 2009). Of the soluble compounds, the greatest contributor to toxicity for water-column and benthic organisms are the lower-molecular-weight aromatic compounds, which are both volatile and soluble in water. Although they are not the most water-soluble hydrocarbons within most oil types, the polynuclear aromatic hydrocarbons (PAHs) containing 2 – 3 aromatic ring structures typically exert the largest narcotic effects because they are semi-soluble and not highly volatile, so they persist in the environment long enough for significant accumulation to occur (Anderson et al., 1974; 1987; Neff & Anderson, 1981; Malins & Hodgins, 1981; McAuliffe, 1987; NRC, 2003). The monoaromatic hydrocarbons (MAHs), including the BTEX compounds (benzene, toluene, ethylbenzene, and xylenes), and the soluble alkanes (straight chain hydrocarbons) also contribute to toxicity, but these compounds are highly volatile, so that their contribution will be low when oil is exposed to evaporation and higher when oil is discharged at depth where volatilisation does not occur (French-McCay, 2002).

French-McCay (2002) reviewed available toxicity data, where marine biota was exposed to dissolved hydrocarbons prepared from oil mixtures, finding that 95% of species and life stages exhibited 50% population mortality (LC_{50}) between 6 and 400 ppb (with an average of 50 ppb) total PAH concentration after 96 hrs exposure. Therefore, concentrations lower than 6 ppb total PAH value should be protective of 97.5% of species and life stages even with exposure periods of days (at least 96 hours). Early life-history stages of fish appear to be more sensitive than older fish stages and invertebrates.

Exceedances of 10, 50 or 400 ppb over a 1-hour timestep (see Table 7-5) were applied in this study to indicate the increasing potential for sub-lethal to lethal toxic effects (or low to high), based on NOPSEMA (2019).

7.3.2 Entrained Hydrocarbons

Entrained hydrocarbons consist of oil droplets that are suspended in the water column and insoluble. Insoluble compounds in oil cannot be absorbed from the water column by aquatic organisms, therefore they are not bioavailable through absorption of compounds from the water. Exposure to these compounds would require routes of uptake other than absorption of soluble compounds. The route of exposure of organisms to whole oil alone include direct contact with tissues of organisms and uptake of oil by direct consumption, with potential for biomagnification through the food chain (NRC, 2003).

Thresholds of 10 ppb and 100 ppb were applied over a 1-hour time exposure (Table 7-5) as per NOPSEMA (2019). French-McCay (2024) suggests 1,000 ppb to be sufficiently conservative for entrained oil droplets of all oil types and all weathering states.

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Table 7-5 Dissolved and entrained hydrocarbon exposure thresholds assessed over a 1-hour time step used in the oil spill modelling study (in alignment NOPSEMA, 2019 with exception of entrained 1,000 ppb threshold based on French-McCay, 2023).

	Exposure level	In-water threshold (ppb)	Description
Dissolved hydrocarbons	Low	10	Establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers
	Moderate	50	Approximates potential toxic effects, particularly sublethal effects to sensitive species
	High	400	Approximates toxic effects including lethal effects to sensitive species
Entrained hydrocarbons	Low	10	Establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers
	Moderate	100	As appropriate given oil characteristics for informing risk evaluation
	High	1,000	Approximates potential toxic effects, particularly sublethal effects to sensitive species

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7.4 Dispersion Coefficients and Mixed Layer Depth

A horizontal dispersion coefficient of 10 m^2/s was used to account for dispersive processes affecting the floating oil on the surface, which are below the resolution scale of the current data. The value is based on a typical value for open waters (Okubo, 1971).

A vertical dispersion coefficient (*Dv)* of 91 cm^2/s was used to represent the turbulent mixing and diffusion processes in the wave-mixed layer in the upper water column. It is a site-specific value computed using the 50^{th} percentile wind speed of 12 knots from the 10 year dataset (2010-2019) at 10 m above the sea surface (W_{10}) based on French-McCay (2004).

The mixed layer depth is the depth that vertical mixing is strong enough to cause uniform temperature and salinity, and is influenced by factors like wind, ocean currents and waves. The 50^{th} percentile value at the site was calculated using Copernicus' 10 years (2010 to 2019) monthly averaged mixed layer depth data and was found to be 20 m.

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8 OIL PROPERTIES

Table 8-1 and Table 8-2 present the physical properties and boiling point ranges of Wandoo crude and MGO used for Scenario 1 and Scenario 2 modelling, respectively.

Wandoo crude has a density of 937.0 kg/m^3 at 16ºC (API of 19.4) and a low pour point of -24°C, which ensures that this crude will remain in a liquid state over the annual temperature range observed on the North West Shelf. It is also low in wax content, typical of a biodegraded oil.

Generally, <2% of the crude should evaporate within the first 12 hours (Boiling point (BP) < 180°C); a further 10.2% is expected to evaporate within the first 24 hours (180°C < BP < 265°C); and an additional 33.1% should evaporate over several weeks (265°C < BP < 380°C). Additionally, 55% (by mass) of the crude will not evaporate, decaying slowly over time. It is categorised as a Group IV (or persistent) oil according to oil classifications by AMSA (2023). The classification is based on the specific gravity of hydrocarbons in combination with relevant boiling point ranges.

The MGO has a density of 829 kg/m^3 at 25ºC (API of 37.6) and a low pour point of -14°C. The oil comprises of a significant portion of volatiles and semi- to low volatiles (~95 % total) with 5 % residual components. This means most of the hydrocarbons will evaporate when on the water surface, with the persistent components to remain on the water surface over a longer period. The MGO is categorised as a Group II oil (light-persistent) according to the AMSA (2023) classifications.

It's noteworthy that the heavier components of the Wandoo crude and MGO, specifically the low-volatile and residual (persistent) portions will have a strong tendency to become entrained into the water column in the presence of winds speeds above 7 knots and in turn breaking waves, however, it can re-surface under calm conditions (less than 7 knots).

Table 8-1 Physical properties for Wandoo crude and MGO.

Properties	Wandoo Crude	MGO
Density (kg/m^3)	937 (at 16 °C)	829 (at 25 °C)
API	19.4	37.6
Dynamic viscosity (cP)	161 (at 25 °C)	4 (at 25 °C)
Pour point (°C)	-24	-14
Hydrocarbon property category	Group IV	Group II
Hydrocarbon property classification	Persistent	Light persistent

Table 8-2 Boiling point ranges for Wandoo crude and MGO.

Characteristic Oil Type	Volatiles (%)	Semi-volatiles (%)	Low Volatiles (%)	Residual (%)
Boiling point (°C)	< 180	180-265	265-380	> 380
	Non persistent			Persistent
Wandoo crude	1.7	10.2	33.1	55.0
MGO	6.0	34.6	54.4	5.0

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8.1 Weathering Characteristics

8.1.1 Wandoo crude

A series of weathering tests were conducted to illustrate the potential behaviour following a 50 m^3 instantaneous surface release of Wandoo crude when exposed to:

- 5 knot (2.6 m/s) constant wind speed, 27°C water temperature and currents; and
- Variable wind speeds (1 – 12 m/s or 2 to 24 knots), 27°C water temperature and currents.

The first case is indicative of the potential weathering rates under calm conditions that would not generate entrainment, while the second case would be more representative of the moderate winds experienced over the region.

The mass balance forecast for the constant wind case (Figure 8.1) shows that 13.0% of the crude is predicted to evaporate within 24 hours. The remaining hydrocarbon on the water surface will weather at a slower rate and be subject to more gradual decay through biological and photochemical processes.

In the variable wind speeds test (Figure 8.2), characterised by stronger average winds and breaking waves, there is an increased entrainment of the crude into the water column. Approximately 24 hours into the spill, the forecast indicates that 3.2% of the crude will have evaporated, with additional 93.9% expected to have entrained. Hence, less than 1% of floating oil remains on the water surface 24 hours into the spill.

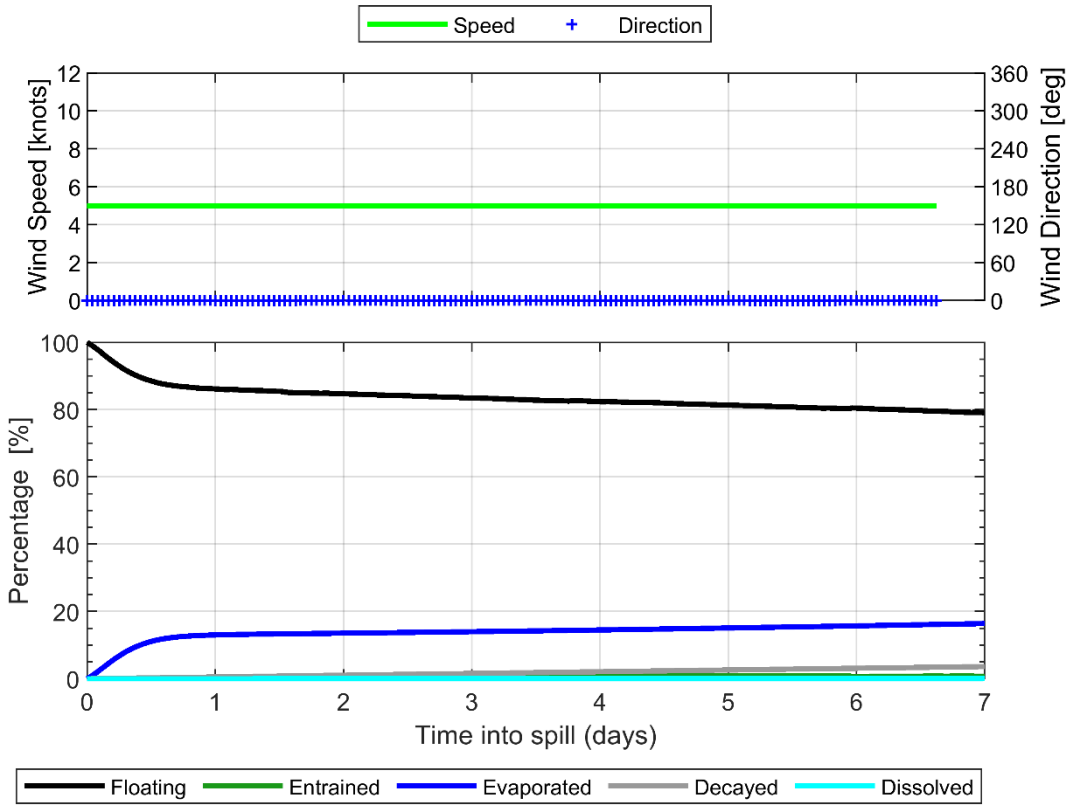


Figure 8.1 Mass balance plot for an instantaneous 50 m^3 surface release of Wandoo crude subjected to a constant 5 knot (2.6 m/s) wind, currents and 27°C water temperature.

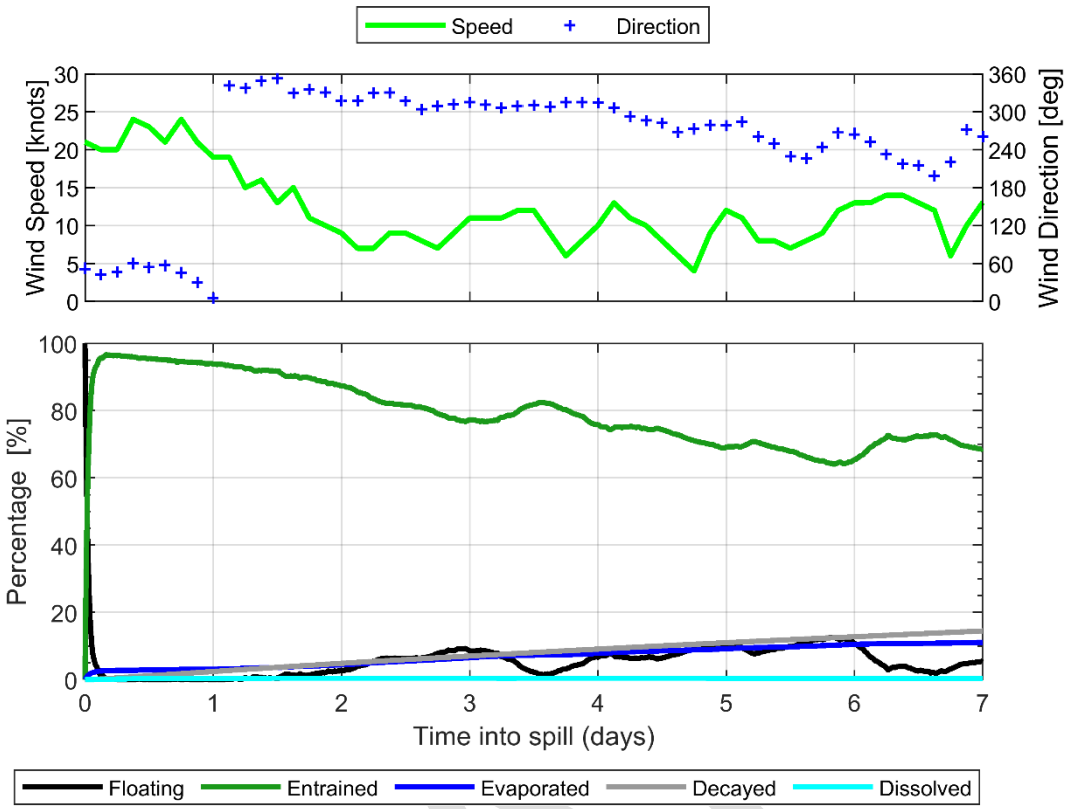


Figure 8.2 Mass balance plot for an instantaneous 50 m³ surface release of Wandoo crude subjected to variable wind speeds (1 – 12 m/s or 2 to 24 knots), currents and 27°C water temperature.

8.1.2 Marine Gas Oil

A series of weathering tests were conducted to illustrate the potential behaviour following a 50 m³ instantaneous surface release of MGO when exposed to:

- 5 knot (2.6 m/s) constant wind speed, 27°C water temperature and currents; and
- Variable wind speeds (1 – 12 m/s or 2 to 23 knots), 27°C water temperature and currents.

The first case is indicative of conditions that would not generate entrainment, while the second case represents conditions that would likely cause entrainment. Both scenarios provide examples of potential behaviour during a spill once the oil is on the sea surface.

The mass balance forecast for the constant wind case (Figure 8.1)) shows that 39.3% is expected to evaporate within 24 hours. Under calm conditions, the majority of the remaining oil on the water surface will weather at a slower rate due to being comprised of the less volatile, longer-chain compounds. Evaporation shall cease when only the residual compounds remain, and they will be subject to more gradual decay through biological and photochemical processes.

For the variable wind speed case (Figure 8.2), where the winds are of greater strength on average, entrainment of hydrocarbons into the water column is shown to increase. Approximately 24 hours after the spill, 78.1% of the mass is shown to have entrained and a further 17.4% has evaporated, leaving only a small proportion floating on the water surface (<1%).

The increased level of entrainment in the variable-wind case result in a higher percentage decaying at an approximate rate of ~2.7% per day with 19.1% after 7 days, compared to 0.2% per day and a total of 1.4% after 7 days for the constant-wind case. Given the proportion of entrained oil and the tendency for it to remain mixed in the water column, the remaining hydrocarbons will decay over time scales of several weeks.

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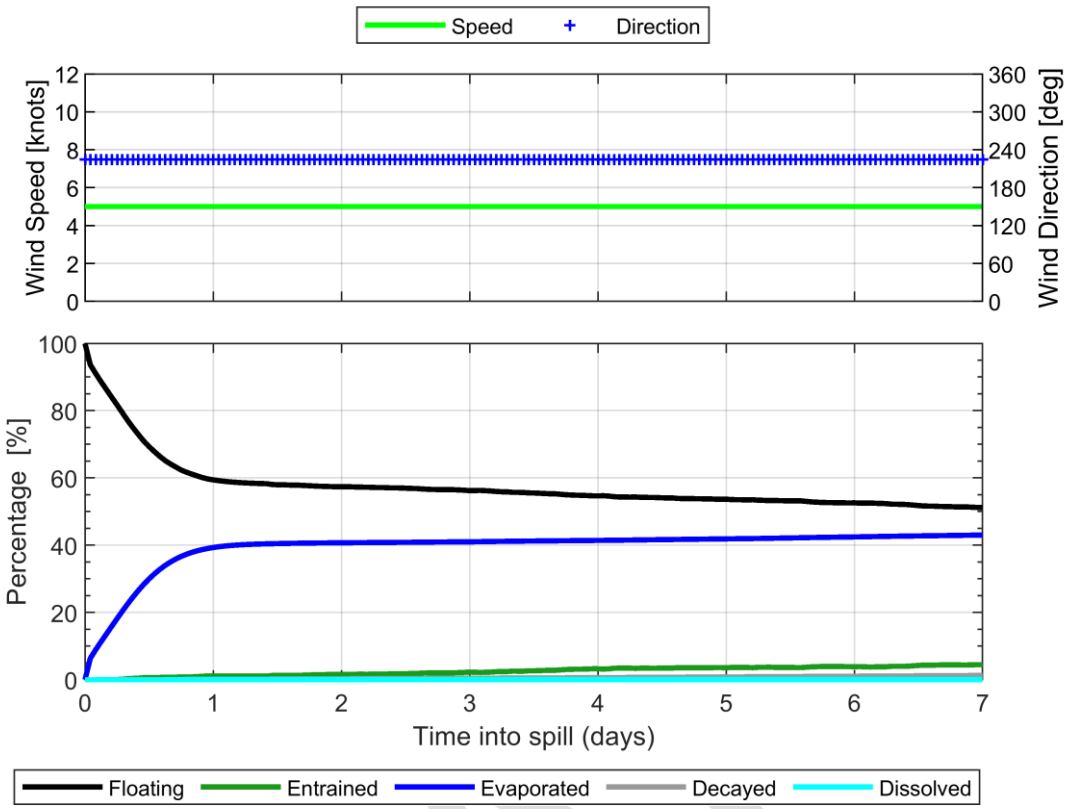


Figure 8.3 **Mass balance plot for an instantaneous 50 m³ surface release of MGO subjected to a constant 5 knot (2.6 m/s) wind, currents and 27°C water temperature.**

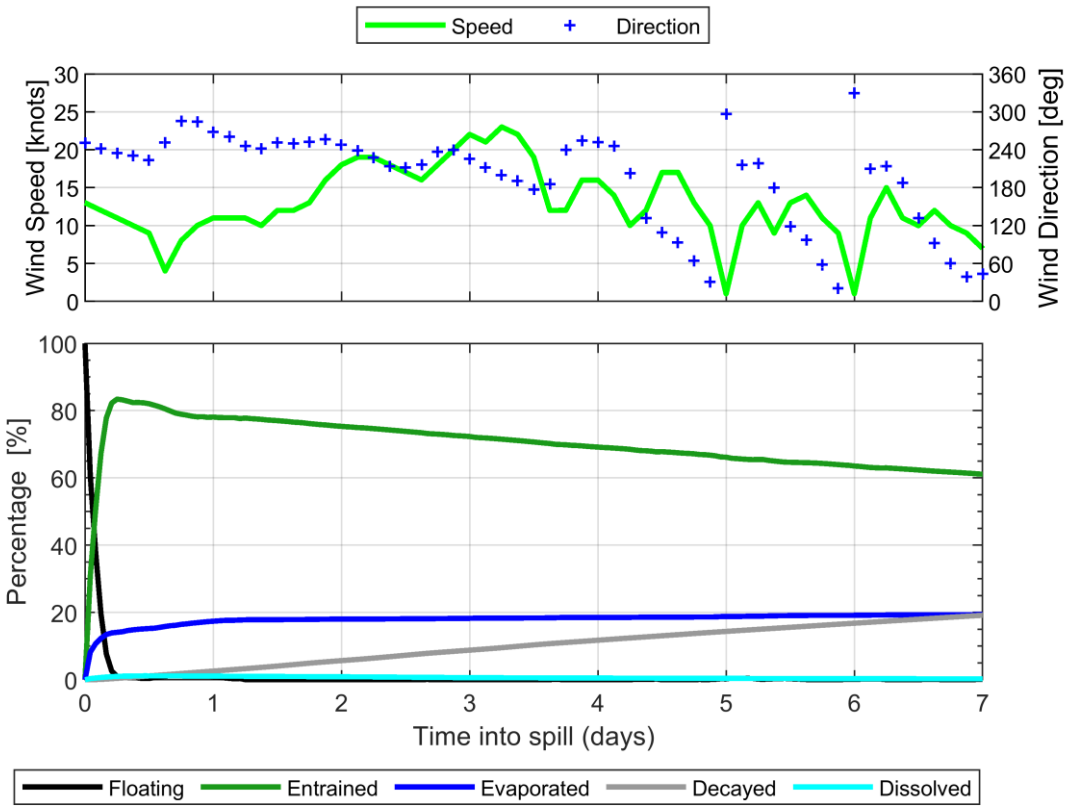


Figure 8.4 **Mass balance plot for an instantaneous 50 m³ surface release of MGO subjected to variable wind speeds of 2 to 23 knots (1 – 12 m/s), currents and 27°C water temperature.**

9 RECEPTORS

A comprehensive receptor database was compiled from multiple sources to assess floating oil, in-water column exposure (entrained and dissolved hydrocarbons), and shoreline oil accumulation. These sources include:

- Protected Matters Search Tool (PMST) from Department of Climate Change, Energy, the Environment and Water (https://pmst.environment.gov.au);
- Shoreline cells from the Western Australia Marine Oil Pollution Risk Assessment Protection Priorities (https://www.transport.wa.gov.au/imarine/preparedness-response-resources.asp); and
- Additional receptors, such as Habitat Critical to Turtles from Department of Climate Change, Energy, the Environment and Water (https://fed.dcceew.gov.au).

Table 9-1 summarises the receptors assessed for hydrocarbon exposure and presented in the report. Exposure risks were calculated separately for each receptor, with results presented only for those predicted to exceed the minimum exposure thresholds. The assessment also includes exposure within Western Australian State Waters (WA State Waters) and Northern Territory Waters (NT Waters).

Table 9-2 lists other receptor categories assessed but not presented in the report for conciseness. These results are available upon request.

Table 9-1 Summary of receptors assessed for hydrocarbon exposure and presented in the report.

Receptor Category	Acronym	Source	Hydrocarbon Exposure Assessment		
			Water Column	Floating oil	Shoreline
Australian Marine Park	AMP	https://fed.dcceew.gov.au	✓	✓	×
Exclusive Economic Zone	EEZ	http://www.marineregions.org	✓	✓	×
Indigenous Protected Area	IPA	https://fed.dcceew.gov.au	✓	✓	×
Key Ecological Feature	KEF	https://fed.dcceew.gov.au	✓	✓	×
Management Agreement Area	MAA	https://fed.dcceew.gov.au	✓	✓	×
Marine Park	MP	https://fed.dcceew.gov.au	✓	✓	×
National Parks	NP	https://fed.dcceew.gov.au	✓	✓	×
Nature Reserve	NR	https://fed.dcceew.gov.au	✓	✓	×
Ramsar wetland	Ramsar	https://fed.dcceew.gov.au	✓	✓	×
Reefs, Shoals and Banks	RSB	Digital nautical charts	✓	✓	×
State and Territory Waters	State and Territory Waters	https://www.ga.gov.au/scientific-topics/marine/jurisdiction	✓	✓	×
Western Australia Marine Oil Pollution Risk Assessment Protection Priorities (WAMOPRA)	Shoreline cells	http://www.transport.wa.gov.au	×	×	✓

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Table 9-2 Summary of receptors assessed but not presented in the report and available upon request.

Receptor Category	Acronym	Source	Hydrocarbon Exposure Assessment		
			Water Column	Floating oil	Shoreline
5(1)(g) Reserve	S5G	https://fed.dcceew.gov.au	✓	✓	×
5(1)(h) Reserve	S5H	https://fed.dcceew.gov.au	✓	✓	×
Biologically Important Areas	BIA	https://fed.dcceew.gov.au	✓	✓	×
Commonwealth Heritage Place Historic	CHPH	https://fed.dcceew.gov.au	✓	✓	×
Commonwealth Heritage Place Natural	CHPN	https://fed.dcceew.gov.au	✓	✓	×
Conservation Park	CP	https://fed.dcceew.gov.au	✓	✓	×
Fish Habitat Protected Area	FHPA	https://fed.dcceew.gov.au	✓	✓	×
Habitat Critical to Turtles	TUR	https://fed.dcceew.gov.au	✓	✓	×
Indigenous Cultural Heritage - WA	ICH	https://catalogue.data.wa.gov.au/dataset	✓	✓	×
Integrated Marine and Coastal Regionalisation of Australia (Meso-scale)	IMCRA	https://fed.dcceew.gov.au	✓	✓	×
National Heritage Places Historic	NHPH	https://fed.dcceew.gov.au	✓	✓	×
Nationally Important Wetlands	NIW	https://fed.dcceew.gov.au	✓	✓	×
Natural Resource Management Regions	NRMR	https://fed.dcceew.gov.au	✓	✓	×
NRS Addition - Gazettal in Progress	NRS	https://fed.dcceew.gov.au	✓	✓	×
Private Nature Reserve	PNR	https://fed.dcceew.gov.au	✓	✓	×
Shipwreck Protection Zones	SPZ	https://fed.dcceew.gov.au	✓	✓	×
World Heritage Properties (Australia Only)	WHP	https://fed.dcceew.gov.au	✓	✓	×

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10 MODEL SETTINGS

Table 10-1 provides a summary of the oil spill model settings for Scenarios 1–3. Additionally, Table 10-2 presents the summary of the exponential decrease of the volume released to simulate a tank draining for the MGO scenario (Scenario 2).

The simulation lengths were carefully determined based on extensive sensitivity testing for each scenario. During this testing process, sample spill simulations were run for longer than initially intended durations. Upon completion of these spill simulations, the results were carefully assessed to evaluate the persistence of the hydrocarbons. This assessment focussed on when the maximum evaporative loss has been achieved for the period modelled; and whether a substantial volume of hydrocarbons remain in the water column, if any.

Additionally, the extent of floating oil exposure was analysed based on reporting thresholds. Once there was agreement between the two factors, ensuring that the final fate of the hydrocarbons was accounted for, and the full exposure area was identified, the simulation length was deemed appropriate.

Table 10-1 Summary of the oil spill model settings used in this assessment.

	Scenario 1	Scenario 2	Scenario 3
Description	Surface release of Wandoo crude from offtake export system	Surface release of MGO from Wandoo B's shaft 2	Surface release of Wandoo crude from a tanker collision
Number of spill simulations with randomly selected start times	100 per season		
Period	Summer (October to February) Winter (April to July) Transitional (March, August, and September)		
Spill volume	300 m^3	2,200 m^3	10,000 m^3
Oil type	Wandoo crude	MGO	Wandoo crude
Release depth	0 m (surface)	0 m (surface)	0 m (surface)
Release duration	1 hour	12 hours	24 hours
Simulation length	30 days	50 days	50 days
Floating oil (NOPSEMA) thresholds	1 g/m^2, low exposure 10 g/m^2, moderate exposure 50 g/m^2, high exposure		
Shoreline accumulation (NOPSEMA) thresholds	10 g/m^2, low exposure 100 g/m^2, moderate exposure 1,000 g/m^2, high exposure		
Dissolved hydrocarbon (NOPSEMA) thresholds	10 ppb over 1 hour, low exposure 50 ppb over 1 hour, moderate exposure 400 ppb over 1 hour, high exposure		
Entrained hydrocarbon (NOPSEMA) thresholds	10 ppb over 1 hour, low exposure 100 ppb over 1 hour, moderate exposure 1,000 ppb over 1 hour, high exposure		

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Table 10-2 Summary of the exponential decrease of the volume released to simulate a tank draining for the MGO scenario.

Hour	Volume released (m^3)
1	586
2	434
3	322
4	238
5	177
6	131
7	97
8	72
9	53
10	39
11	29
12	22

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11 PRESENTATION AND INTERPRETATION OF MODEL RESULTS

11.1 Stochastic Modelling

11.1.1 Calculation of Risk and Potential Exposure

During each simulation, the SIMAP model records the location (by latitude, longitude, and depth) of each particle representing a given mass of oil on, or in, the water column, at regular time intervals. For particles that reach a shoreline, the model records the accumulation of oil mass on each section of the shoreline over time, less any mass that is lost to evaporation and/or removal by currents and winds.

The collective records from all simulations are analysed by dividing the study area into a three-dimensional grid. For oil particles that are classified as being on the water surface (floating oil), the concentration in each grid cell is estimated by summing the mass of all oil particles within that cell (accounting for spreading and dispersion effects) and dividing the cell's area at each time step. For entrained and dissolved hydrocarbon particles, concentrations are calculated at each time step by summing the mass of particles within a grid cell and dividing by the cell's volume.

The concentrations for each grid cell at each time step are then analysed to determine if they exceed defined thresholds over time. The risks are then summarised as follows:

- **Probability of Exposure:** This is calculated by dividing the number of spill simulations where any instantaneous contact occurred above a specified threshold at a given location by the total number of simulations. For example, if exposure occurred at a location during 63 out of 300 simulations, the probability of exposure would be 21%.
- **Minimum Time Before Exposure:** This is determined by the shortest time required for oil at a concentration above a threshold (floating oil, entrained or dissolved or shoreline accumulation) to travel from the source to a specific location in any of the simulations.
- **Maximum Potential Concentration:** This represents the highest mass of oil per square meter predicted to strand at any location along a shoreline receptor during any of the simulations.
- **Average Maximum Concentration:** This is calculated by determining the greatest mass of oil per square meter of shoreline during each simulation and averaging these estimates across all simulations.
- **Entrained and Dissolved Hydrocarbon concentrations:** Similar calculations are performed to calculate maximum and average maximum entrained and dissolved hydrocarbon concentrations.

The minimum time before shoreline oil accumulation and the maximum volume ashore estimates indicate the worst-case simulation for each shoreline receptor. In contrast, the average concentrations provide an estimate of potential outcomes regarding oil stranding.

It is important to note that the shoreline oil accumulation results are derived for individual grid cells, each approximately 1 km in length, rather than for entire shoreline receptor. While receptors may span tens to hundreds of kilometres, we caution against multiplying the maximum concentration estimates by the total length of the receptor, as this would significantly overestimate the total volume expected in that area.

Accumulated concentrations are calculated by summing the mass of oil that arrives at any concentration (including below threshold) over time in a model cell, subtracting any mass lost through evaporation and washing off (i.e., removal) as necessary.

Additionally, oil films arriving on shorelines at concentrations below the threshold may accumulate over the course of a spill event, potentially resulting in concentrations that exceed the threshold. Therefore, the average maximum and maximum concentrations of accumulated oil can surpass the thresholds applied to the probability calculations for floating oil, even if no instantaneous exceedances are predicted.

It is crucial to understand that floating and shoreline concentrations are distinct parameters, calculated differently and representing alternative outcomes. The floating probability estimates and shoreline accumulation estimates should be treated as independent indicators of different exposure outcomes and should not be directly compared.

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Lastly, the stochastic modelling results presented in this document reflect predicted outcomes following defined spill events. The probability of the spill scenario occurring is not considered, so the results should be viewed as a guide to the likely outcomes should the spill scenario take place.

11.1.2 Presentation of Results

The results detailing the probabilities and minimum times for oil concentrations that equal or exceed defined thresholds for floating oil, shoreline oil accumulation, entrained hydrocarbons, and dissolved hydrocarbons are presented in various tables and figures. These outputs illustrate the predicted risks and exposure to surrounding waters and shorelines, where applicable.

For readers who may not be fully familiar with interpreting stochastic modelling outputs, we recommend consulting the relevant NOPSEMA factsheet (NOPSEMA, 2018) before proceeding with this section of the report.

All stochastic results are presented on a seasonal basis. To further enhance the understanding of the modelling results, the tailored outputs are provided based on the following calculations:

- **Socio-economic and Ecological Environment That May Be Affected (EMBA), and Scientific monitoring planning area** – These images represent the largest spatial extent predicted, derived by merging all three hundred spill simulations based on the defined thresholds for each oil phase as shown in Table 11-1.

Table 11-1 Thresholds for each oil phase used to generate socio-economic and ecological EMBA and scientific monitoring planning area.

Oil phase	Socio-economic EMBA	Ecological EMBA	Scientific monitoring planning area
Floating oil	≥1 g/m^2	≥10 g/m^2	≥1 g/m^2
Shoreline oil accumulation	≥10 g/m^2	≥100 g/m^2	≥10 g/m^2
Entrained oil	≥100 ppb	≥100 ppb	≥10 ppb
Dissolved hydrocarbons	≥10 ppb	≥50 ppb	≥10 ppb

- **Predicted Zones of Potential Exposure and Accumulation** – The maps illustrating zones of floating oil, entrained and dissolved hydrocarbon exposures and shoreline oil accumulation were generated based on the following thresholds:

  Floating oil zones – 1-10 g/m^2 (Low threshold), 10-50 g/m^2 (Moderate threshold) and ≥ 50 g/m^2 (High threshold);

  - Entrained hydrocarbon zone – Entrained hydrocarbons – 10-100 ppb (Low) and 100-1,000 ppb (Moderate) and ≥ 400 ppb (High threshold); and
  - Dissolved hydrocarbon zones – 10-50 ppb (Low threshold), 50-400 ppb (Moderate threshold) and ≥ 400 ppb (High threshold); and
  - Shoreline oil accumulation – 10-100 g/m^2 (Low threshold), 100-1,000 g/m^2 (Moderate threshold) and ≥ 1,000 g/m^2 (High threshold).

- **Cross-Sections of Entrained and Dissolved Hydrocarbon Concentrations** – These images represent the maximum entrained and dissolved hydrocarbon concentrations predicted within the water column, along both east-west and north-south transects in the vicinity of the release location.

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12 MODELLING RESULTS: CRUDE RELEASE FROM THE OFFTAKE EXPORT SYSTEM

This scenario investigated the potential exposure from a 300 m^3 surface release of crude over 1 hour resulting from the offtake export system. The crude was tracked for 30 days to allow the concentrations to decrease below the lowest reporting thresholds. The modelling for this scenario assumed no mitigation efforts are undertaken to collect or otherwise affect the natural transport and weathering.

12.1 Stochastic Analysis

12.1.1 Socio-Economic and Ecological EMBAs

Figure 12.1 and Figure 12.2 illustrate the socio-economic and ecological EMBAs following a surface release of crude from the offtake export system. These figures represent the largest spatial extent predicted, derived by merging all three hundred spill simulations based on the defined thresholds (see Section 11.1.2) for each oil phase.

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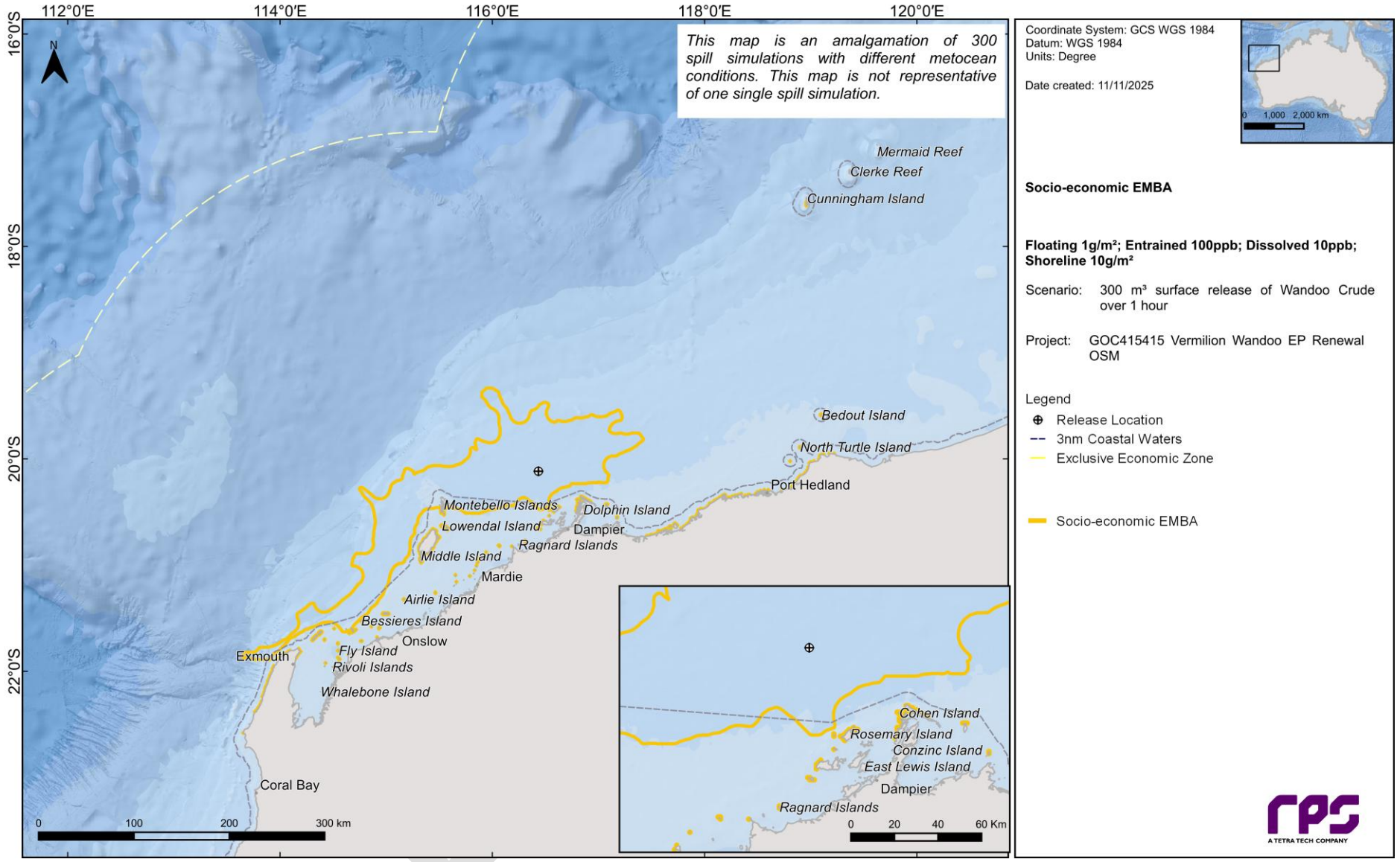


Figure 12.1 Socio-economic EMBA following a surface release of crude from the offtake export system. The EMBA was determined by merging the results of all 300 simulations.

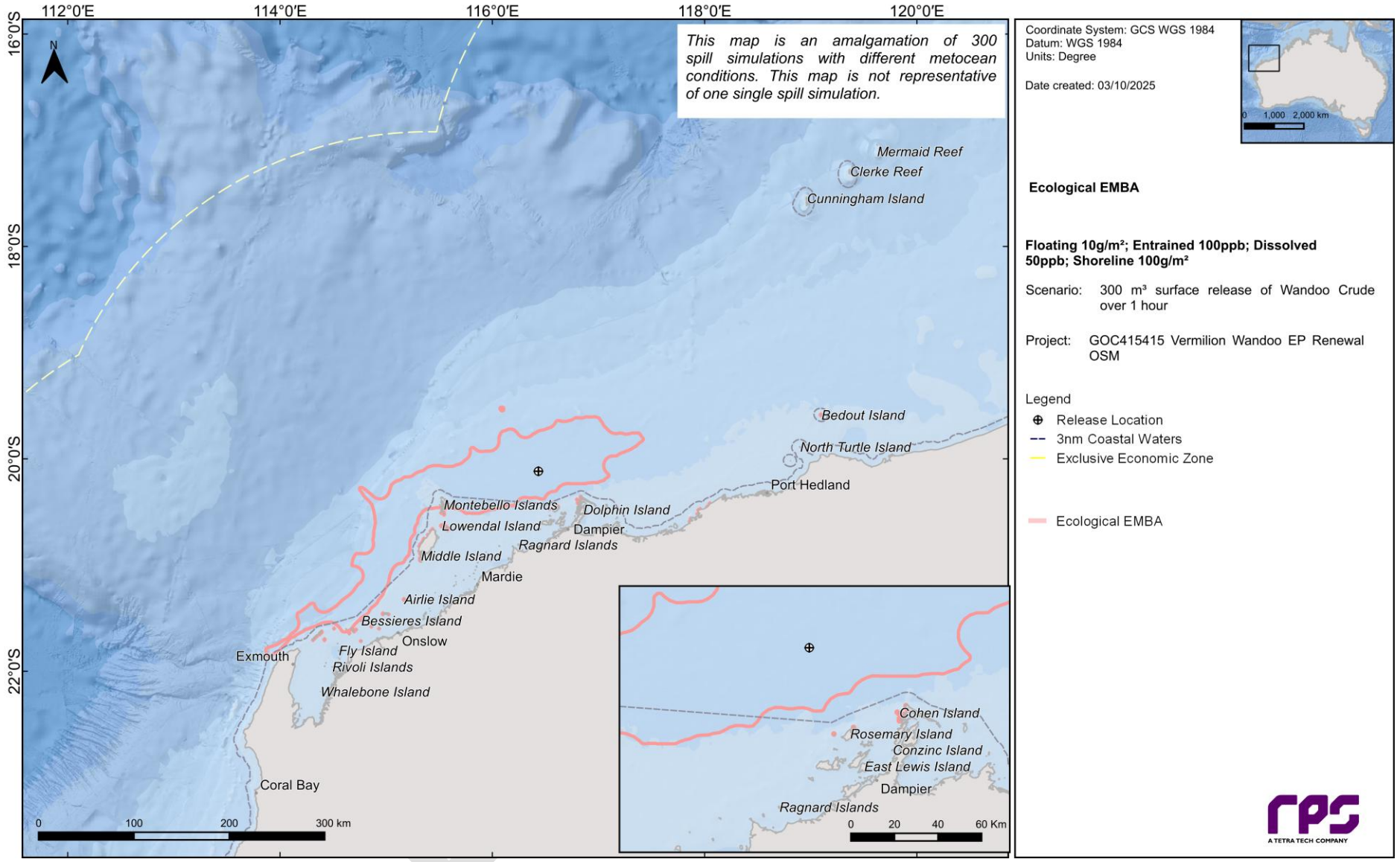


Figure 12.2 Ecological EMBA following a surface release of crude from the offtake export system. The EMBA was determined by merging the results of all 300 simulations.

12.1.2 Scientific Monitoring Planning Area

Figure 12.3 illustrates the SMPA following a surface release of crude from the offtake export system. These figure represent the largest spatial extent predicted, derived by merging all three hundred spill simulations based on the defined thresholds (see Section 11.1.2) for each oil phase.

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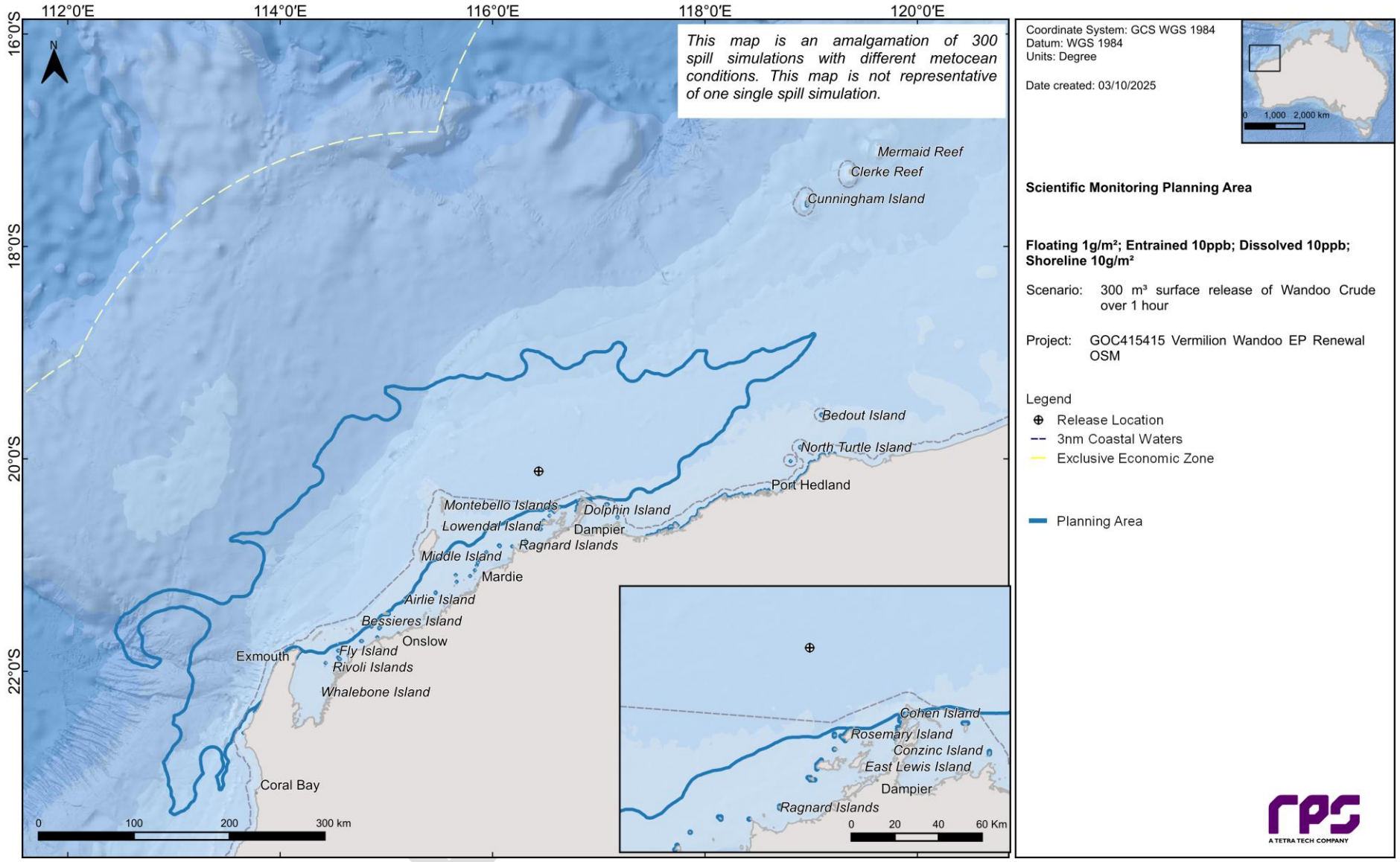


Figure 12.3 Scientific monitoring planning area following a surface release of crude from the offtake export system. The SMPA was determined by merging the results of all 300 simulations.

12.1.3 Floating Oil Exposure

Table 12-1 summarises the maximum distances from the release location to floating oil exposure thresholds for each season. Concentrations exceeding 1 g/m^2 could extend up to 347 km from the release location. The maximum distances reduced to 56 km and 20 km as the threshold increases to 10 g/m^2 and 50 g/m^2, respectively.

Table 12-2 presents the receptors predicted to be exposed by floating oil for each season.

The Montebello AMP (5%) recorded the overall highest probability of exposure at, or above, 1 g/m^2 during the transitional season, followed by Glomar Shoals KEF at 3% during summer. The Montebello AMP recorded the fastest time to exposure at 1 day 13 hours, for a spill commencing during winter conditions.

Figure 12.4 to Figure 12.6 illustrate the extent floating oil exposure zones for each season. Figure 12.7 to Figure 12.24 depict the seasonal minimum times before exposure and probability of exposure for each threshold and season.

Table 12-1 Maximum distances from the release location to floating oil exposure thresholds following a surface release of crude from the offtake export system. Results were calculated from 100 spill simulations per season.

Season	Distance and direction travelled	Floating oil exposure thresholds		
		1 g/m^2	10 g/m^2	50 g/m^2
Summer	Maximum distance (km) from release location	82	35	16
	Direction	Northeast	East	West
Transitional	Maximum distance (km) from release location	133	56	17
	Direction	West	Northeast	East
Winter	Maximum distance (km) from release location	347	33	20
	Direction	Southwest	Northwest	Northeast

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Table 12-2 Receptors predicted to be exposed by floating oil following a surface release of crude from the offtake export system. Results were calculated from100 spill simulations per season.

Category	Name	Summer						Transitional						Winter					
		Probability (%) of floating oil at			Minimum times before floating oil exposure			Probability (%) of floating oil at			Minimum times before floating oil exposure			Probability (%) of floating oil at			Minimum times before floating oil exposure		
		≥ 1 g/m^2	≥ 10 g/m^2	≥ 50 g/m^2	≥ 1 g/m^2	≥ 10 g/m^2	≥ 50 g/m^2	≥ 1 g/m^2	≥ 10 g/m^2	≥ 50 g/m^2	≥ 1 g/m^2	≥ 10 g/m^2	≥ 50 g/m^2	≥ 1 g/m^2	≥ 10 g/m^2	≥ 50 g/m^2	≥ 1 g/m^2	≥ 10 g/m^2	≥ 50 g/m^2
AMP	Gascoyne	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	8 d, 5 hrs	NC	NC
	Montebello	2	NC	NC	2 d, 8 hrs	NC	NC	5	NC	NC	1 d, 17 hrs	NC	NC	2	NC	NC	1 d, 13 hrs	NC	NC
KEF	Ancient coastline at 125 m depth contour	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	6 d, 7 hrs	NC	NC
	Commonwealth waters adjacent to Ningaloo Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	7 d, 14 hrs	NC	NC
	Continental Slope Demersal Fish Communities	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	7 d, 23 hrs	NC	NC
	Glomar Shoals	3	NC	NC	3 d, 19 hrs	NC	NC	1	NC	NC	3 d, 6 hrs	NC	NC	2	NC	NC	3 d, 10 hrs	NC	NC
MP	Ningaloo	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	7 d, 14 hrs	NC	NC
RSB	Tryal Rocks	NC	NC	NC	NC	NC	NC	1	NC	NC	7 d, 1 hr	NC	NC	NC	NC	NC	NC	NC	NC
State and Territory Waters	Western Australia	NC	NC	NC	NC	NC	NC	1	NC	NC	6 d, 12 hrs	NC	NC	1	NC	NC	2 d, 5 hrs	NC	NC

NC: No contact to receptor predicted for specified threshold.

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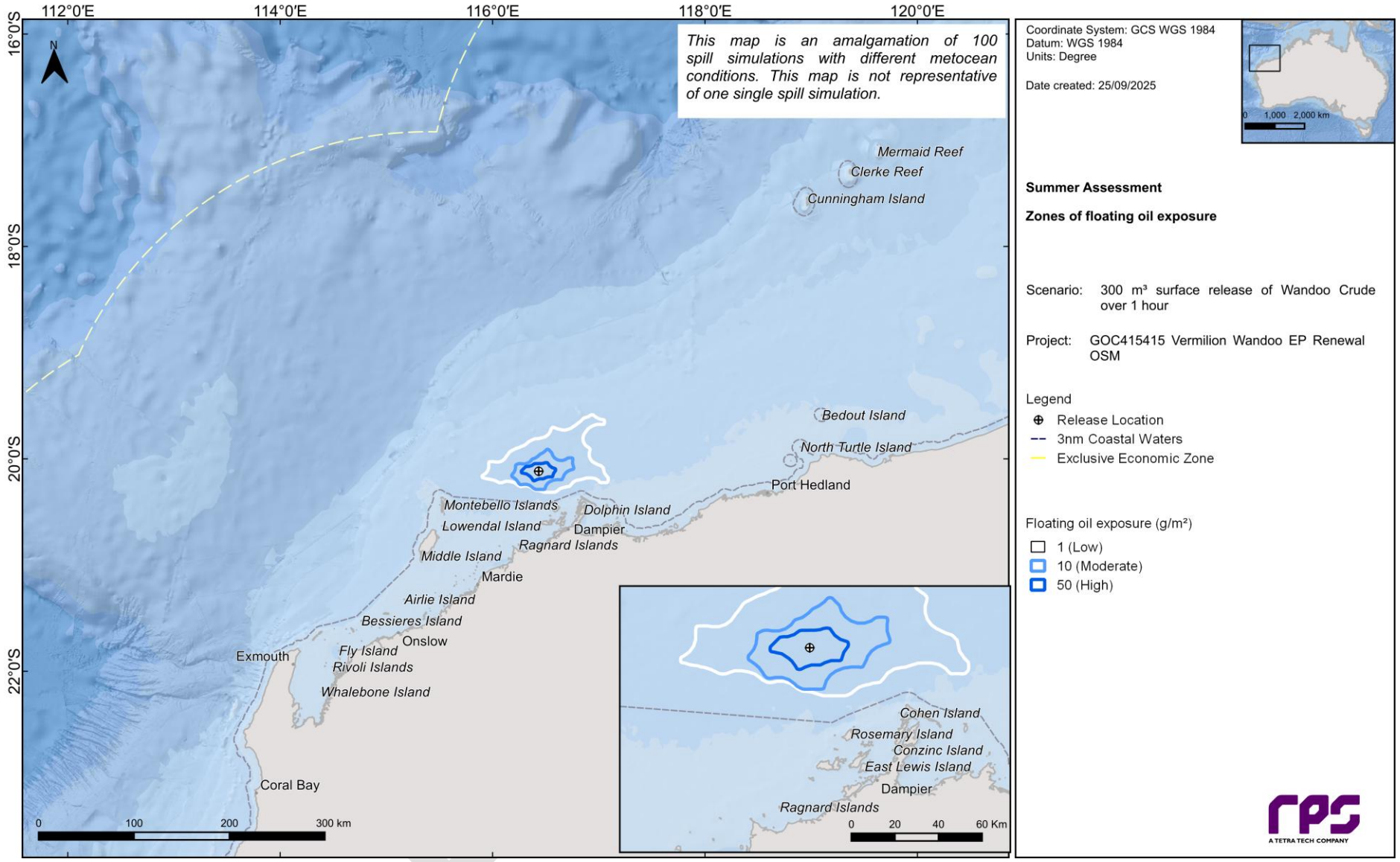


Figure 12.4 Predicted zones of floating oil exposure following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

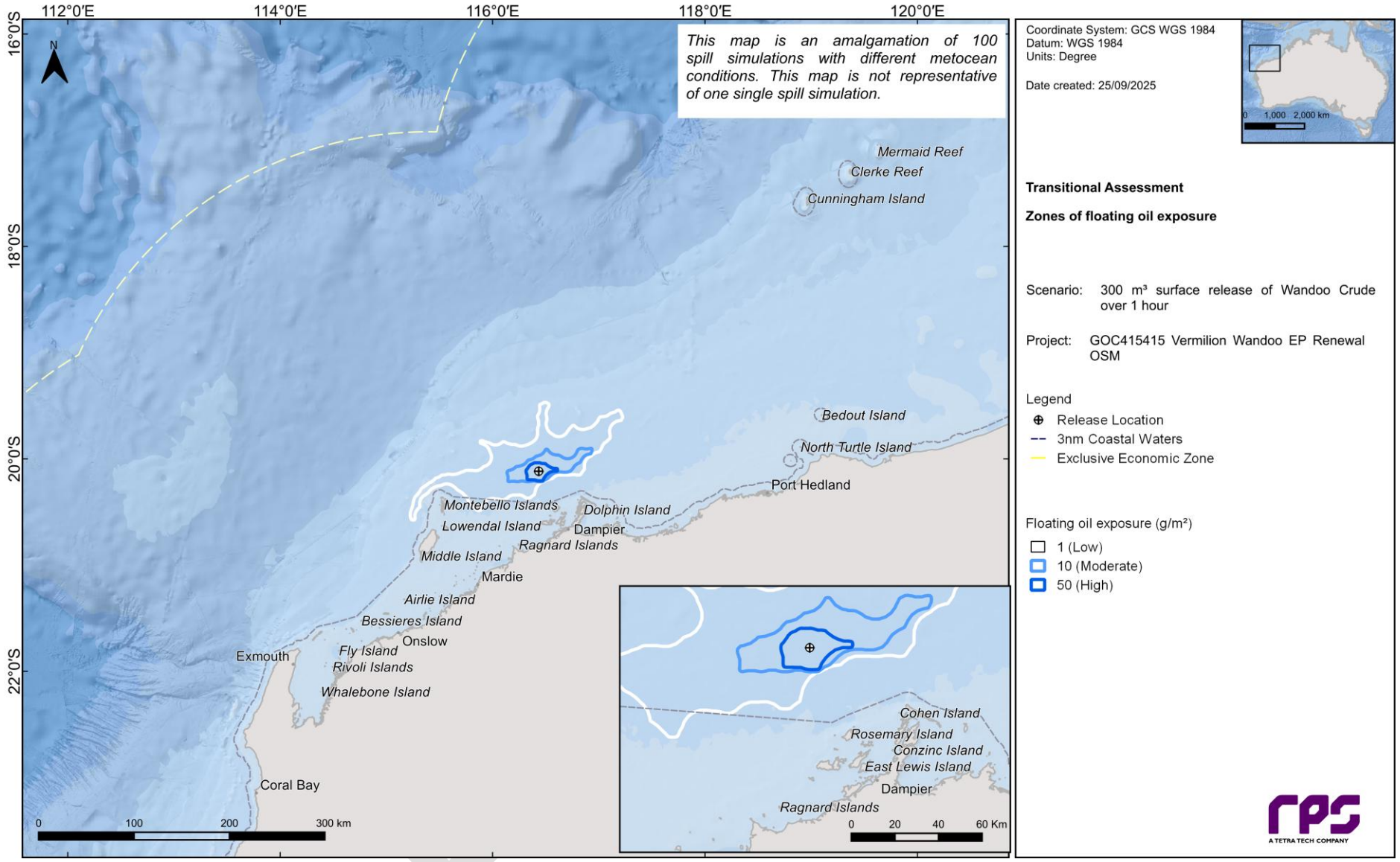


Figure 12.5 Predicted zones of floating oil exposure following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

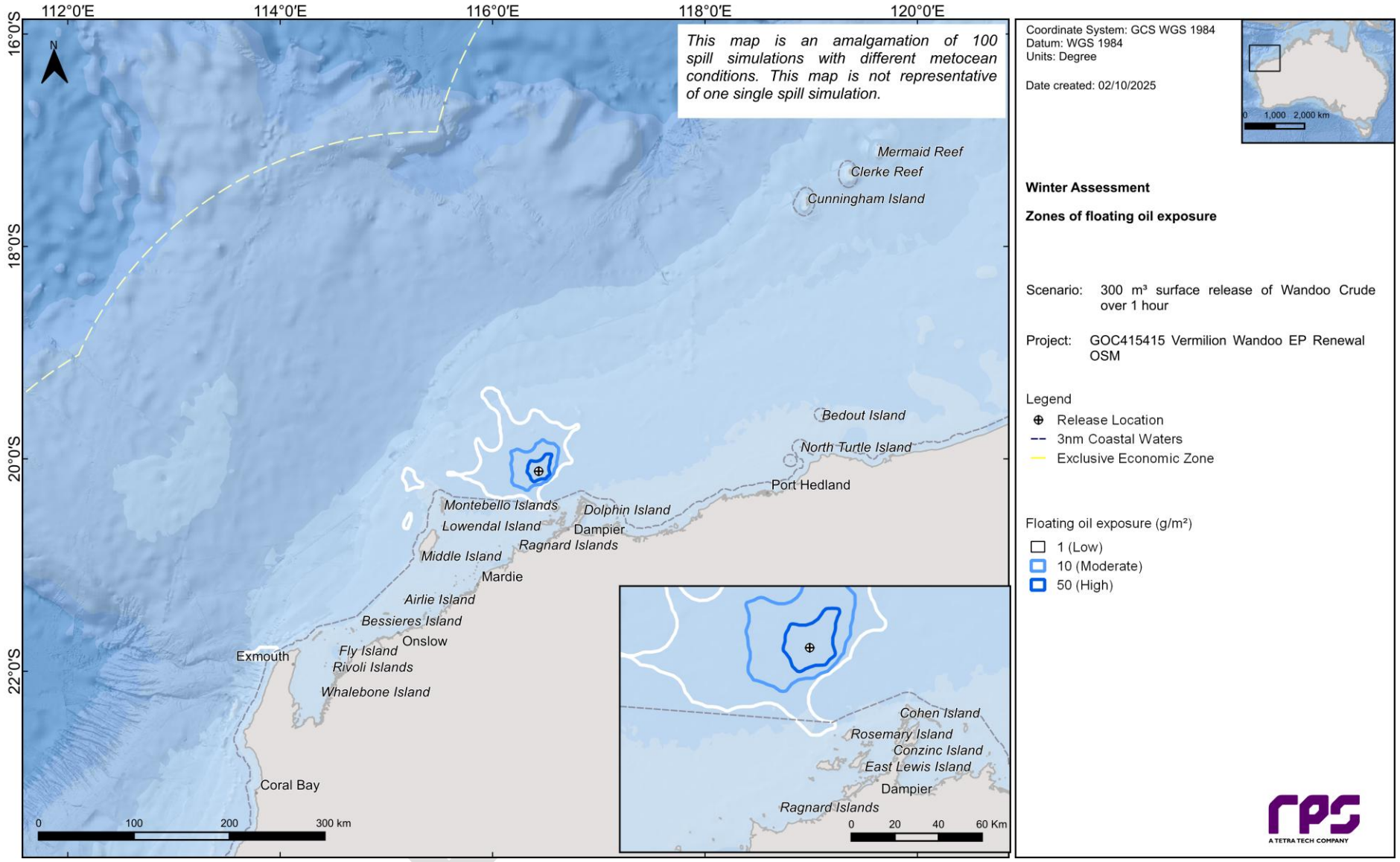


Figure 12.6 Predicted zones of floating oil exposure following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

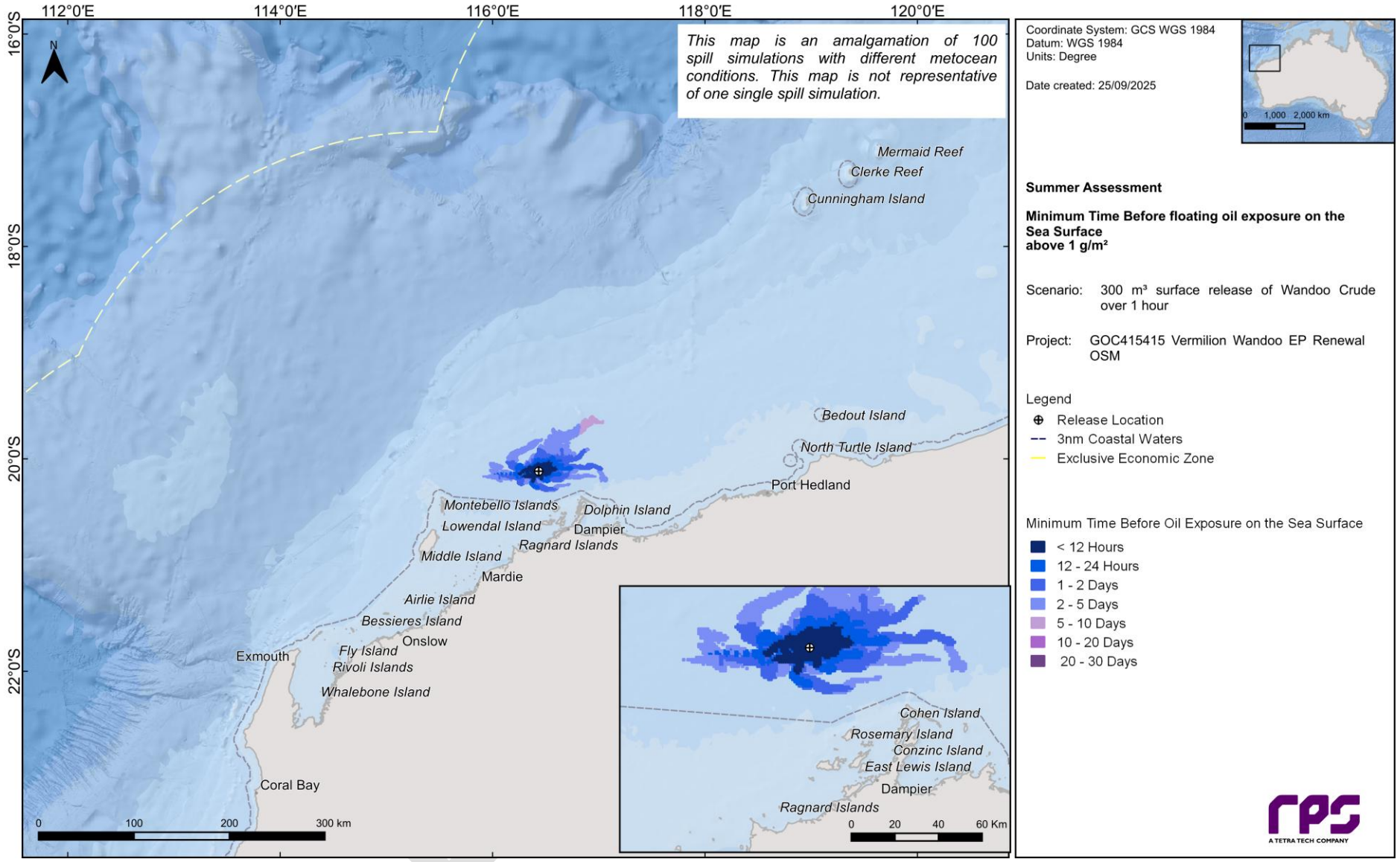


Figure 12.7 Minimum time before floating oil exposure at, or above, 1 g/m² following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

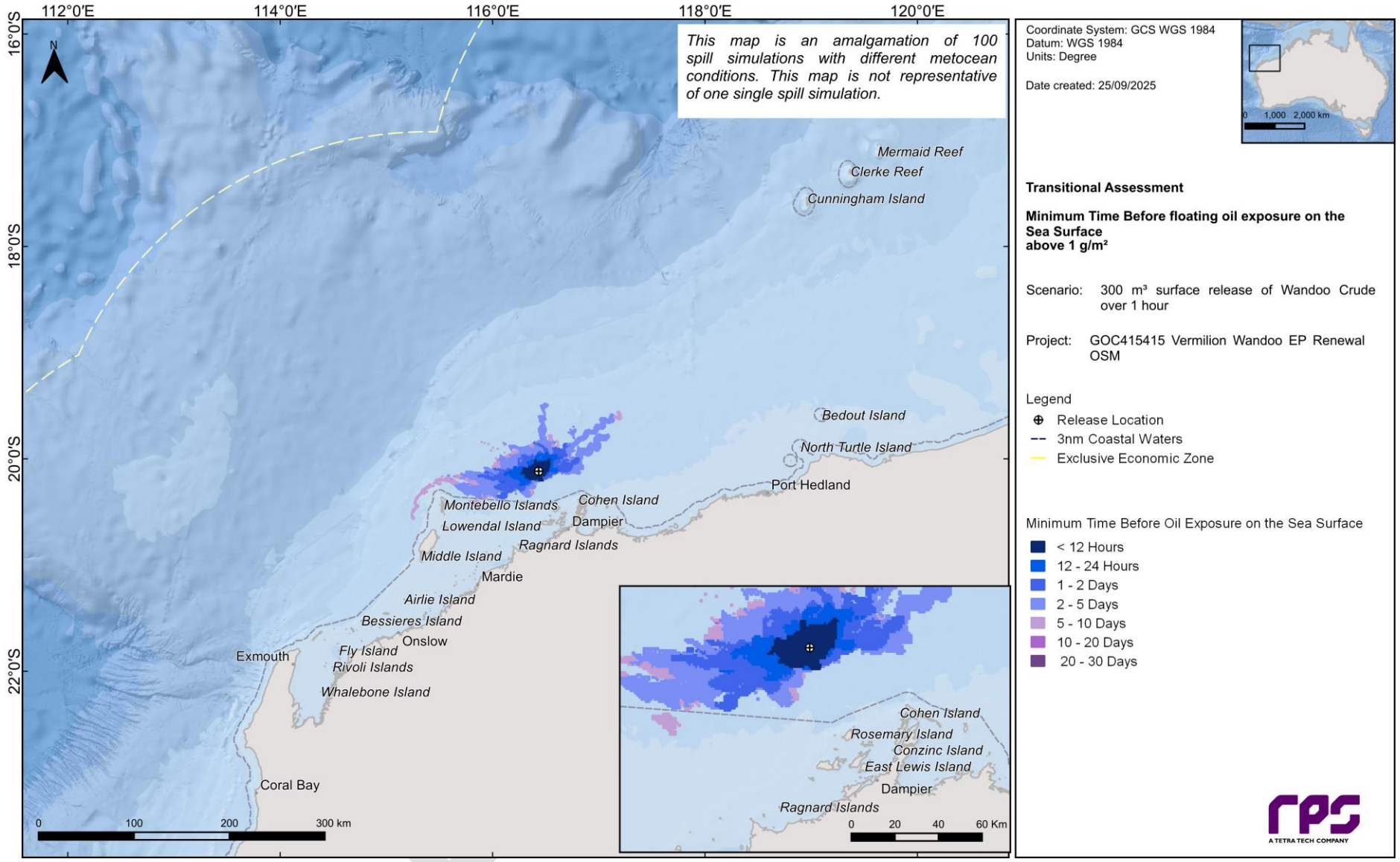


Figure 12.8 Minimum time before floating oil exposure at, or above, 1 g/m² following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

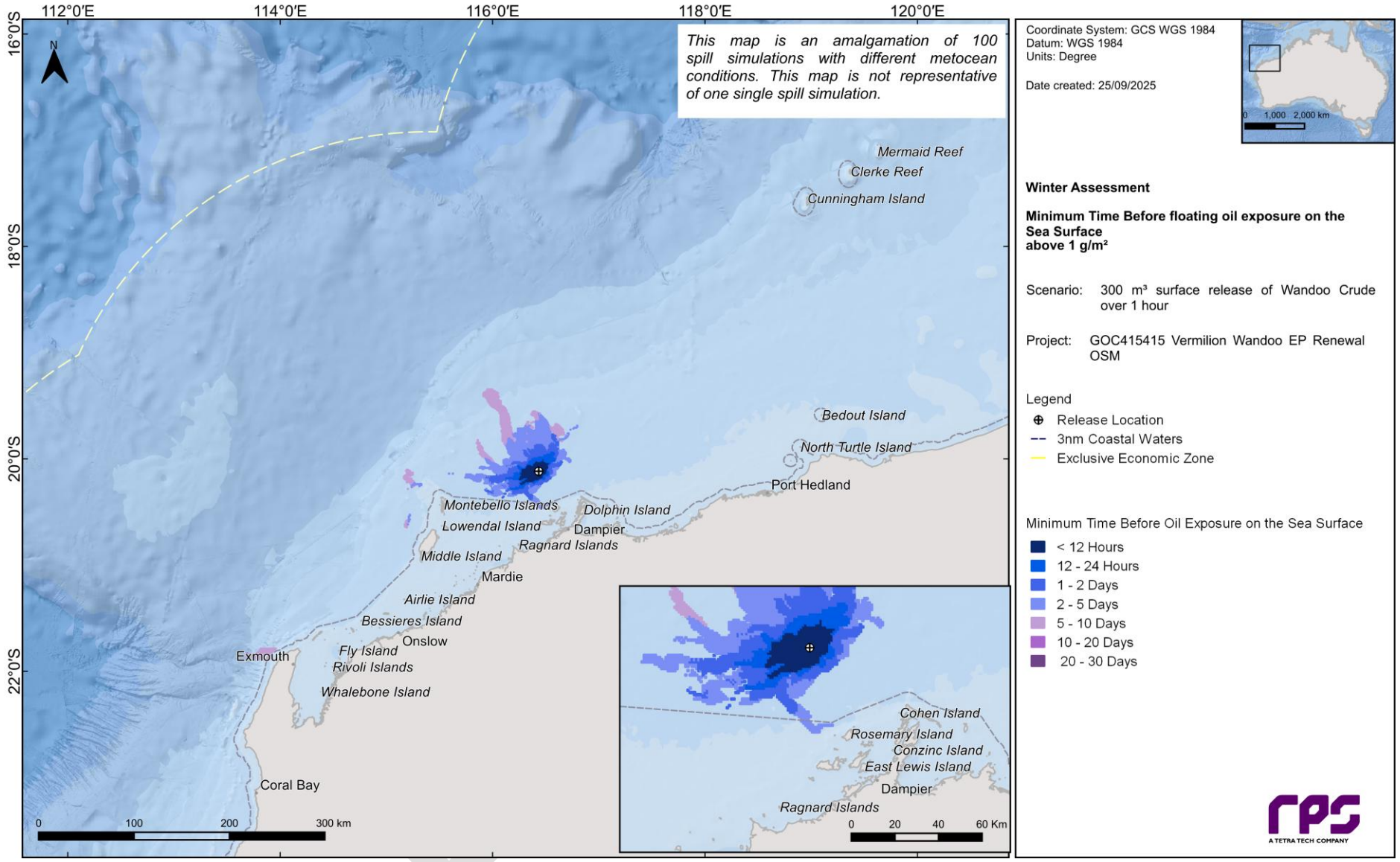


Figure 12.9 Minimum time before floating oil exposure at, or above, 1 g/m² following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

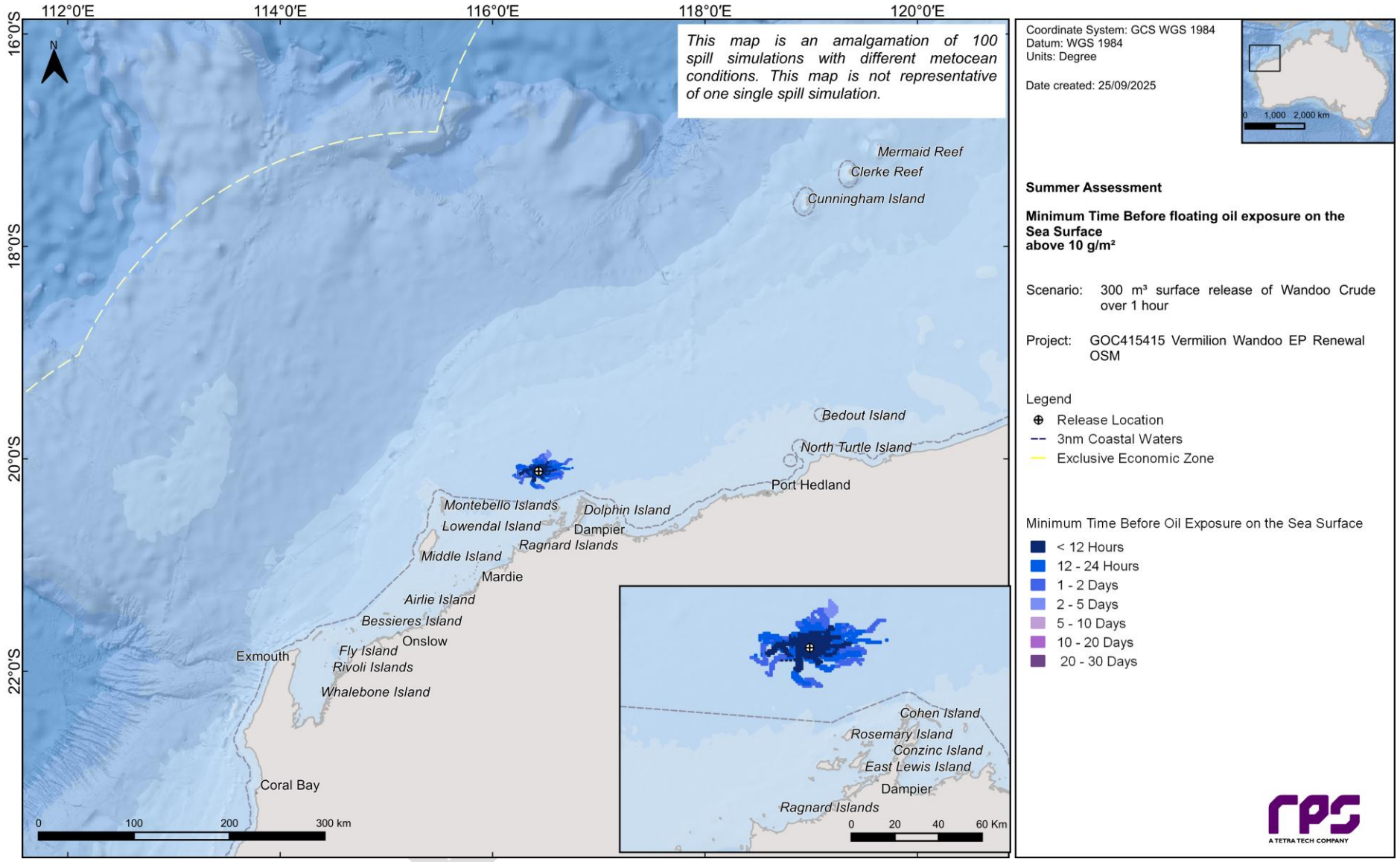


Figure 12.10 Minimum time before floating oil exposure at, or above, 10 g/m² following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

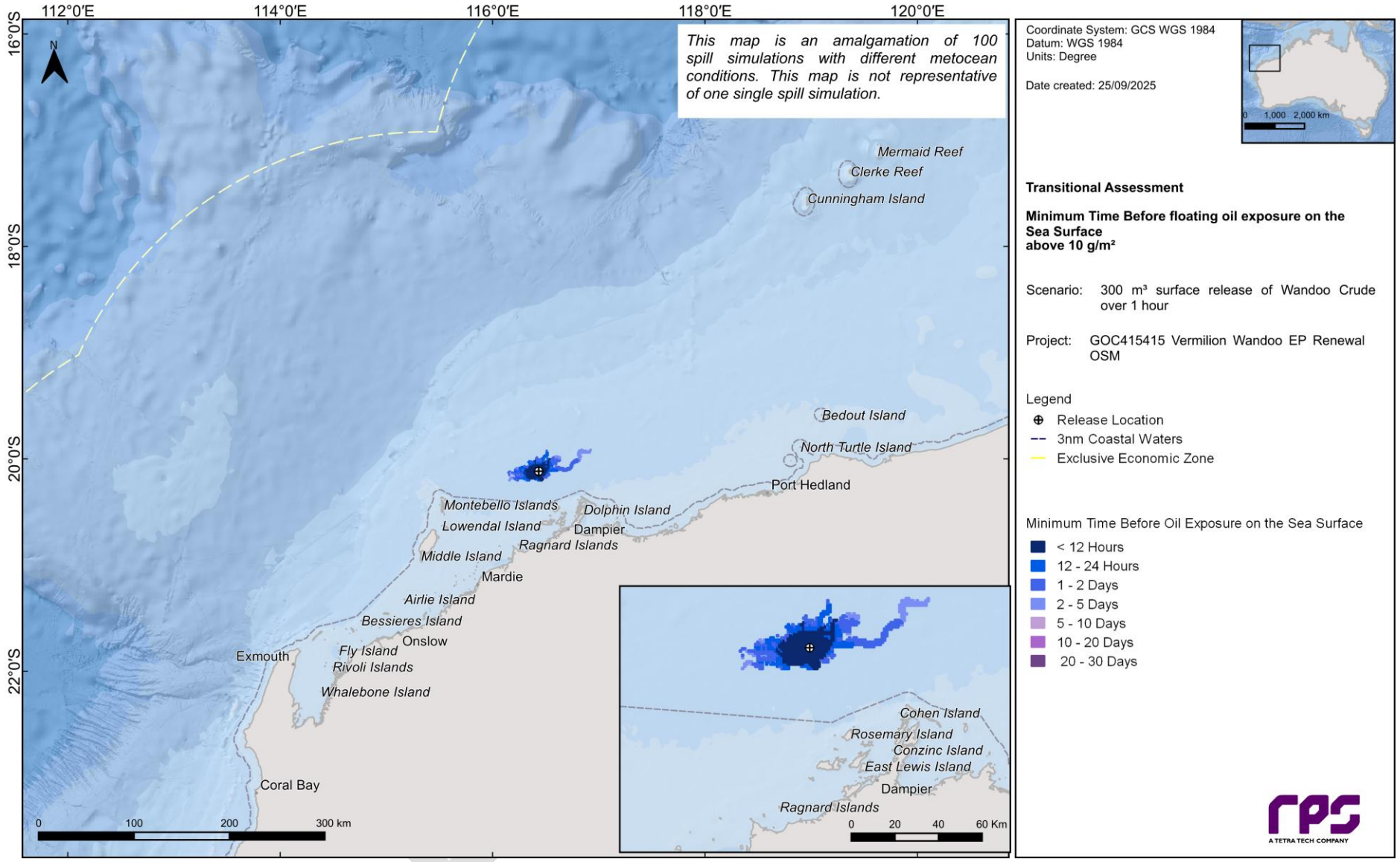


Figure 12.11 Minimum time before floating oil exposure at, or above, 10 g/m² following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

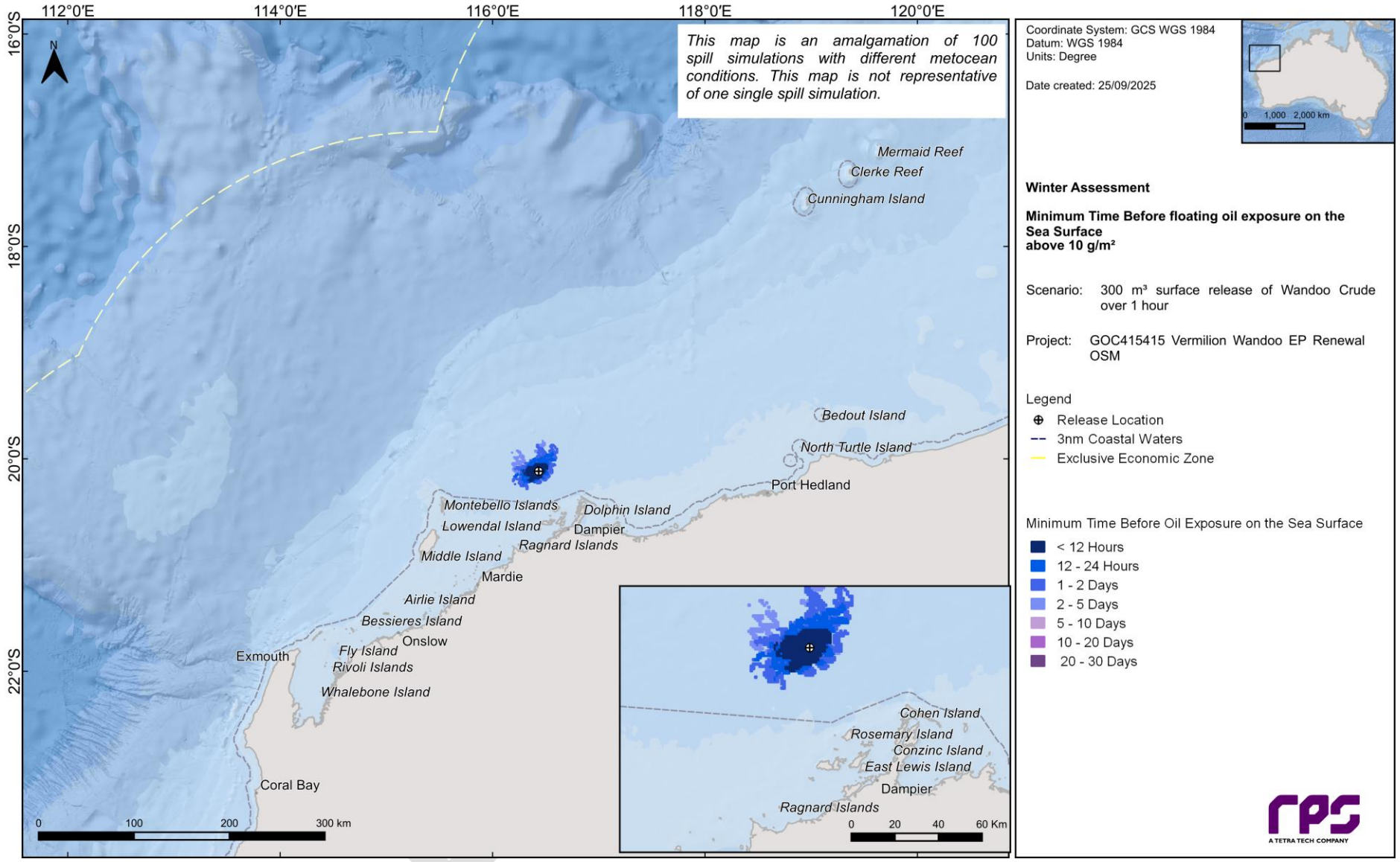


Figure 12.12 Minimum time before floating oil exposure at, or above, 10 g/m² following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

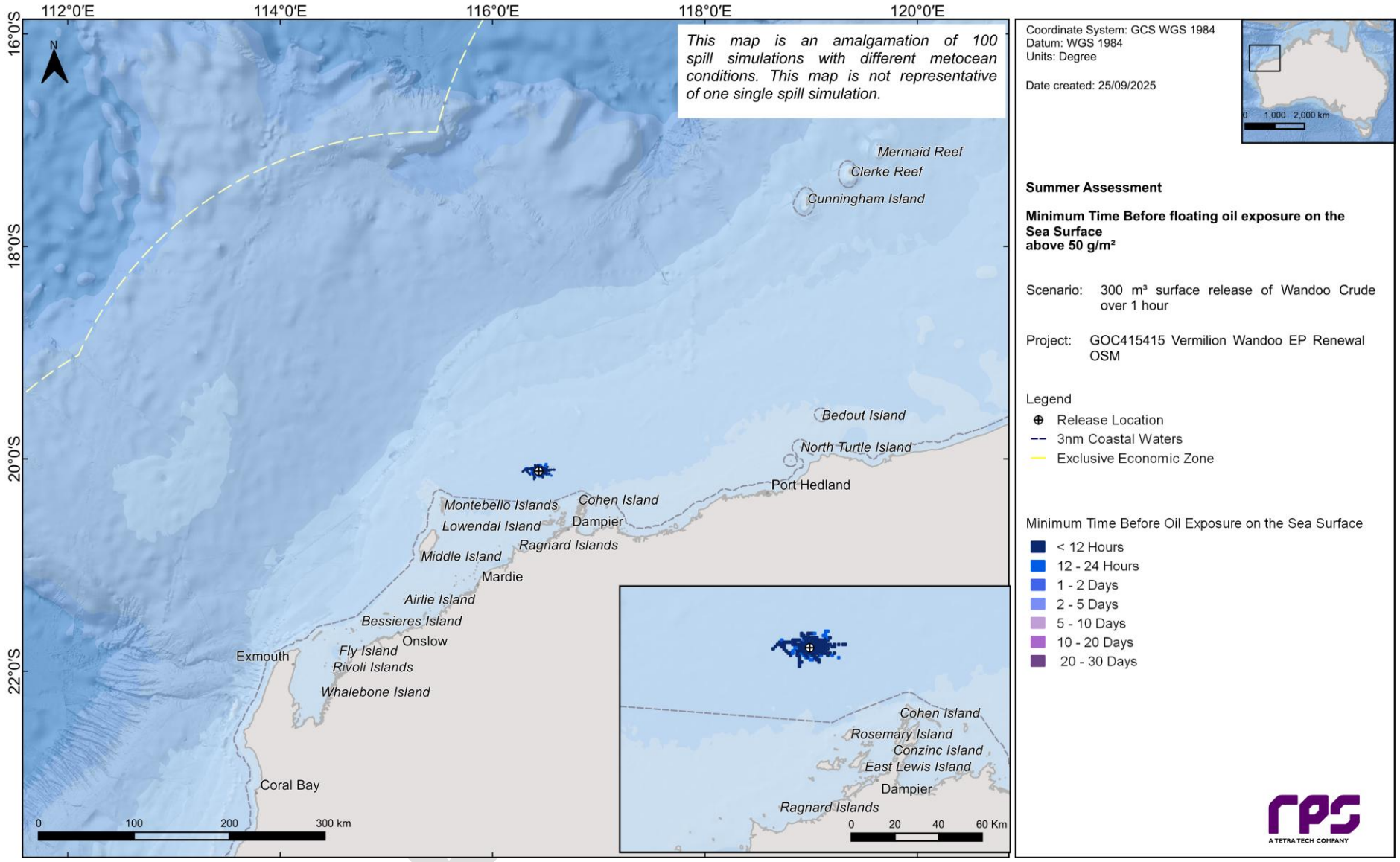


Figure 12.13 Minimum time before floating oil exposure at, or above, 50 g/m² following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

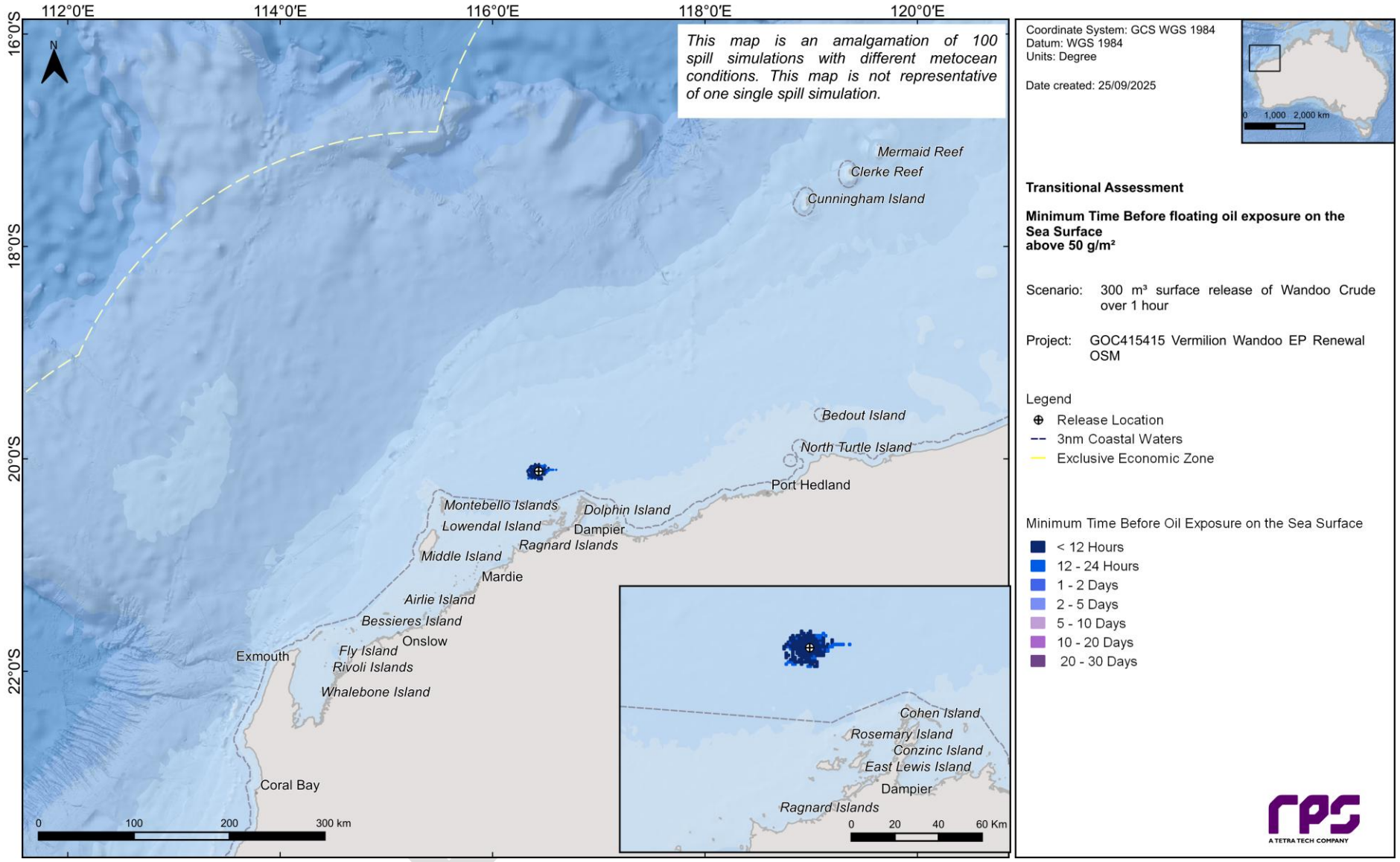


Figure 12.14 Minimum time before floating oil exposure at, or above, 50 g/m² following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

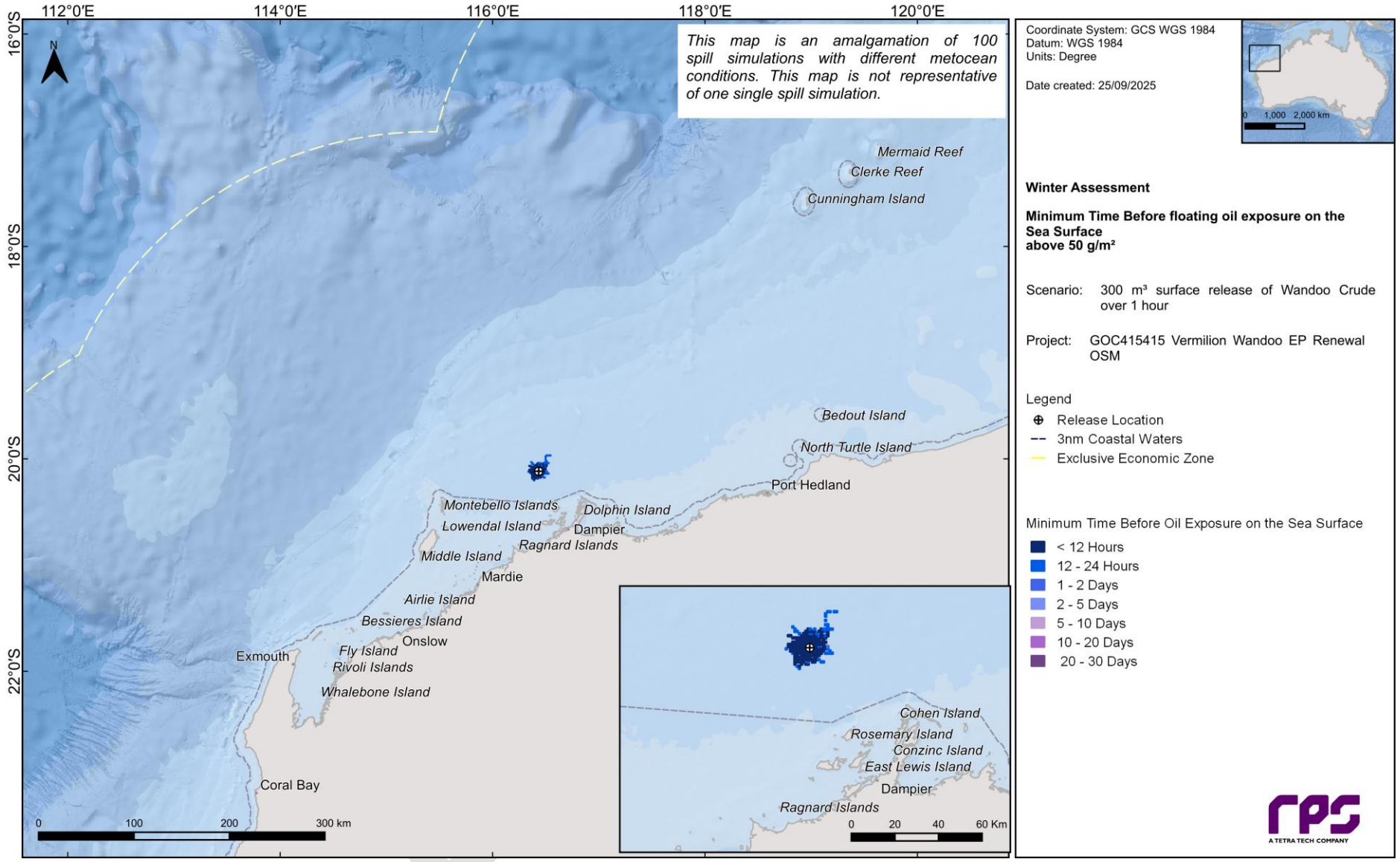


Figure 12.15 Minimum time before floating oil exposure at, or above, 50 g/m² following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

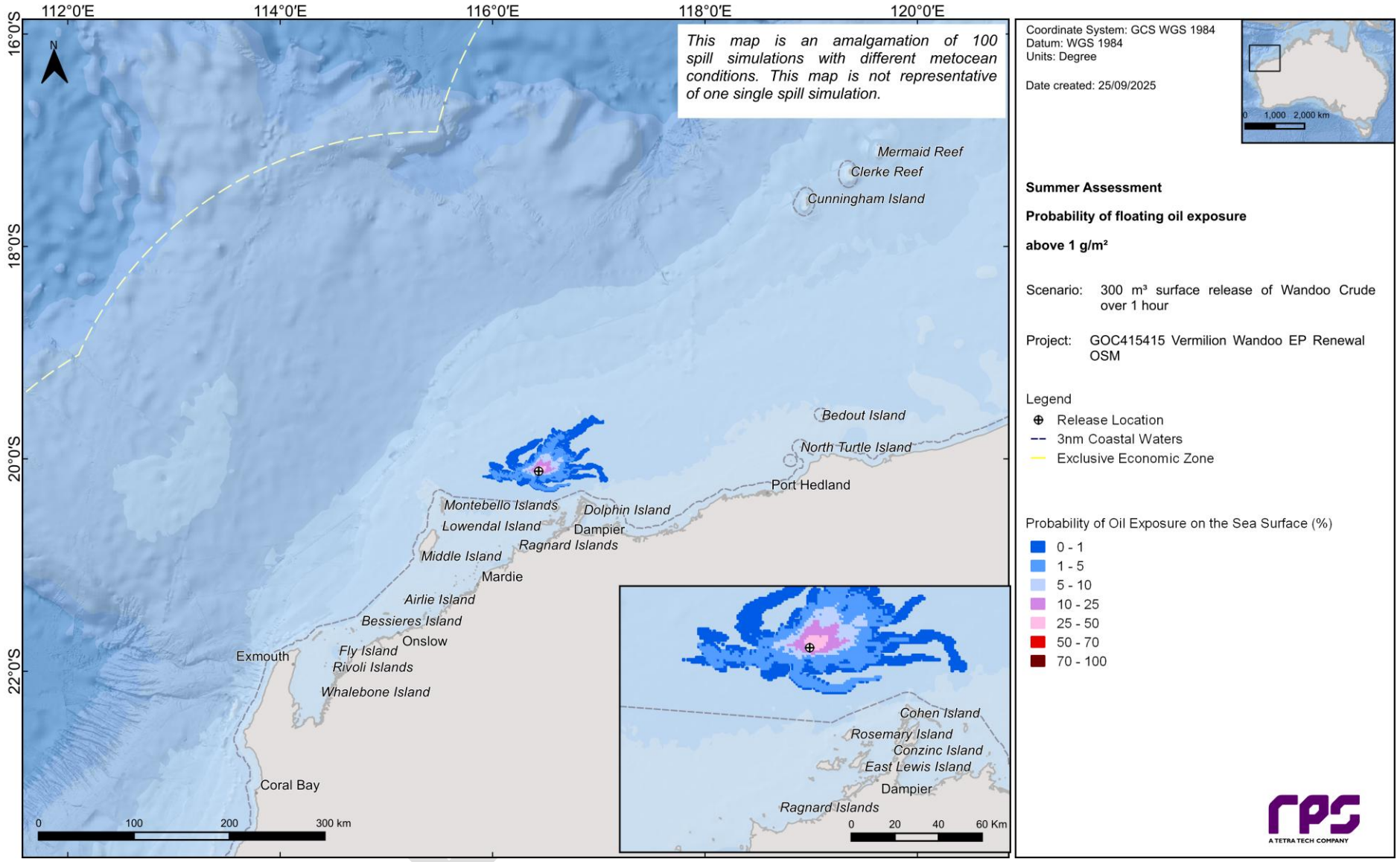


Figure 12.16 Probability of floating oil exposure at, or above, 1 g/m^2 following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

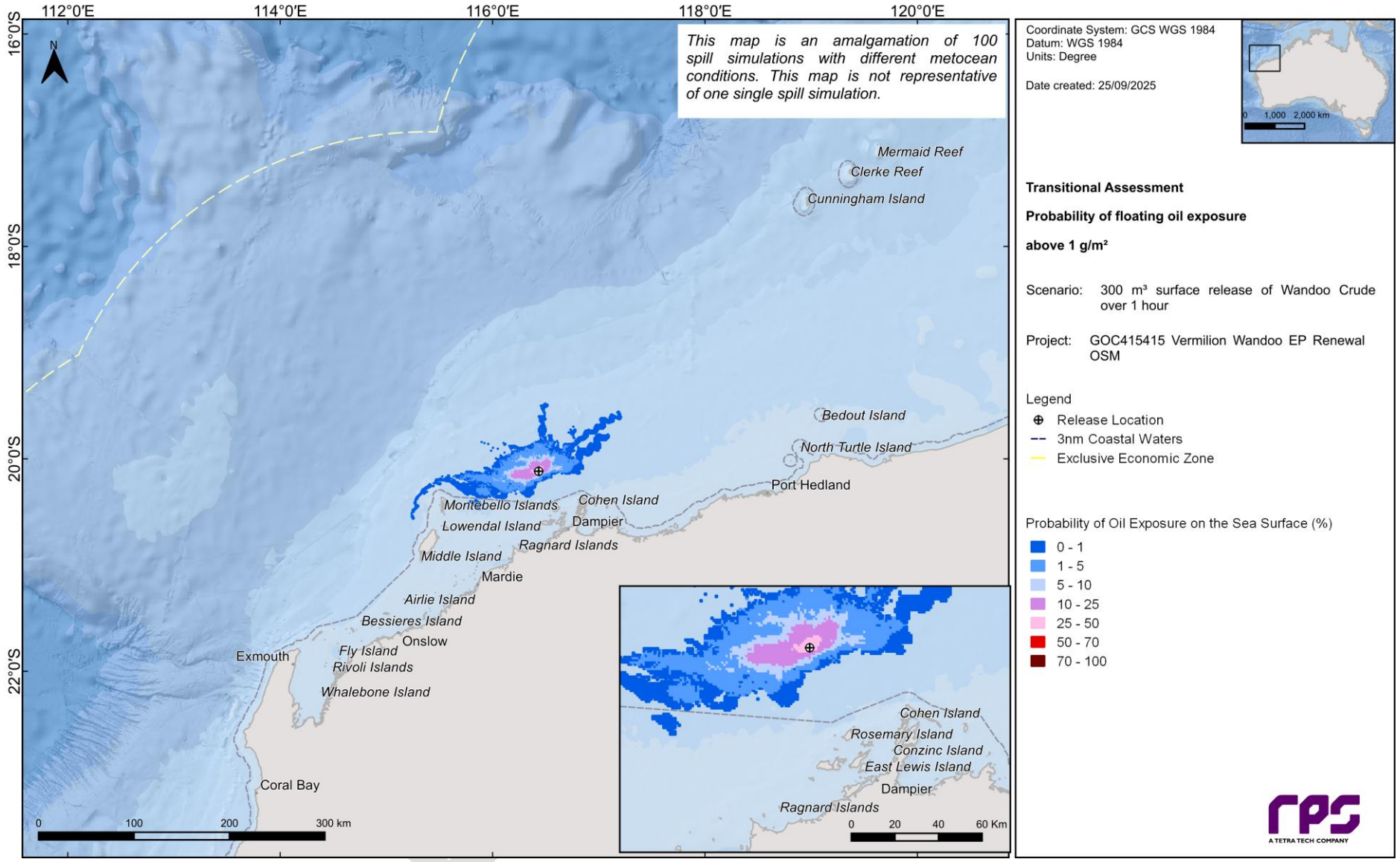


Figure 12.17 Probability of floating oil exposure at, or above, 1 g/m^2 following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

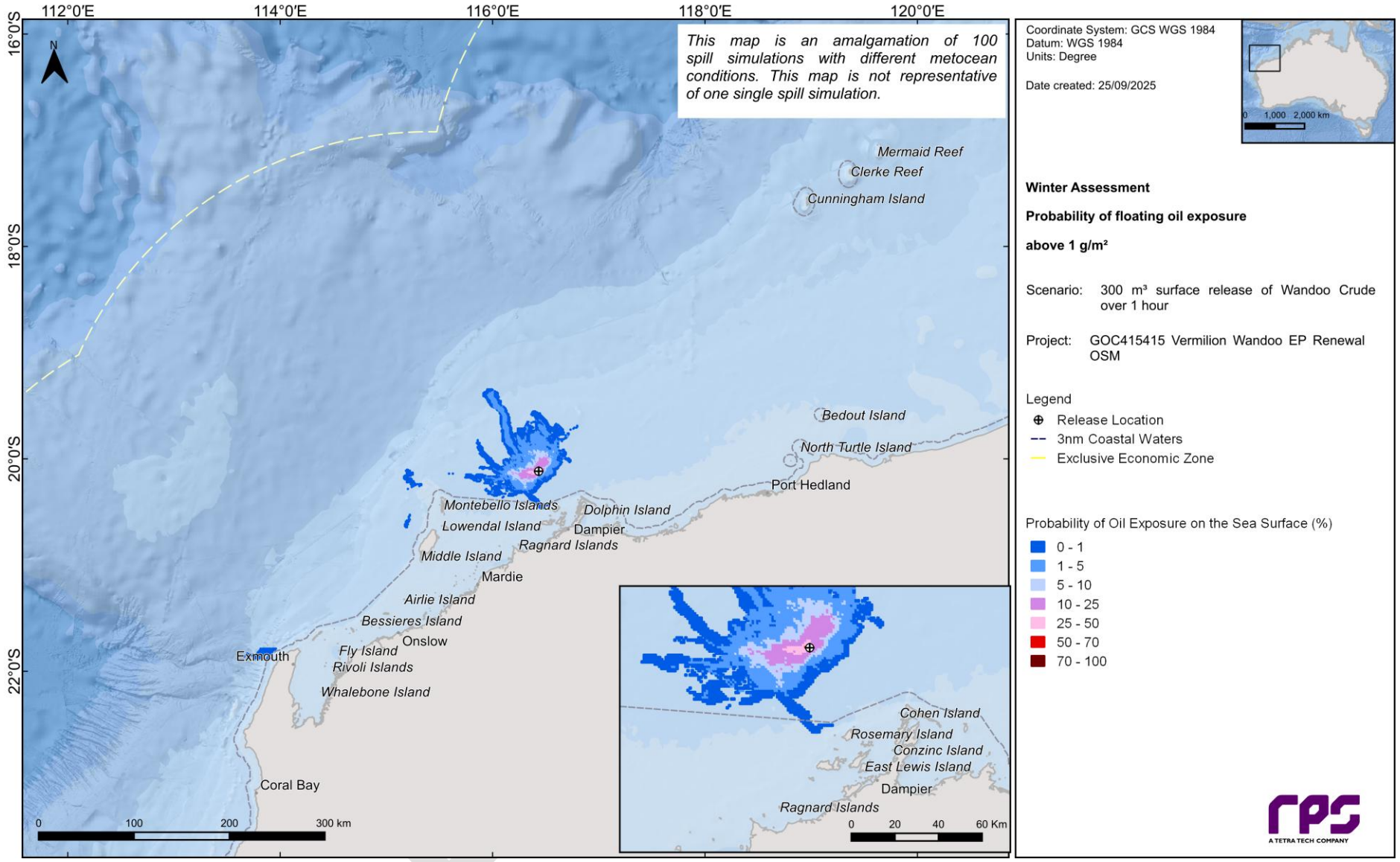


Figure 12.18 Probability of floating oil exposure at, or above, 1 g/m^2 following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

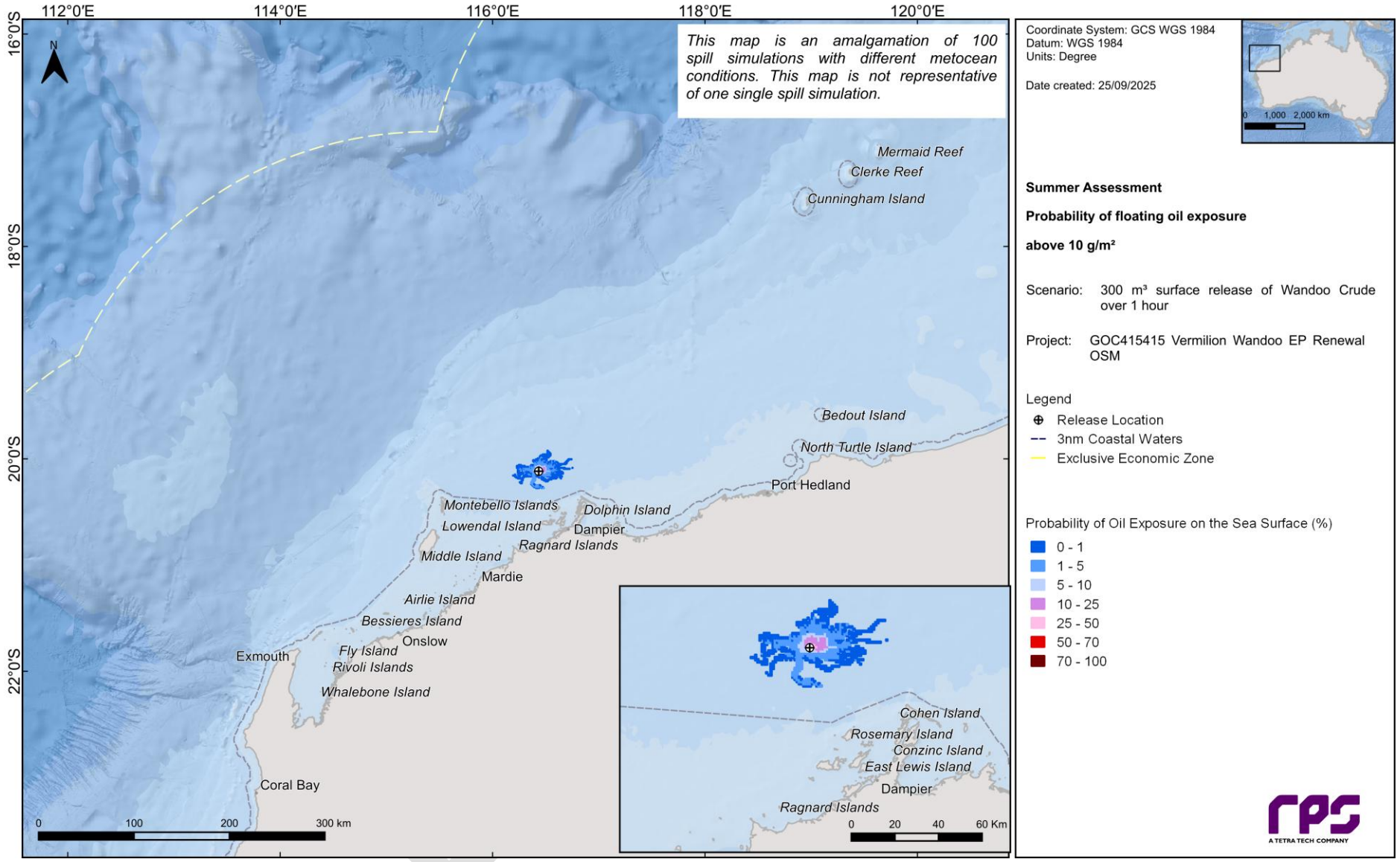


Figure 12.19 Probability of floating oil exposure at, or above, 10 g/m^2 following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

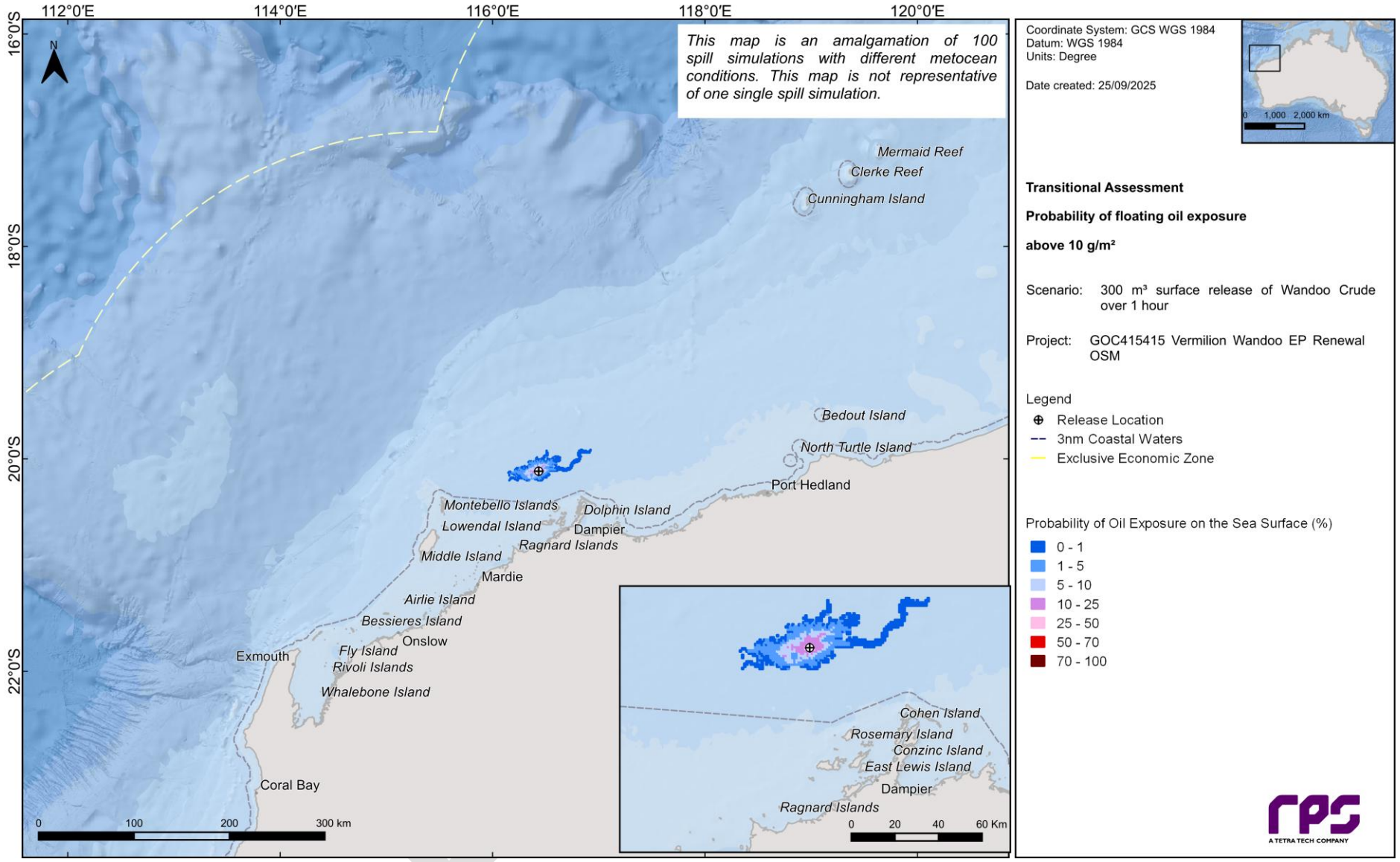


Figure 12.20 Probability of floating oil exposure at, or above, 10 g/m^2 following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

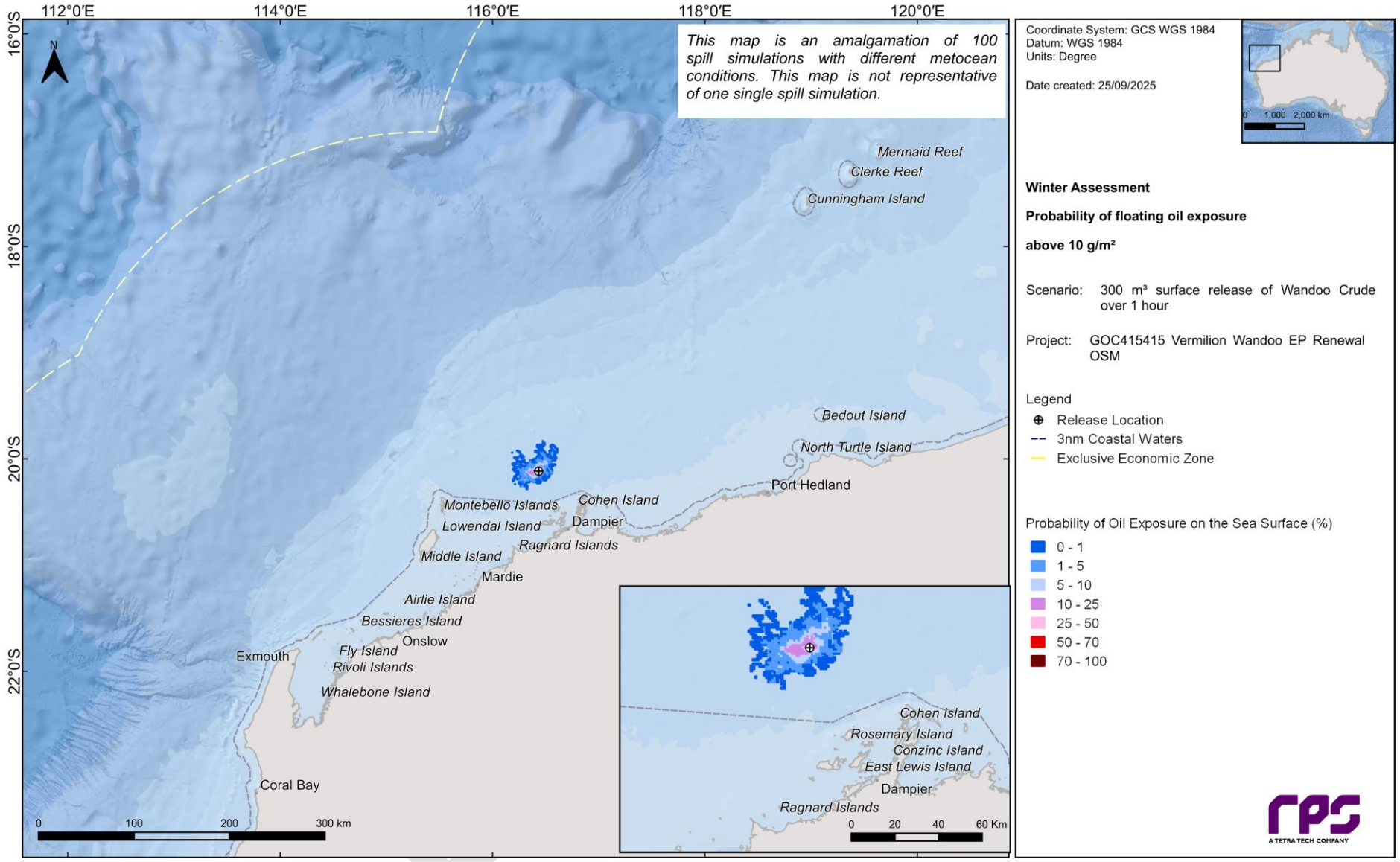


Figure 12.21 Probability of floating oil exposure at, or above, 10 g/m^2 following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

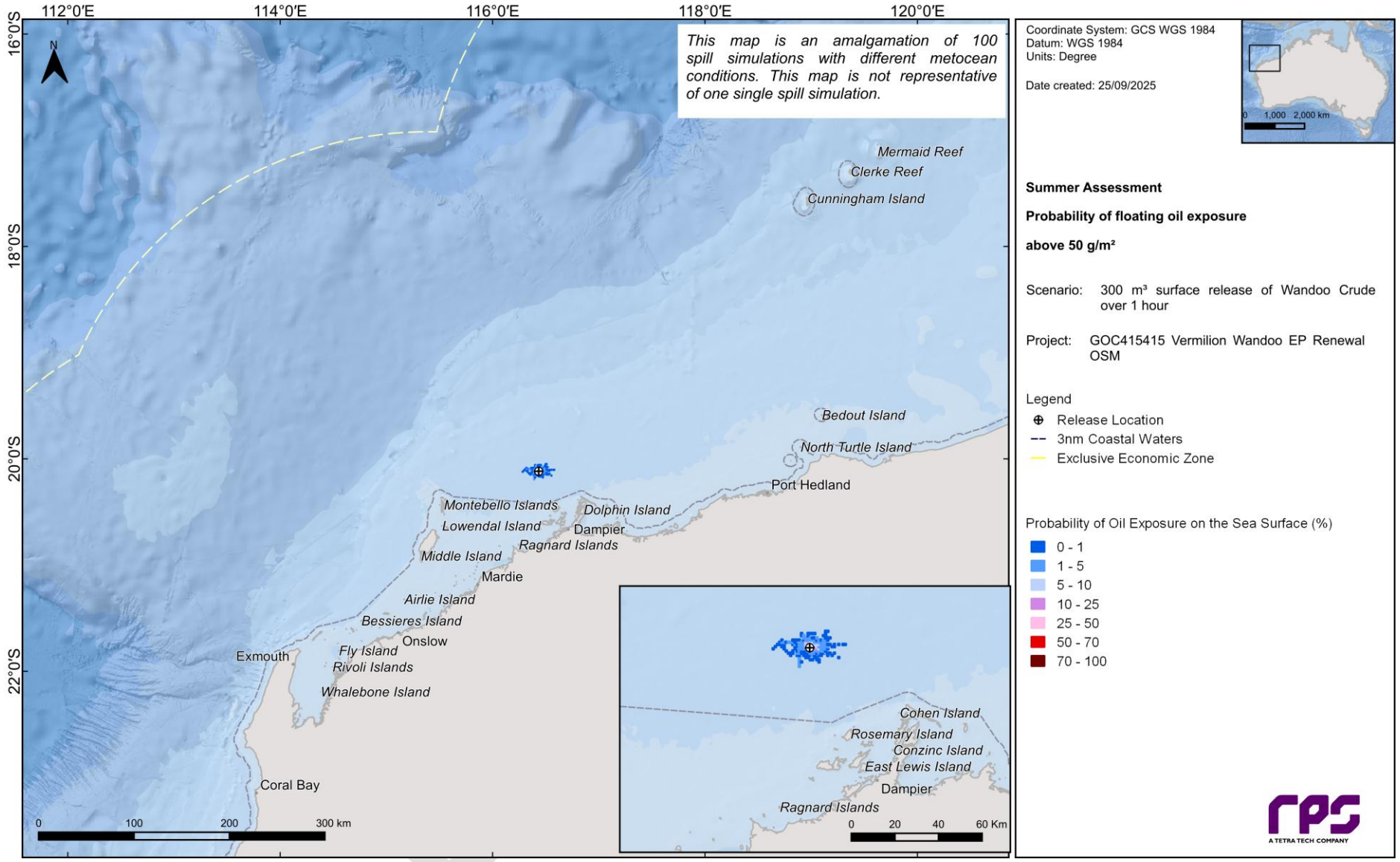


Figure 12.22 Probability of floating oil exposure at, or above, 50 g/m^2 following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

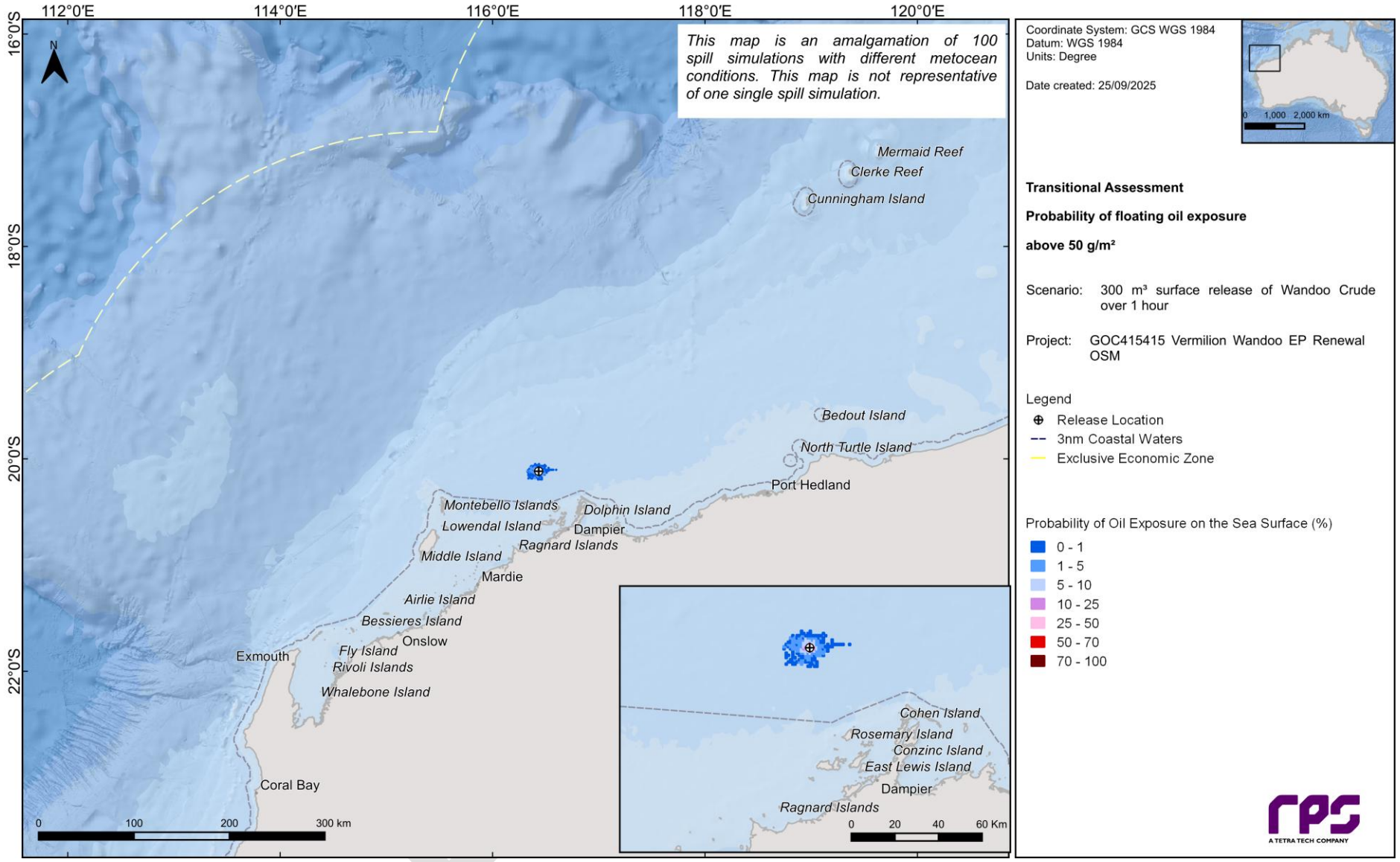


Figure 12.23 Probability of floating oil exposure at, or above, 50 g/m^2 following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

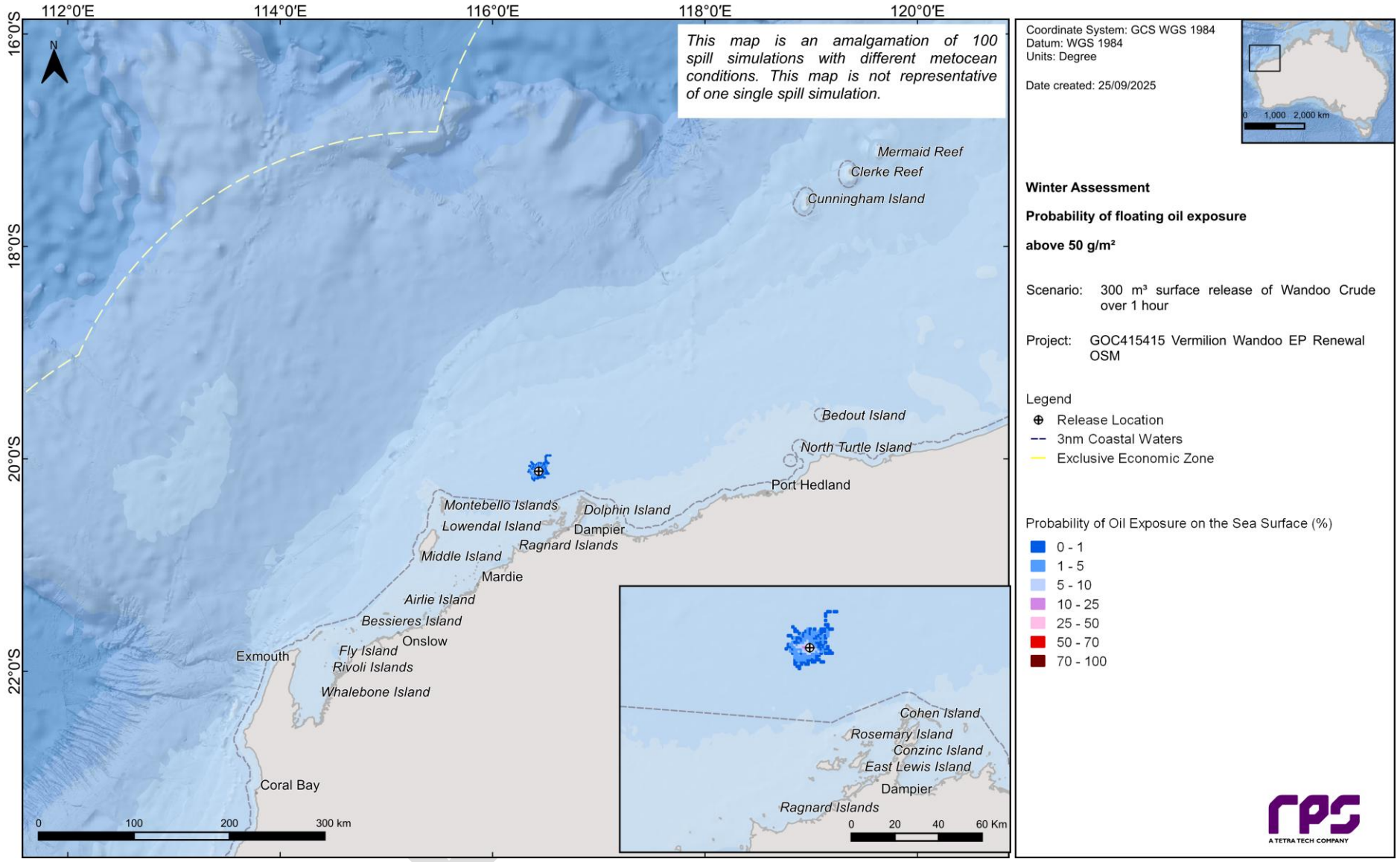


Figure 12.24 Probability of floating oil exposure at, or above, 50 g/m^2 following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

12.1.4 Shoreline accumulation

Table 12-3 summarises the predicted oil accumulation on shorelines across different seasons and thresholds. The highest probability of accumulation at, or above, the 10 g/m^2 threshold was recorded during winter, reaching 66%. The shortest time for oil to accumulate on any shoreline at this threshold was 2 days 20 hours, also during winter. The maximum volume of oil ashore from a single spill was 62.8 m^3, occurring during winter.

Table 12-4 to Table 12-6 present the predicted oil accumulation for WAMOPRA shoreline cells for each season.

The highest overall probability of oil accumulation at or above the 10 g/m² threshold was forecast for WA11.West (326) – Bares and Point to Entrance Point E, with a 43% likelihood during winter conditions. Under transitional conditions, the highest probability was 22% at WA11.West (318) – Barrow Island and Montebello Islands (A). During summer, the highest probability decreased to 7% and was observed at both WA11.West (318) – Barrow Island and Montebello Islands (A), and WA12 (312) – Yan Well Coast to Condini Landing (C).

Across all seasons, WA11.West (318) – Barrow Island and Montebello Islands (A) recorded the fastest oil accumulation on any shoreline, taking 4 days 19 hours in summer, 4 days 2 hours in transitional conditions, and 2 days 20 hours in winter.

This same shoreline also registered the highest volume of oil ashore: 47 m³ in winter, 40 m³ during transitional conditions, and 32 m³ in summer.

The maximum potential shoreline oil accumulation for each season are presented in Figure 12.25 to Figure 12.27. Probabilities of oil accumulation for each of the thresholds and seasons are presented in Figure 12.28 to Figure 12.33.

Table 12-3 Summary of oil accumulation on any shoreline following a surface release of crude from the offtake export system. Results were calculated from 100 spill simulations per season.

Shoreline statistics	Summer			Transitional			Winter		
	Shoreline accumulation thresholds			Shoreline accumulation thresholds			Shoreline accumulation thresholds		
	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²
Probability of contact to any shoreline (%)	27	13	NC	37	17	NC	66	26	NC
Absolute minimum time to shore	4 d, 19 hrs	5 d, 19 hrs	NC	4 d, 2 hrs	4 d, 14 hrs	NC	2 d, 20 hrs	3 d, 10 hrs	NC
Maximum accumulated volume (m^3) from a single spill simulation	55.9	37.2	NC	49.7	34.5	NC	62.8	50.2	NC
Average accumulated volume (m^3) across all spill simulations	3.9	1.5	NC	3.7	1.6	NC	7.9	3.9	NC
Maximum length of shoreline (km) from a single spill simulation	125	17	NC	57	14	NC	81	19	NC
Average length of shoreline (km) across all spill simulations	8.9	0.9	NC	8.3	0.9	NC	15.7	2.0	NC

NC: No contact predicted for specified threshold.

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Table 12-4 Summary of shoreline oil accumulation on WAMOPRA shoreline cells following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

WAMOPRA shoreline cells	Maximum probability (%) of oil accumulation at			Minimum time before oil accumulation at			Maximum shoreline oil accumulation (g/m²) in a given grid cell		Maximum volume (m^3) of accumulated oil ashore at ≥ 10 g/m²		Maximum volume (m^3) of accumulated oil ashore at ≥ 100 g/m²		Maximum volume (m^3) of accumulated oil ashore at ≥ 1,000 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 10 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 100 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 1,000 g/m²	
	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all simulations	for the worst simulation	averaged over all simulations	for the worst simulation	averaged over all simulations	for the worst simulation	averaged over all simulations	for the worst simulation	averaged over all simulations	for the worst simulation	averaged over all simulations	for the worst simulation	averaged over all simulations	for the worst simulation
WA10 (123) - Low Point - Vlamingh Head (A)	1	NC	NC	22 d, 20 hrs	NC	NC	0.1	12	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA10 (124) - Low Point - Vlamingh Head (B)	1	NC	NC	17 d, 20 hrs	NC	NC	0.3	25	<1	2	NC	NC	NC	NC	<1	9	NC	NC	NC	NC
WA10 (125) - Osprey Bay - Low Point	1	NC	NC	18 d, 19 hrs	NC	NC	0.2	14	<1	<1	NC	NC	NC	NC	<1	6	NC	NC	NC	NC
WA11.East (100) - Sherlock coast - Cape Cossigny (B)	2	NC	NC	19 d, 12 hrs	NC	NC	0.5	44	<1	3	NC	NC	NC	NC	<1	14	NC	NC	NC	NC
WA11.East (102) - Cape Lambert - Sherlock coast (B)	1	NC	NC	21 d, 12 hrs	NC	NC	0.3	23	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA11.East (104) - West Intercourse Island - Dolphin Island N point (B)	2	NC	NC	23 d, 3 hrs	NC	NC	0.5	31	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA11.East (105) - West Intercourse Island - Dolphin Island N point (C)	6	3	NC	4 d, 20 hrs	6 d, 5 hrs	NC	11	640	<1	30	<1	25	NC	NC	<1	23	<1	9	NC	NC
WA11.East (108) - Pelican Point - West Intercourse Island	2	NC	NC	23 d, 6 hrs	NC	NC	0.3	16	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA11.East (109) - James Point - Cape Preston	2	NC	NC	16 d, 19 hrs	NC	NC	0.7	39	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA11.East (315) - Dolphin Island N point - Cinders Rd coast	3	NC	NC	8 d, 2 hrs	NC	NC	1.1	65	<1	2	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA11.East (316) - West Intercourse Island - Dolphin Island N point (F)	6	1	NC	4 d, 23 hrs	5 d, 16 hrs	NC	3.3	157	<1	4	<1	2	NC	NC	<1	11	<1	1	NC	NC
WA11.East (317) - West Intercourse Island - Dolphin Island N point (G)	5	2	NC	7 d, 12 hrs	12 d, 23 hrs	NC	3.3	108	<1	4	<1	2	NC	NC	<1	12	<1	1	NC	NC
WA11.East (95) - Turner River NE foreland - Beebingara Creek coast E (A)	3	NC	NC	19 d, 0 hrs	NC	NC	0.9	44	<1	2	NC	NC	NC	NC	<1	6	NC	NC	NC	NC
WA11.East (96) - Turner River NE foreland - Beebingara Creek coast E (B)	3	NC	NC	15 d, 16 hrs	NC	NC	1.8	62	<1	4	NC	NC	NC	NC	<1	16	NC	NC	NC	NC
WA11.East (97) - Cape Thouin - Turner River NE foreland	4	2	NC	14 d, 21 hrs	25 d, 15 hrs	NC	3.2	138	<1	18	<1	7	NC	NC	<1	21	<1	5	NC	NC
WA11.East (98) - Cape Cossigny - Cape Thouin	3	2	NC	15 d, 13 hrs	23 d, 7 hrs	NC	3	134	<1	15	<1	4	NC	NC	<1	22	<1	3	NC	NC
WA11.East (99) - Sherlock coast - Cape Cossigny (A)	2	NC	NC	17 d, 21 hrs	NC	NC	1.3	90	<1	6	NC	NC	NC	NC	<1	18	NC	NC	NC	NC
WA11.West (110) - Mount Salt coast W - James Point	2	NC	NC	16 d, 10 hrs	NC	NC	0.6	25	<1	2	NC	NC	NC	NC	<1	6	NC	NC	NC	NC
WA11.West (111) - Peter Creek coast E - Mount Salt coast W	1	NC	NC	15 d, 23 hrs	NC	NC	0.3	18	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA11.West (115) - Hope Point - Locker Point (A)	3	1	NC	19 d, 2 hrs	23 d, 0 hrs	NC	2.4	128	<1	6	<1	3	NC	NC	<1	7	<1	2	NC	NC
WA11.West (116) - Hope Point - Locker Point (B)	1	NC	NC	23 d, 12 hrs	NC	NC	0.2	16	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA11.West (318) - Barrow Island and Montebello Islands (A)	7	4	NC	4 d, 19 hrs	5 d, 18 hrs	NC	12	424	<1	32	<1	26	NC	NC	2	23	<1	10	NC	NC
WA11.West (319) - Barrow Island and Montebello Islands (B)	5	NC	NC	8 d, 23 hrs	NC	NC	1.4	54	<1	3	NC	NC	NC	NC	<1	13	NC	NC	NC	NC
WA11.West (320) - Barrow Island and Montebello Islands (C)	3	1	NC	8 d, 17 hrs	11 d, 3 hrs	NC	2.4	143	<1	12	<1	6	NC	NC	<1	17	<1	4	NC	NC
WA11.West (321) - Barrow Island and Montebello Islands (D)	4	2	NC	8 d, 15 hrs	9 d, 23 hrs	NC	4.5	289	<1	12	<1	8	NC	NC	<1	19	<1	3	NC	NC
WA11.West (323) - Yardie Landing - Weld Island coast S (A)	1	NC	NC	20 d, 11 hrs	NC	NC	0.2	11	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA11.West (324) - Yardie Landing - Weld Island coast S (B)	4	1	NC	11 d, 9 hrs	22 d, 7 hrs	NC	3.1	240	<1	6	<1	6	NC	NC	<1	3	<1	3	NC	NC
WA11.West (325) - Coolgra Point W - Yardie Landing (C)	3	1	NC	19 d, 6 hrs	21 d, 4 hrs	NC	2	115	<1	8	<1	4	NC	NC	<1	14	<1	3	NC	NC
WA11.West (326) - Baresand Point - Entrance Point E	4	2	NC	14 d, 21 hrs	20 d, 2 hrs	NC	3.9	202	<1	16	<1	11	NC	NC	<1	23	<1	7	NC	NC

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WA11.West (327) - Hope Point - Locker Point (E)	1	NC	NC	18 d, 16 hrs	NC	NC	0.7	65	<1	2	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA11.West (328) - Hope Point - Locker Point (F)	1	NC	NC	18 d, 14 hrs	NC	NC	0.4	42	<1	2	NC	NC	NC	NC	<1	7	NC	NC	NC	NC
WA11.West (329) - Locker Point - Baresand Point	4	1	NC	14 d, 19 hrs	19 d, 12 hrs	NC	1.7	125	<1	10	<1	2	NC	NC	<1	23	<1	1	NC	NC
WA12 (311) - Imperieuse Reef	1	NC	NC	29 d, 14 hrs	NC	NC	0.2	15	<1	<1	NC	NC	NC	NC	<1	5	NC	NC	NC	NC
WA12 (312) - Yan Well coast - Condini Landing (C)	7	1	NC	20 d, 4 hrs	22 d, 21 hrs	NC	3.2	137	<1	4	<1	3	NC	NC	<1	4	<1	2	NC	NC
WA12 (313) - Wattle Well coast - Yan Well coast (C)	3	NC	NC	24 d, 7 hrs	NC	NC	1.2	53	<1	2	NC	NC	NC	NC	<1	4	NC	NC	NC	NC
WA12 (314) - Wattle Well coast - Yan Well coast (D)	2	NC	NC	20 d, 16 hrs	NC	NC	1.9	80	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA12 (91) - Yan Well coast - Condini Landing (B)	1	NC	NC	28 d, 21 hrs	NC	NC	0.4	26	<1	2	NC	NC	NC	NC	<1	7	NC	NC	NC	NC
WA12 (92) - Wattle Well coast - Yan Well coast (A)	2	NC	NC	28 d, 15 hrs	NC	NC	0.4	24	<1	2	NC	NC	NC	NC	<1	8	NC	NC	NC	NC
WA12 (93) - Wattle Well coast - Yan Well coast (B)	2	NC	NC	28 d, 10 hrs	NC	NC	0.3	17	<1	2	NC	NC	NC	NC	<1	11	NC	NC	NC	NC
WA12 (94) - Beebingara Creek coast E - Wattle Well coast	2	NC	NC	27 d, 18 hrs	NC	NC	0.6	32	<1	<1	NC	NC	NC	NC	<1	5	NC	NC	NC	NC

NC: No contact to receptor predicted for specified threshold.

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Table 12-5 Summary of shoreline oil accumulation on WAMOPRA shoreline cells following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

WAMOPRA shoreline cells	Maximum probability (%) of oil accumulation at			Minimum time before oil accumulation at			Maximum shoreline oil accumulation (g/m²) in a given grid cell		Maximum volume (m^3) of accumulated oil ashore at ≥ 10 g/m²		Maximum volume (m^3) of accumulated oil ashore at ≥ 100 g/m²		Maximum volume (m^3) of accumulated oil ashore at ≥ 1,000 g/m²			Maximum length (km) of oil accumulation on shorelines at ≥ 10 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 100 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 1,000 g/m²	
	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all simulations	for the worst simulation	averaged over all simulations	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all simulations	for the worst simulation	averaged over all simulations	≥ 10 g/m²	≥ 100 g/m²
WA10 (123) - Low Point - Vlamingh Head (A)	1	NC	NC	28 d, 17 hrs	NC	NC	0.2	13	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA10 (124) - Low Point - Vlamingh Head (B)	2	NC	NC	21 d, 3 hrs	NC	NC	1.1	69	<1	4	NC	NC	NC	NC	<1	11	NC	NC	NC	NC
WA10 (125) - Osprey Bay - Low Point	1	NC	NC	25 d, 15 hrs	NC	NC	0.3	23	<1	<1	NC	NC	NC	NC	<1	4	NC	NC	NC	NC
WA11.East (105) - West Intercourse Island - Dolphin Island N point (C)	2	1	NC	19 d, 9 hrs	23 d, 12 hrs	NC	2.3	149	<1	8	<1	3	NC	NC	<1	15	<1	2	NC	NC
WA11.East (109) - James Point - Cape Preston	2	NC	NC	21 d, 9 hrs	NC	NC	0.3	16	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA11.East (316) - West Intercourse Island - Dolphin Island N point (F)	1	NC	NC	22 d, 1 hrs	NC	NC	0.1	12	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA11.West (115) - Hope Point - Locker Point (A)	2	NC	NC	28 d, 4 hrs	NC	NC	0.7	21	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA11.West (318) - Barrow Island and Montebello Islands (A)	22	8	NC	4 d, 2 hrs	4 d, 14 hrs	NC	24	504	2	40	2	33	NC	NC	4	39	<1	12	NC	NC
WA11.West (319) - Barrow Island and Montebello Islands (B)	9	2	NC	5 d, 4 hrs	9 d, 17 hrs	NC	5.2	159	<1	10	<1	6	NC	NC	<1	15	<1	4	NC	NC
WA11.West (320) - Barrow Island and Montebello Islands (C)	6	2	NC	13 d, 11 hrs	14 d, 7 hrs	NC	4.1	187	<1	11	<1	6	NC	NC	<1	17	<1	4	NC	NC
WA11.West (321) - Barrow Island and Montebello Islands (D)	9	2	NC	12 d, 0 hrs	14 d, 9 hrs	NC	3.7	135	<1	7	<1	4	NC	NC	<1	13	<1	3	NC	NC
WA11.West (323) - Yardie Landing - Weld Island coast S (A)	1	NC	NC	29 d, 18 hrs	NC	NC	0.2	11	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA11.West (324) - Yardie Landing - Weld Island coast S (B)	3	NC	NC	23 d, 18 hrs	NC	NC	1	44	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA11.West (325) - Coolgra Point W - Yardie Landing (C)	4	NC	NC	20 d, 13 hrs	NC	NC	1.4	58	<1	3	NC	NC	NC	NC	<1	11	NC	NC	NC	NC
WA11.West (326) - Baresand Point - Entrance Point E	17	3	NC	10 d, 8 hrs	11 d, 11 hrs	NC	7.2	144	<1	13	<1	8	NC	NC	2	20	<1	6	NC	NC
WA11.West (327) - Hope Point - Locker Point (E)	3	NC	NC	28 d, 8 hrs	NC	NC	0.7	20	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA11.West (329) - Locker Point - Baresand Point	9	1	NC	10 d, 23 hrs	14 d, 2 hrs	NC	4.1	178	<1	13	<1	9	NC	NC	<1	14	<1	6	NC	NC

NC: No contact to receptor predicted for specified threshold.

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Table 12-6 Summary of shoreline oil accumulation on WAMOPRA shoreline cells following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

WAMOPRA shoreline cells	Maximum probability (%) of oil accumulation at			Minimum time before oil accumulation at			Maximum shoreline oil accumulation (g/m²) in a given grid cell		Maximum volume (m³) of accumulated oil ashore at ≥ 10 g/m²		Maximum volume (m³) of accumulated oil ashore at ≥ 100 g/m²		Maximum volume (m³) of accumulated oil ashore at ≥ 1,000 g/m²			Maximum length (km) of oil accumulation on shorelines at ≥ 10 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 100 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 1,000 g/m²	
	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all simulations	for the worst simulation	averaged over all simulations	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all simulations	for the worst simulation	averaged over all simulations	≥ 10 g/m²	≥ 100 g/m²
WA10 (121) - Bundegi - Shothole Canyon N (B)	2	NC	NC	13 d, 15 hrs	NC	NC	0.8	25	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA10 (122) - Vlamingh Head - North West Cape	8	NC	NC	13 d, 0 hrs	NC	NC	3.8	77	<1	2	NC	NC	NC	NC	<1	6	NC	NC	NC	NC
WA10 (123) - Low Point - Vlamingh Head (A)	3	NC	NC	21 d, 7 hrs	NC	NC	0.9	30	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA10 (124) - Low Point - Vlamingh Head (B)	4	NC	NC	20 d, 21 hrs	NC	NC	2.1	87	<1	6	NC	NC	NC	NC	<1	13	NC	NC	NC	NC
WA10 (126) - Winderabandi Point - Osprey Bay	2	NC	NC	23 d, 20 hrs	NC	NC	0.4	15	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA11.East (317) - West Intercourse Island - Dolphin Island N point (G)	1	NC	NC	3 d, 6 hrs	NC	NC	0.2	11	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA11.West (115) - Hope Point - Locker Point (A)	1	NC	NC	19 d, 8 hrs	NC	NC	0.6	56	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA11.West (318) - Barrow Island and Montebello Islands (A)	37	14	NC	2 d, 20 hrs	3 d, 10 hrs	NC	64	973	4	47	3	38	NC	NC	5	32	2	14	NC	NC
WA11.West (319) - Barrow Island and Montebello Islands (B)	14	4	NC	4 d, 16 hrs	5 d, 6 hrs	NC	16	584	<1	19	<1	16	NC	NC	2	15	<1	10	NC	NC
WA11.West (320) - Barrow Island and Montebello Islands (C)	6	NC	NC	8 d, 12 hrs	NC	NC	1.5	78	<1	7	NC	NC	NC	NC	<1	23	NC	NC	NC	NC
WA11.West (321) - Barrow Island and Montebello Islands (D)	10	1	NC	8 d, 9 hrs	9 d, 14 hrs	NC	4.4	143	<1	18	<1	7	NC	NC	2	32	<1	6	NC	NC
WA11.West (324) - Yardie Landing - Weld Island coast S (B)	4	1	NC	11 d, 11 hrs	14 d, 0 hrs	NC	1.7	115	<1	4	<1	3	NC	NC	<1	3	<1	2	NC	NC
WA11.West (325) - Coolgra Point W - Yardie Landing (C)	3	1	NC	11 d, 6 hrs	11 d, 17 hrs	NC	2.5	132	<1	4	<1	2	NC	NC	<1	9	<1	1	NC	NC
WA11.West (326) - Baresand Point - Entrance Point E	43	6	NC	6 d, 5 hrs	9 d, 6 hrs	NC	26	314	2	19	<1	11	NC	NC	4	24	<1	8	NC	NC
WA11.West (327) - Hope Point - Locker Point (E)	6	NC	NC	8 d, 7 hrs	NC	NC	2.5	66	<1	2	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA11.West (328) - Hope Point - Locker Point (F)	2	NC	NC	17 d, 16 hrs	NC	NC	1.4	85	<1	2	NC	NC	NC	NC	<1	4	NC	NC	NC	NC
WA11.West (329) - Locker Point - Baresand Point	37	8	NC	9 d, 2 hrs	9 d, 20 hrs	NC	26	380	2	20	<1	18	NC	NC	4	19	<1	11	NC	NC

NC: No contact to receptor predicted for specified threshold.

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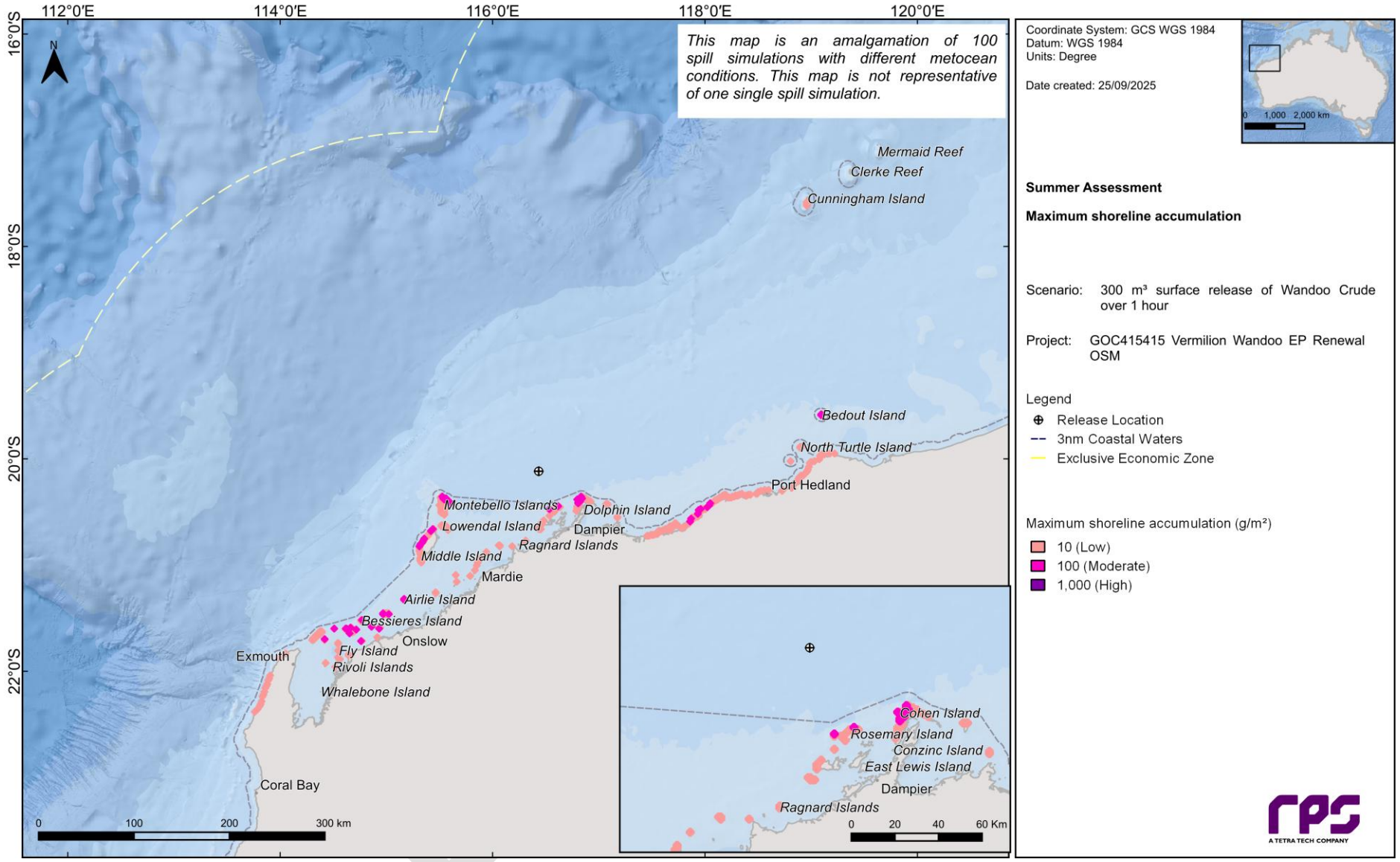


Figure 12.25 Maximum potential shoreline oil accumulation following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

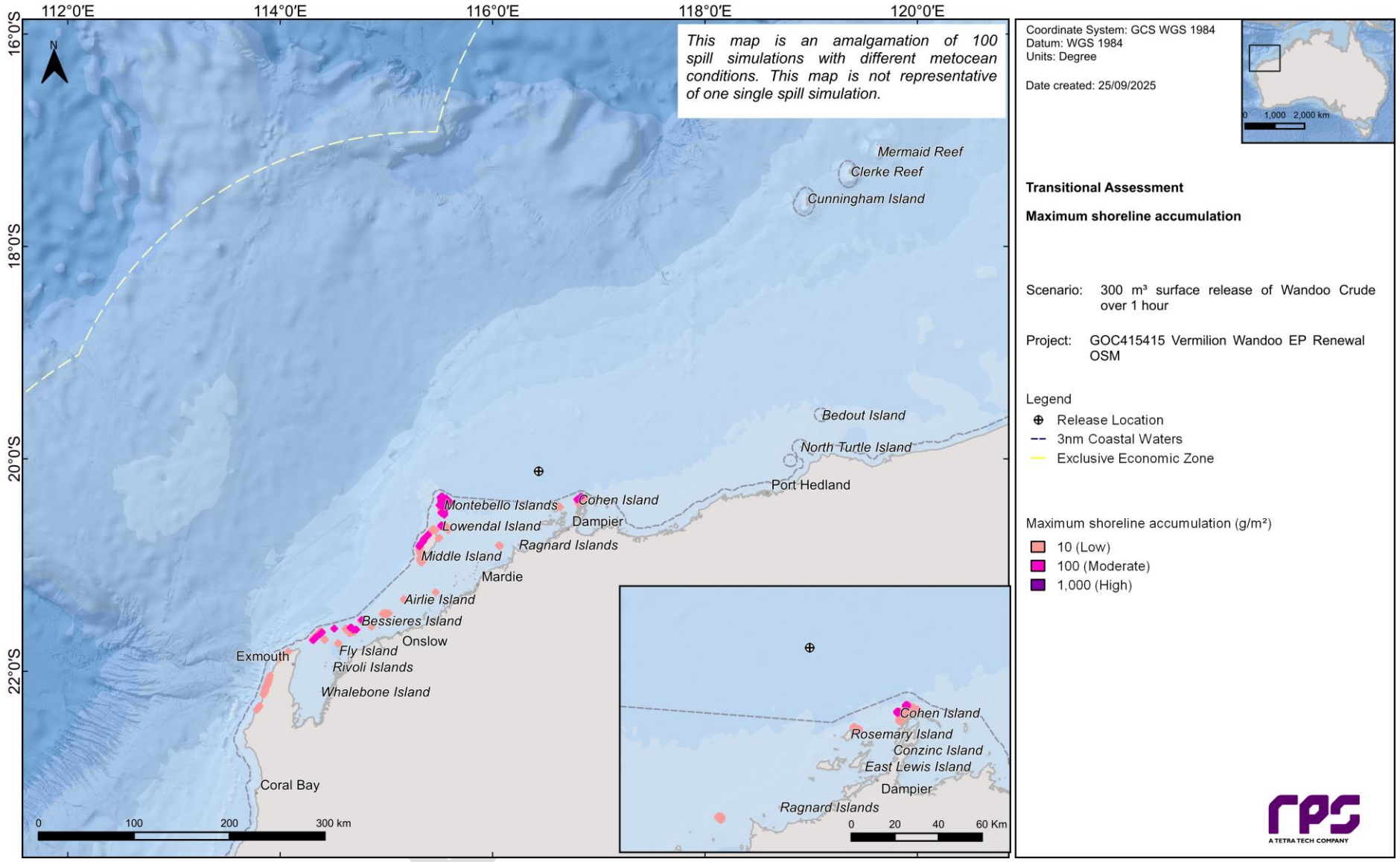


Figure 12.26 Maximum potential shoreline oil accumulation following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

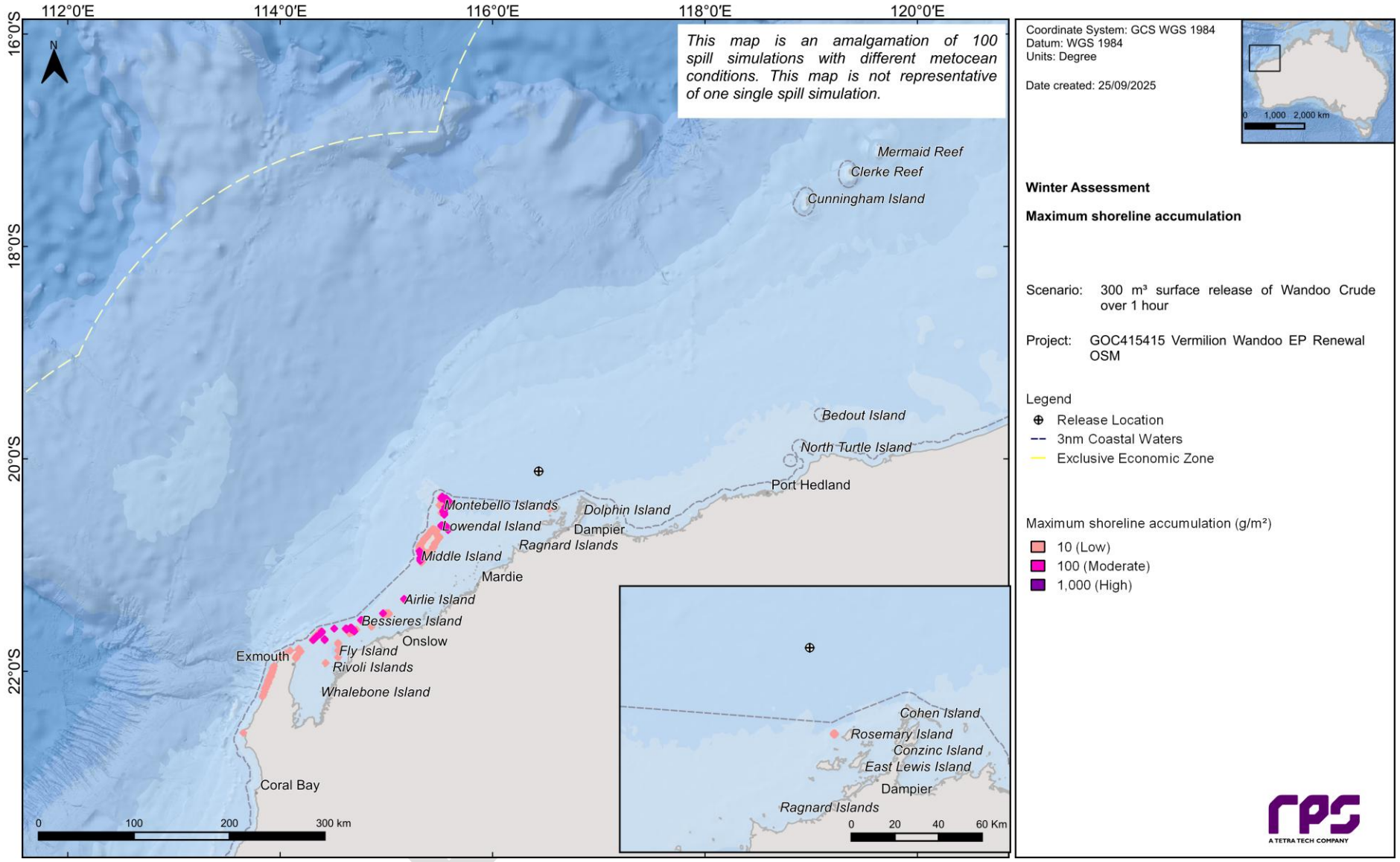


Figure 12.27 Maximum potential shoreline oil accumulation following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

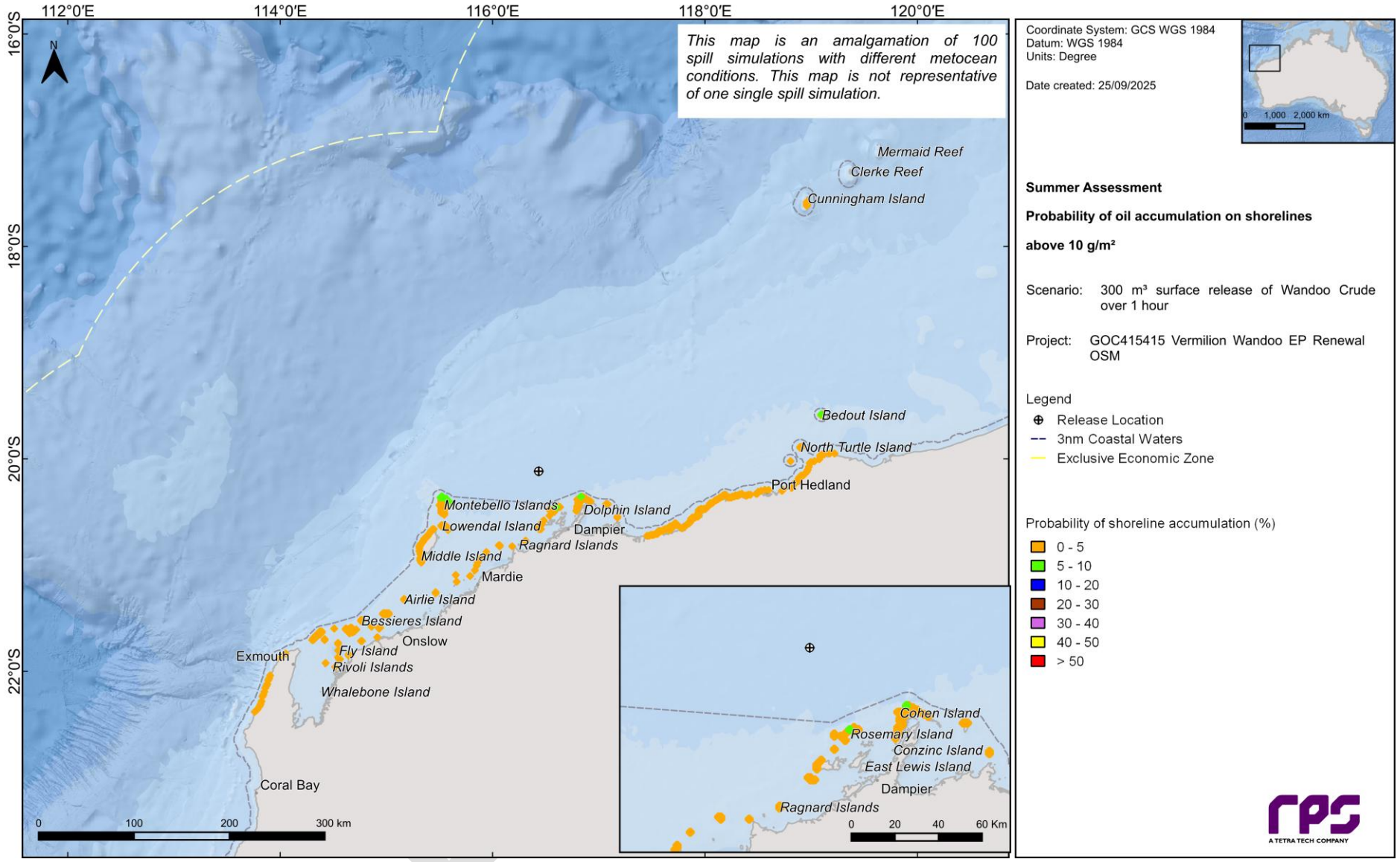


Figure 12.28 Predicted probability of shoreline oil accumulation at, or above, 10 g/m² following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

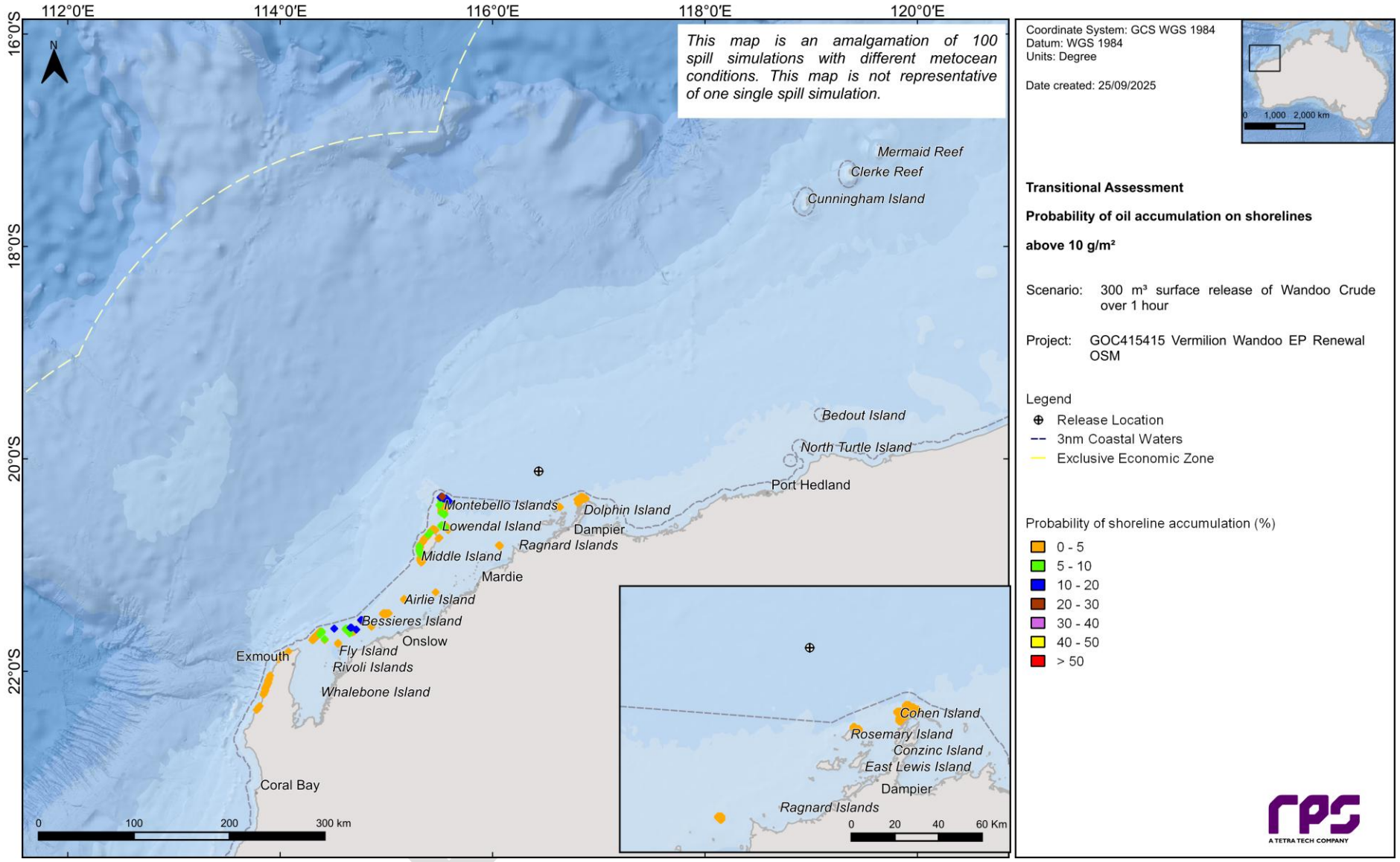


Figure 12.29 Predicted probability of shoreline oil accumulation at, or above, 10 g/m² following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

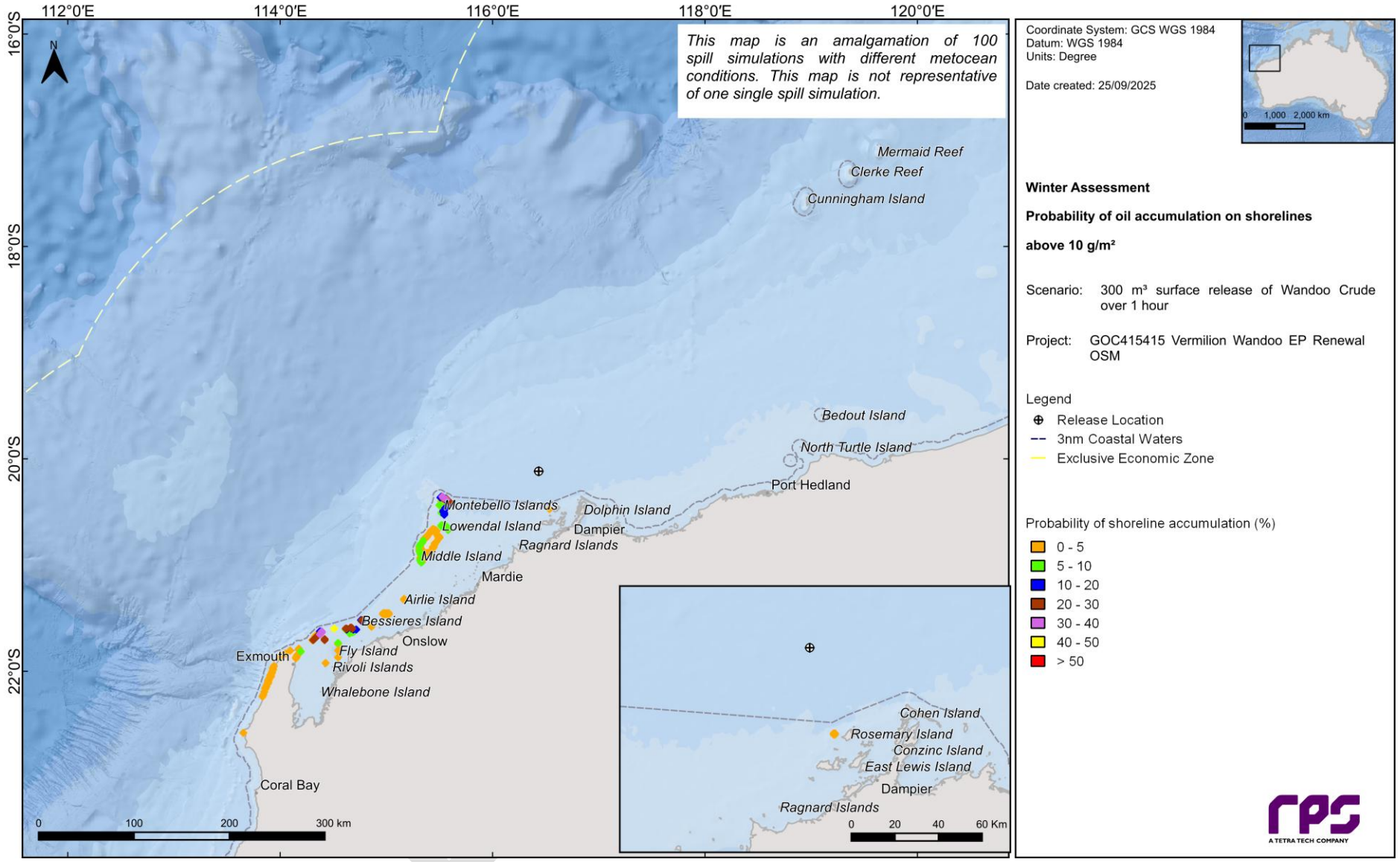


Figure 12.30 Predicted probability of shoreline oil accumulation at, or above, 10 g/m² following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

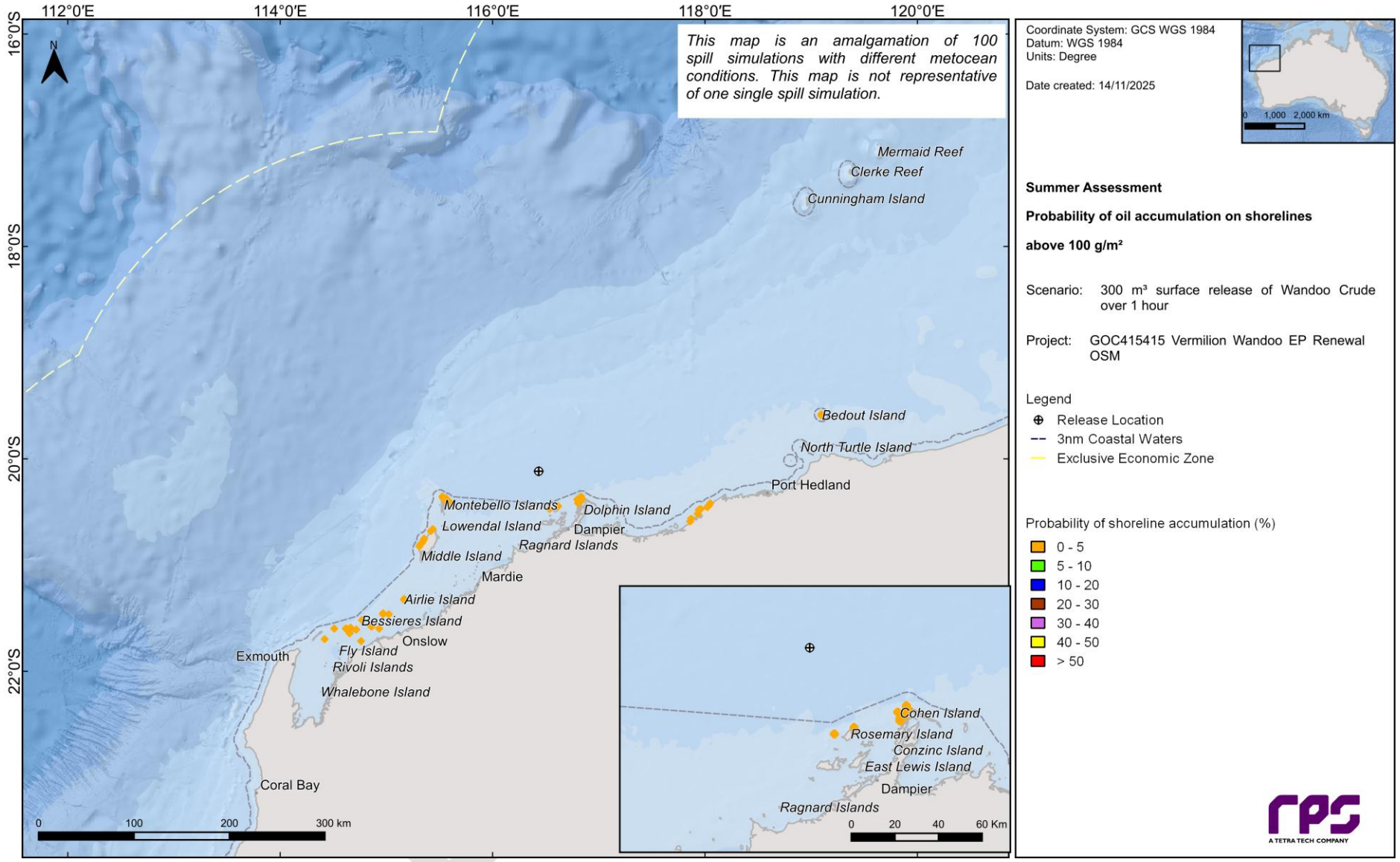


Figure 12.31 Predicted probability of shoreline oil accumulation at, or above, 100 g/m² following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

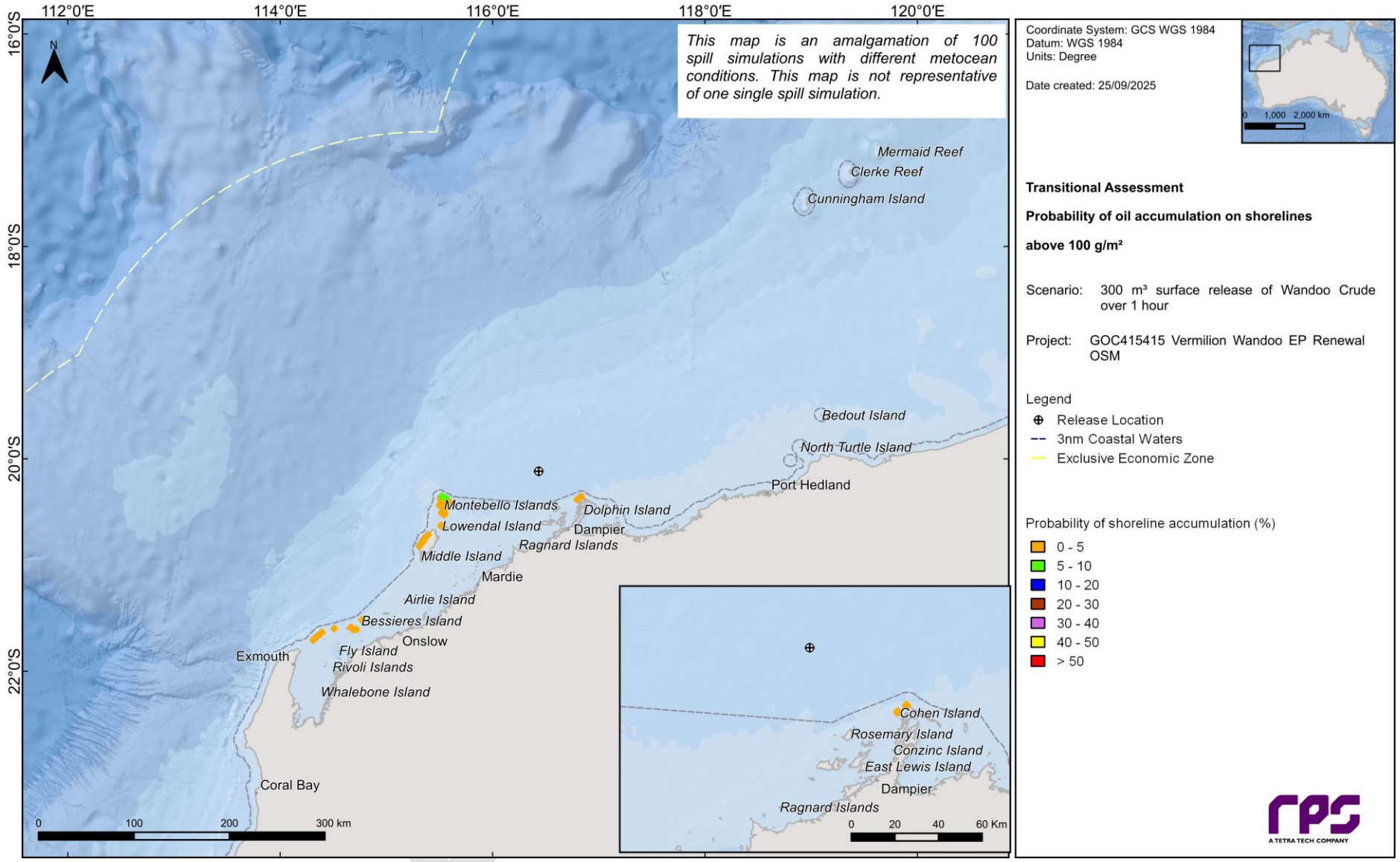


Figure 12.32 Predicted probability of shoreline oil accumulation at, or above, 100 g/m² following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

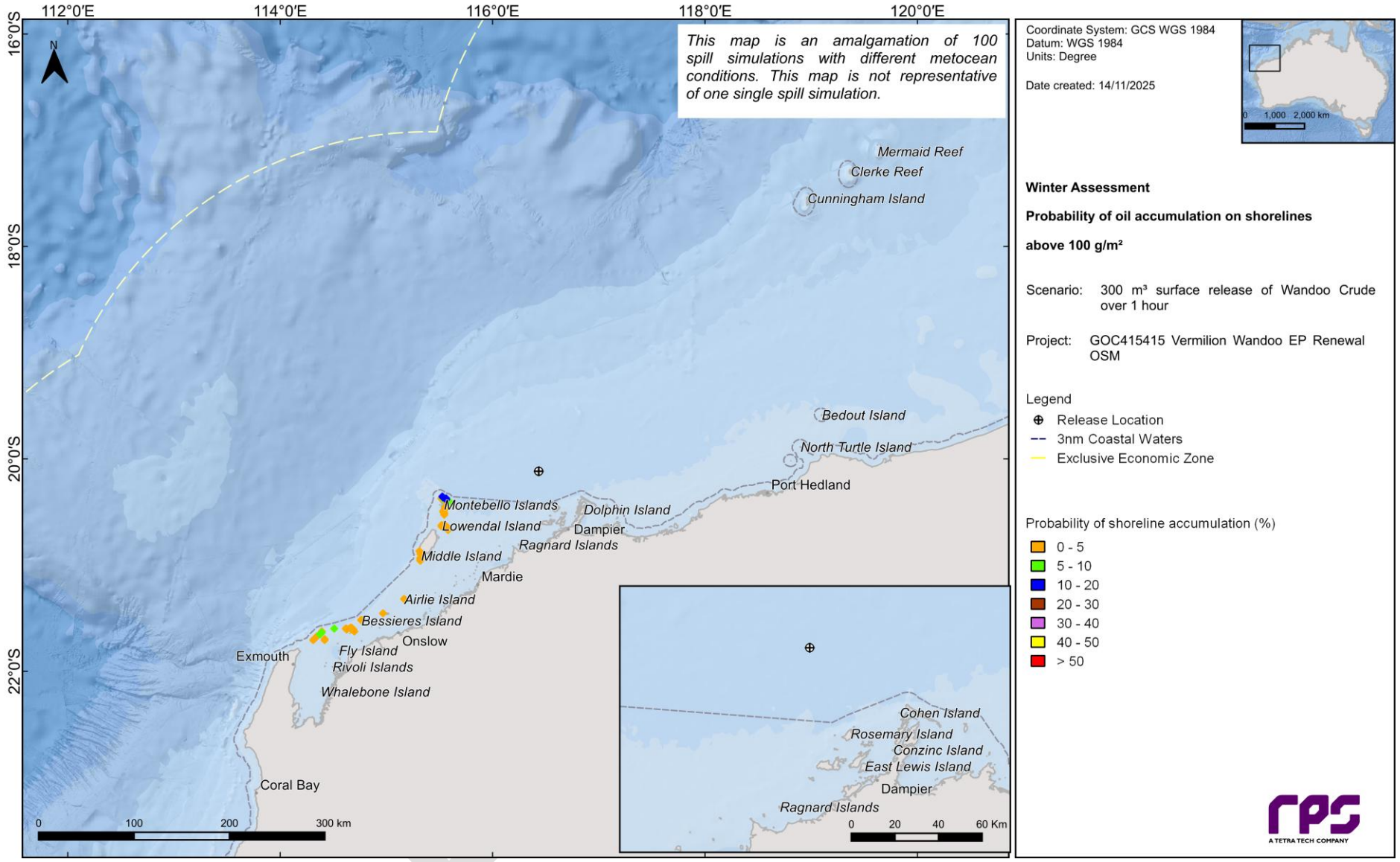


Figure 12.33 Predicted probability of shoreline oil accumulation at, or above, 100 g/m² following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

12.1.5 In-water exposure

12.1.5.1 Dissolved Hydrocarbons

Table 12-7 summarises the maximum distances from the release location to the dissolved hydrocarbon exposure thresholds for each season. Concentrations exceeding 10 ppb may potentially extend up to 45 km from the release location. No exposure was predicted at, or above, 50 ppb.

No receptors were predicted to be exposed to dissolved hydrocarbons at, or above, 10, g/m^2.

Figure 12.34 to Figure 12.36 illustrate the dissolved hydrocarbon exposure zone for the three seasons, whilst Figure 12.37 to Figure 12.42 show the minimum times before exposure and probabilities of exposure at or above, 10 ppb.

Seasonal cross-sectional transects (north-south and east-west) of the maximum dissolved hydrocarbons in the vicinity of the release site are presented in Figure 12.43 to Figure 12.48.

Table 12-7 Maximum distances from the release location to dissolved hydrocarbon exposure thresholds following a surface release of crude from the offtake export system. Results were calculated from 100 spill simulations per season.

Season	Distance and direction travelled	Dissolved hydrocarbon exposure thresholds		
		10 ppb	50 ppb	400 ppb
Summer	Maximum distance (km) from release location	13	NC	NC
	Direction	Southwest	NC	NC
Transitional	Maximum distance (km) from release location	34	NC	NC
	Direction	West	NC	NC
Winter	Maximum distance (km) from release location	45	NC	NC
	Direction	West	NC	NC

NC: No contact to receptor predicted for specified threshold.

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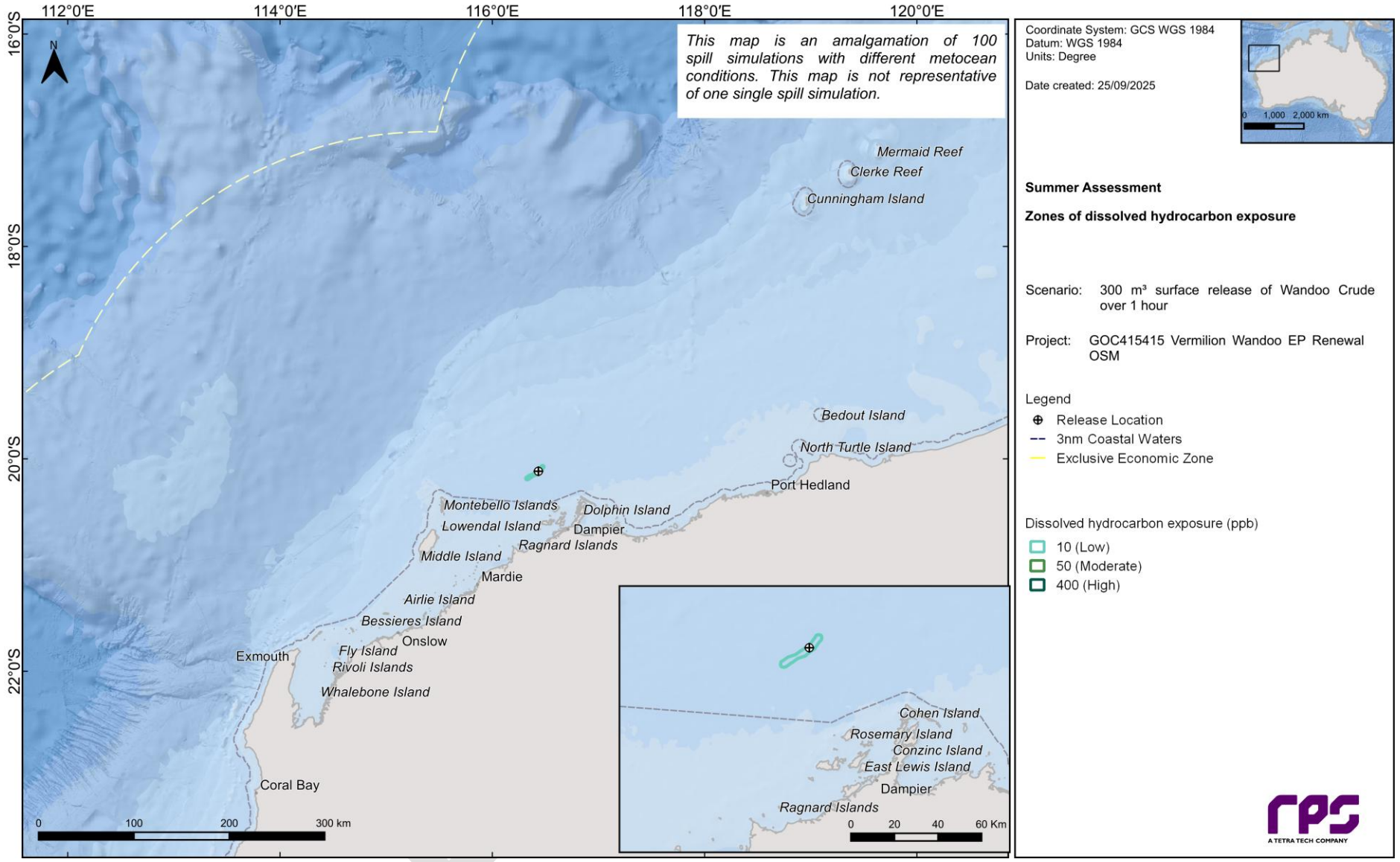


Figure 12.34 Predicted zones of dissolved hydrocarbon exposure following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

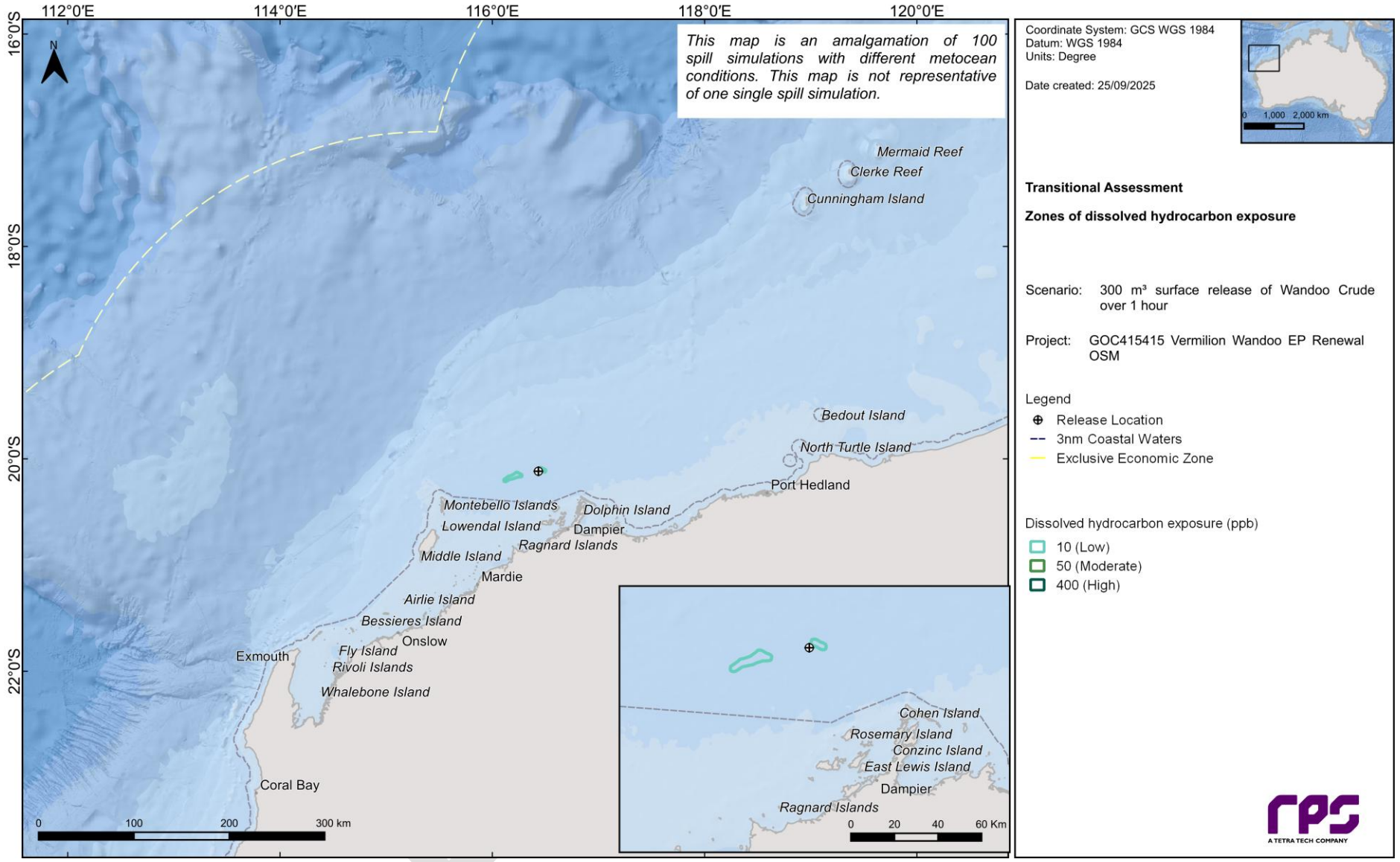


Figure 12.35 Predicted zones of dissolved hydrocarbon exposure following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

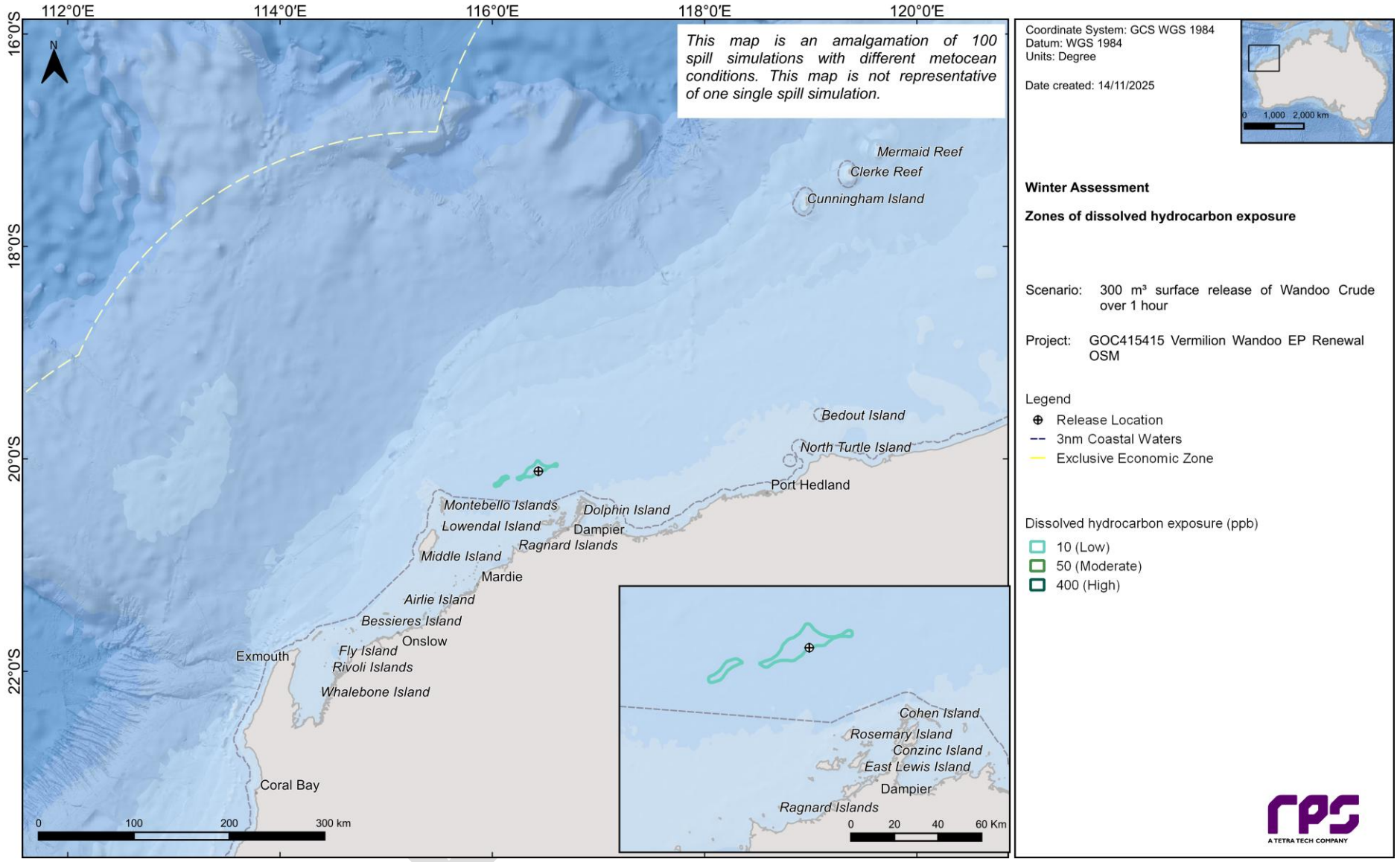


Figure 12.36 Predicted zones of dissolved hydrocarbon exposure following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

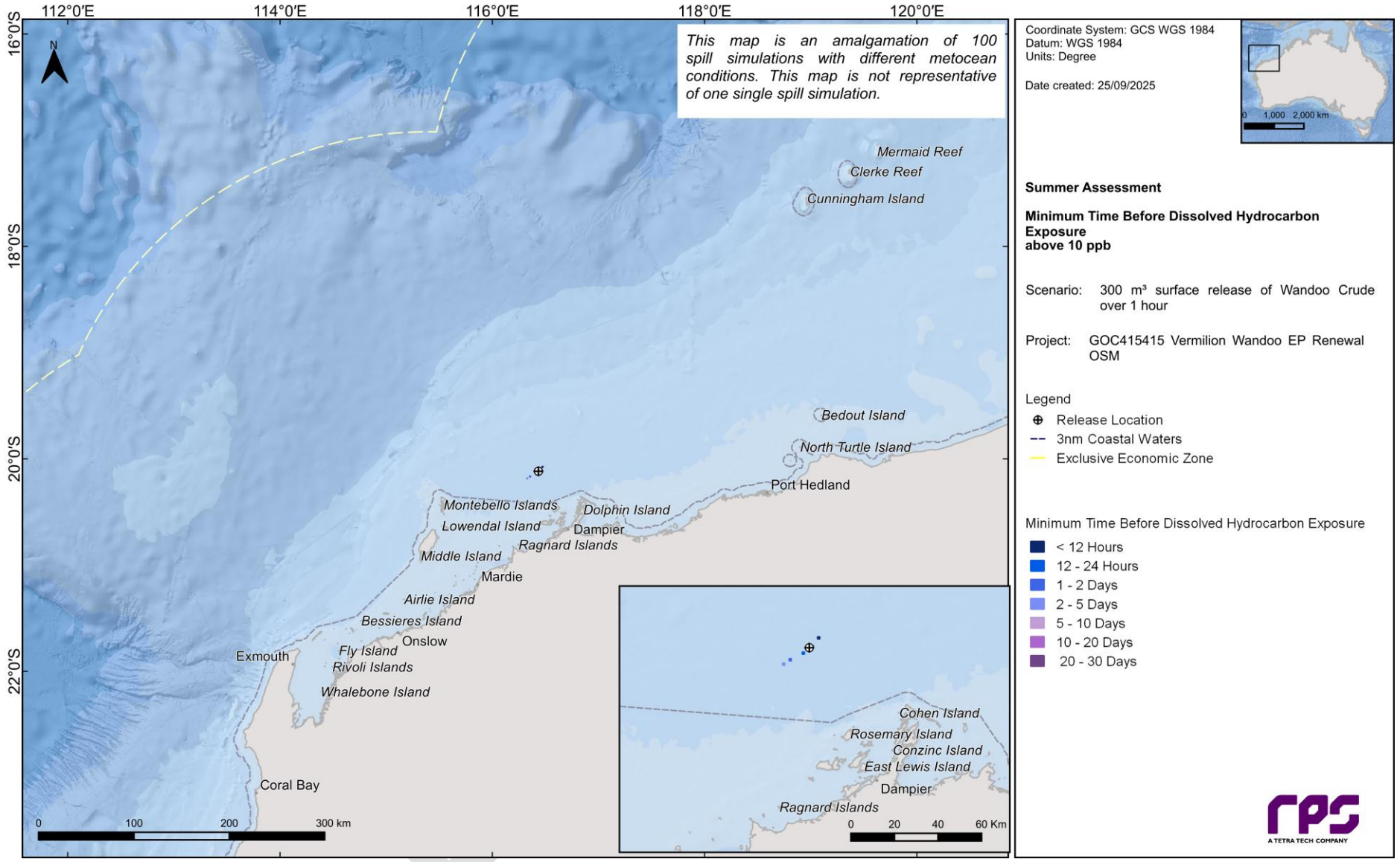


Figure 12.37 Minimum time before dissolved hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

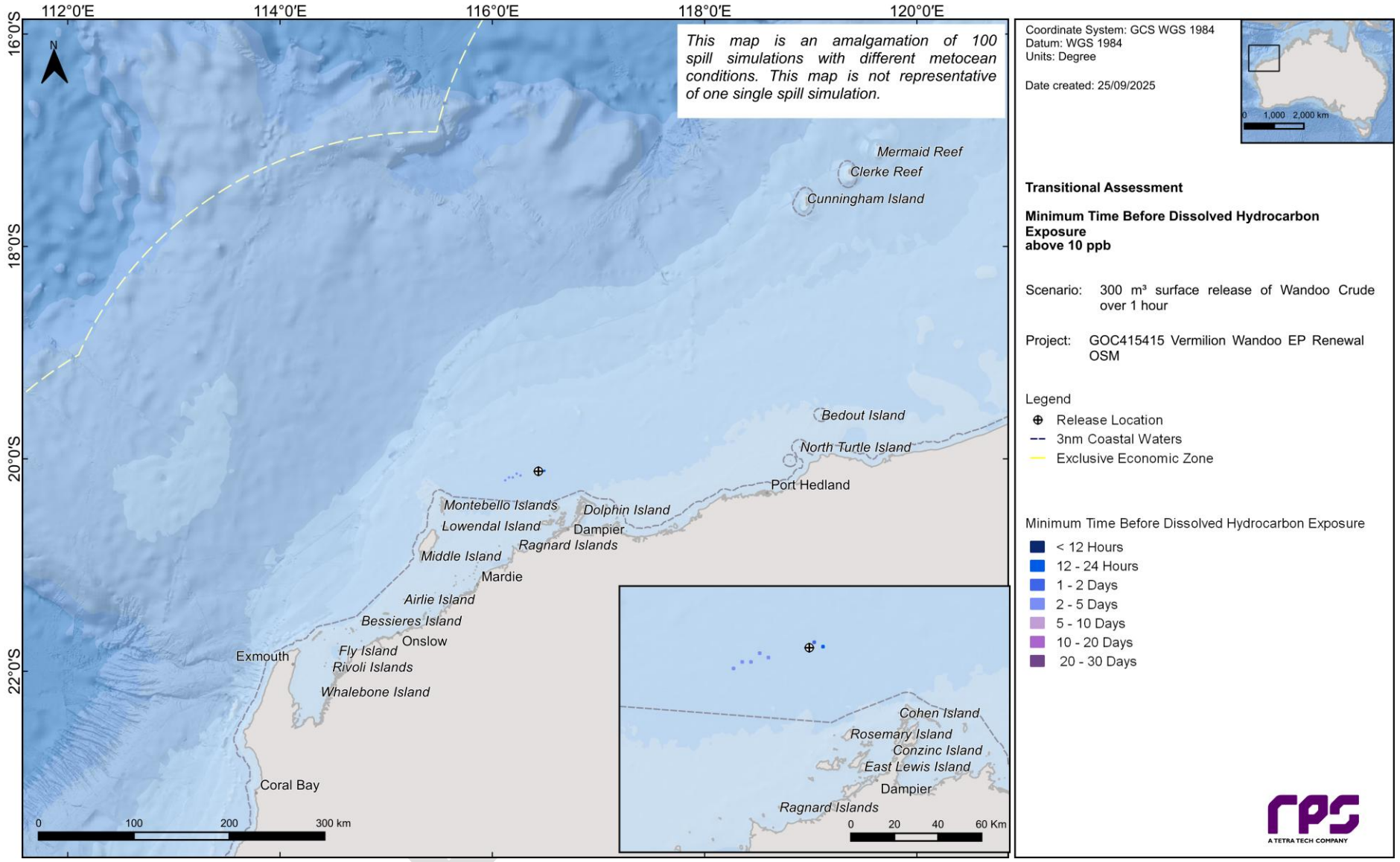


Figure 12.38 Minimum time before dissolved hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

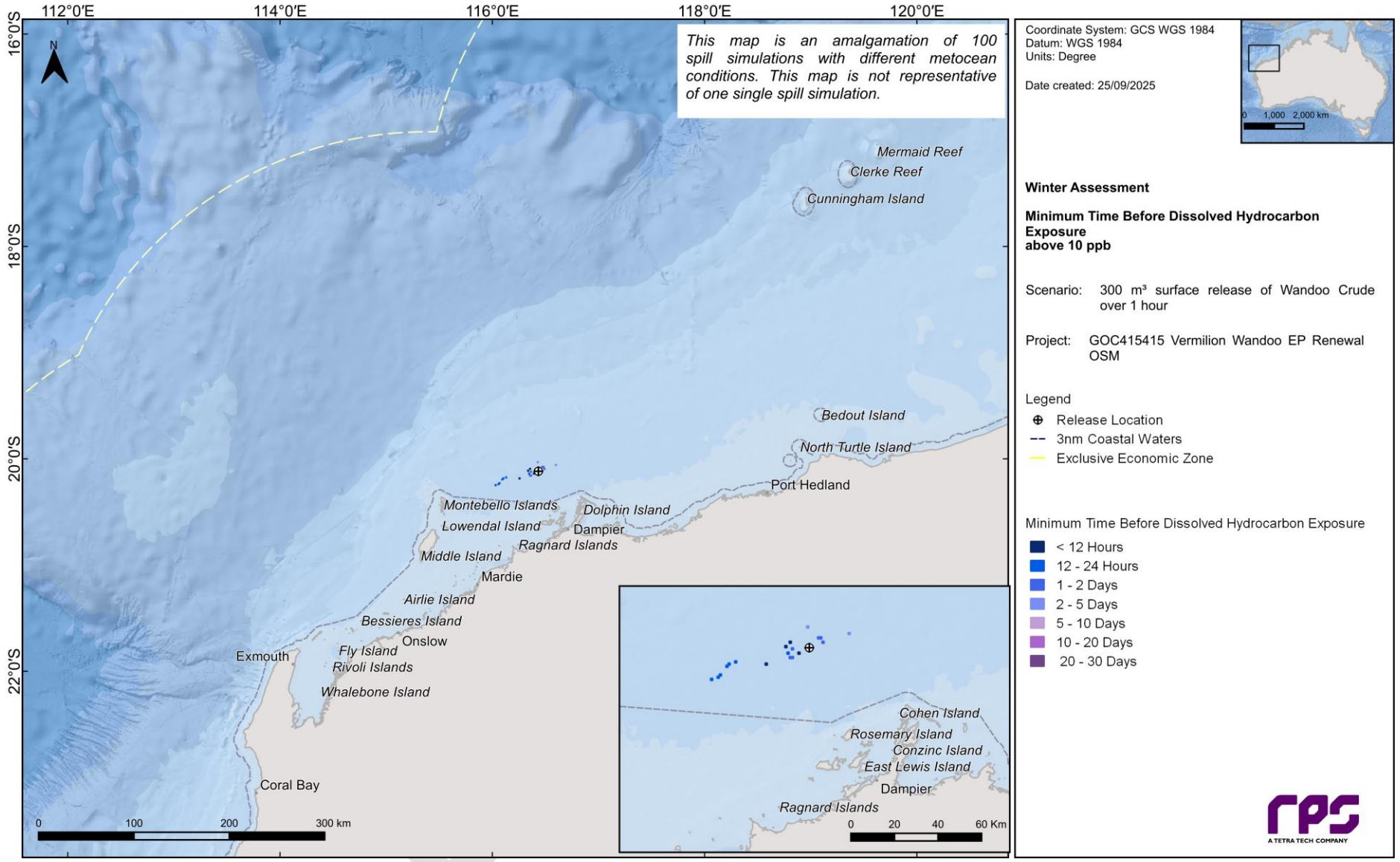


Figure 12.39 Minimum time before dissolved hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

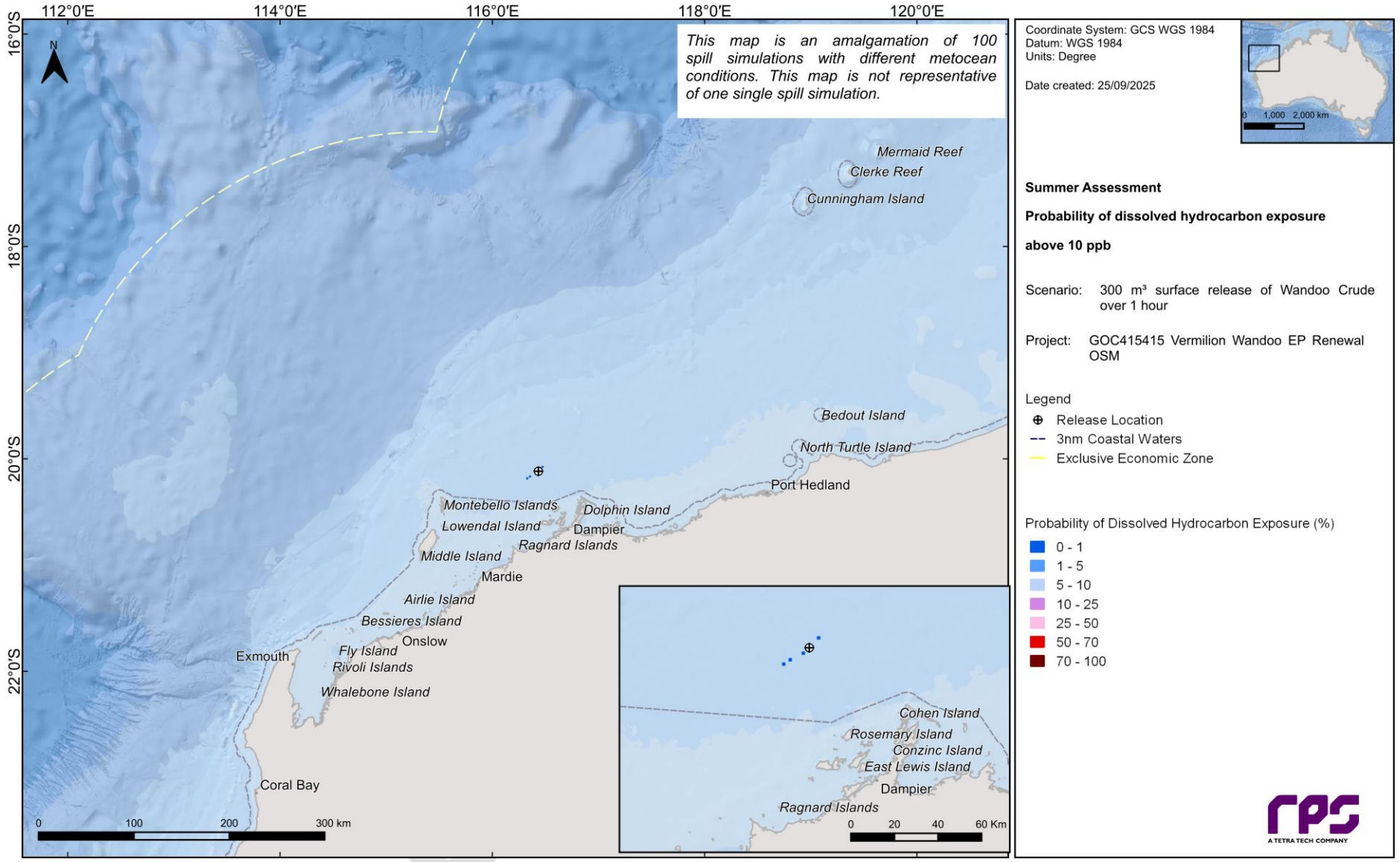


Figure 12.40 Probability of dissolved hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

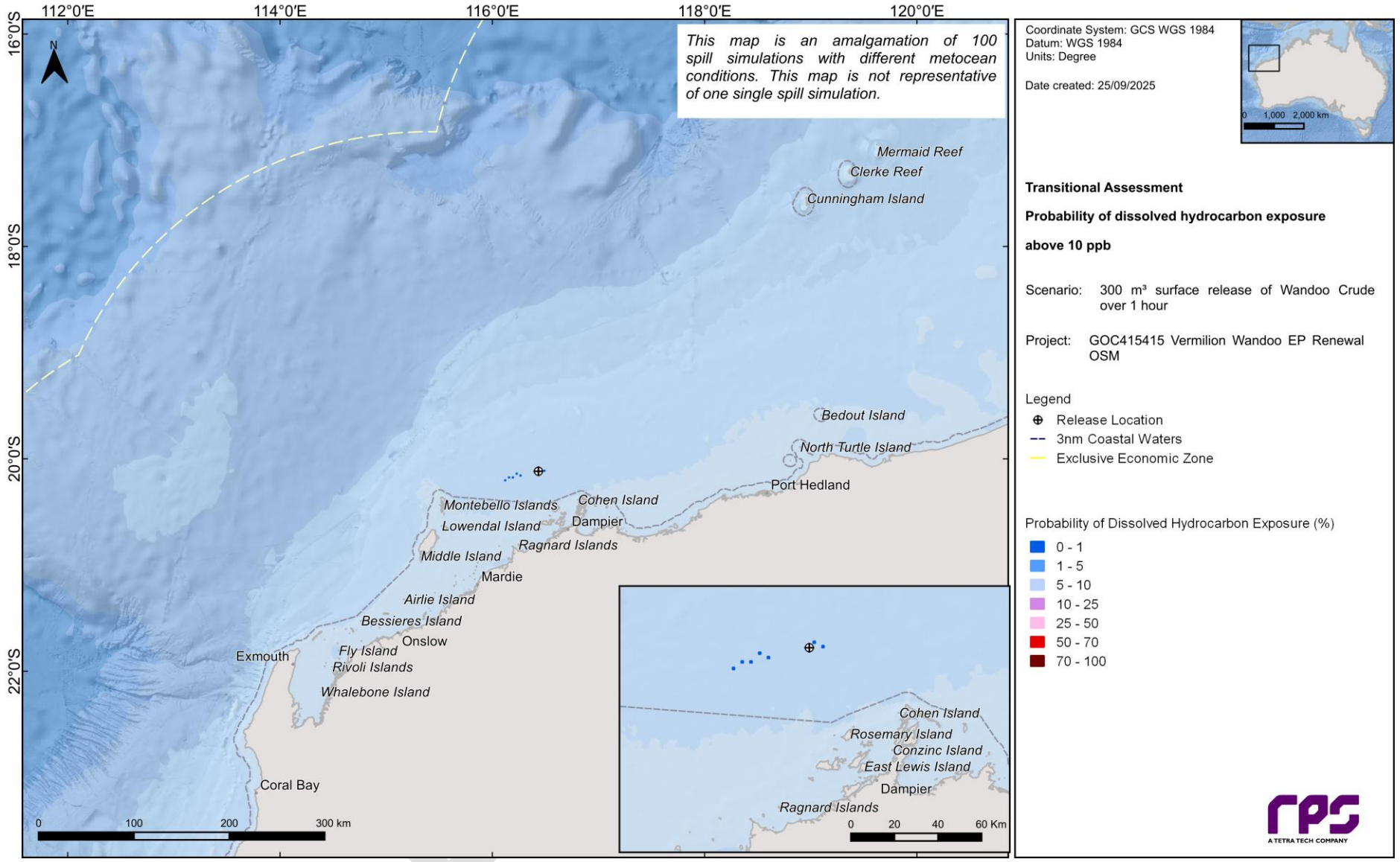


Figure 12.41 Probability of dissolved hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

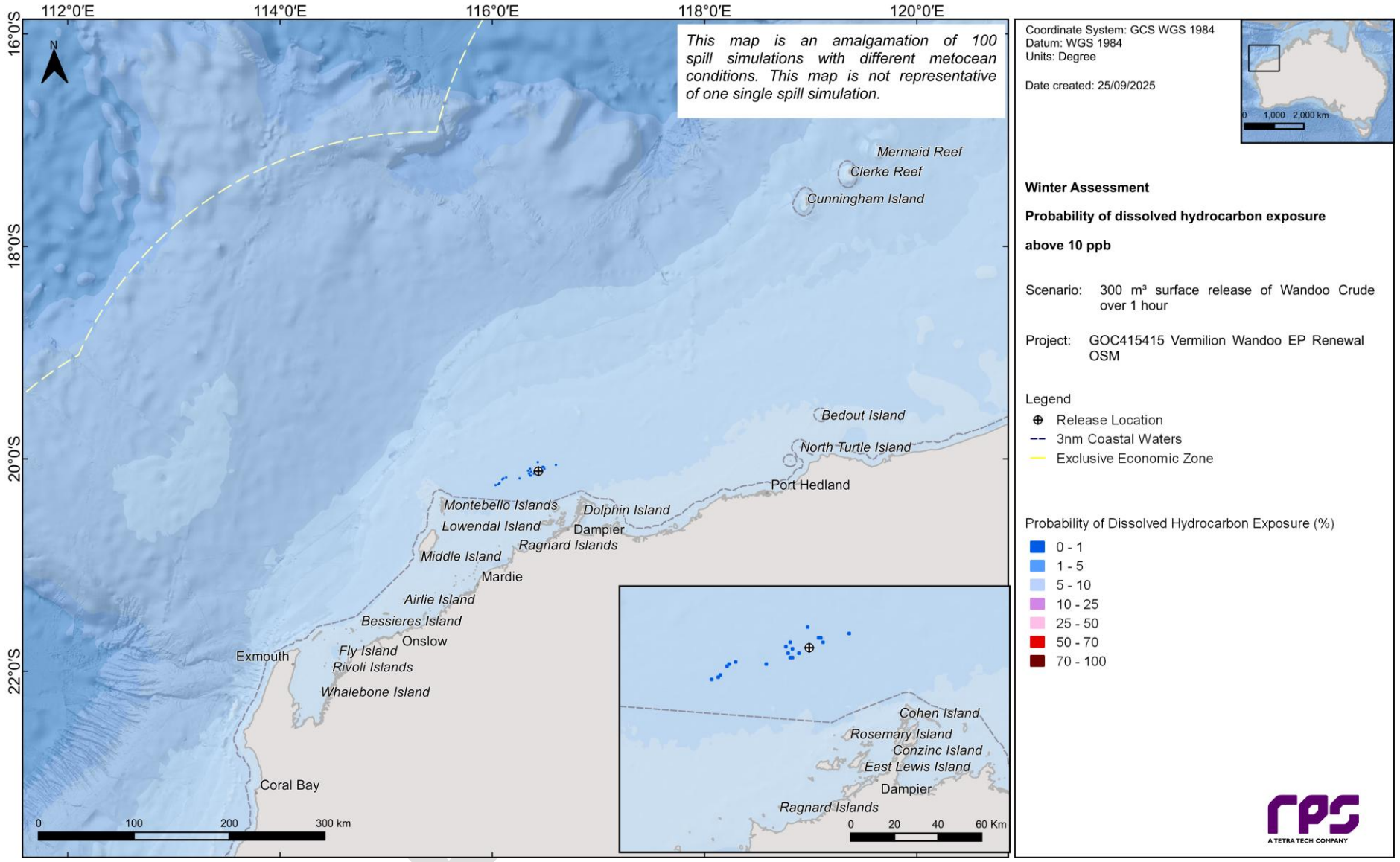


Figure 12.42 Probability of dissolved hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

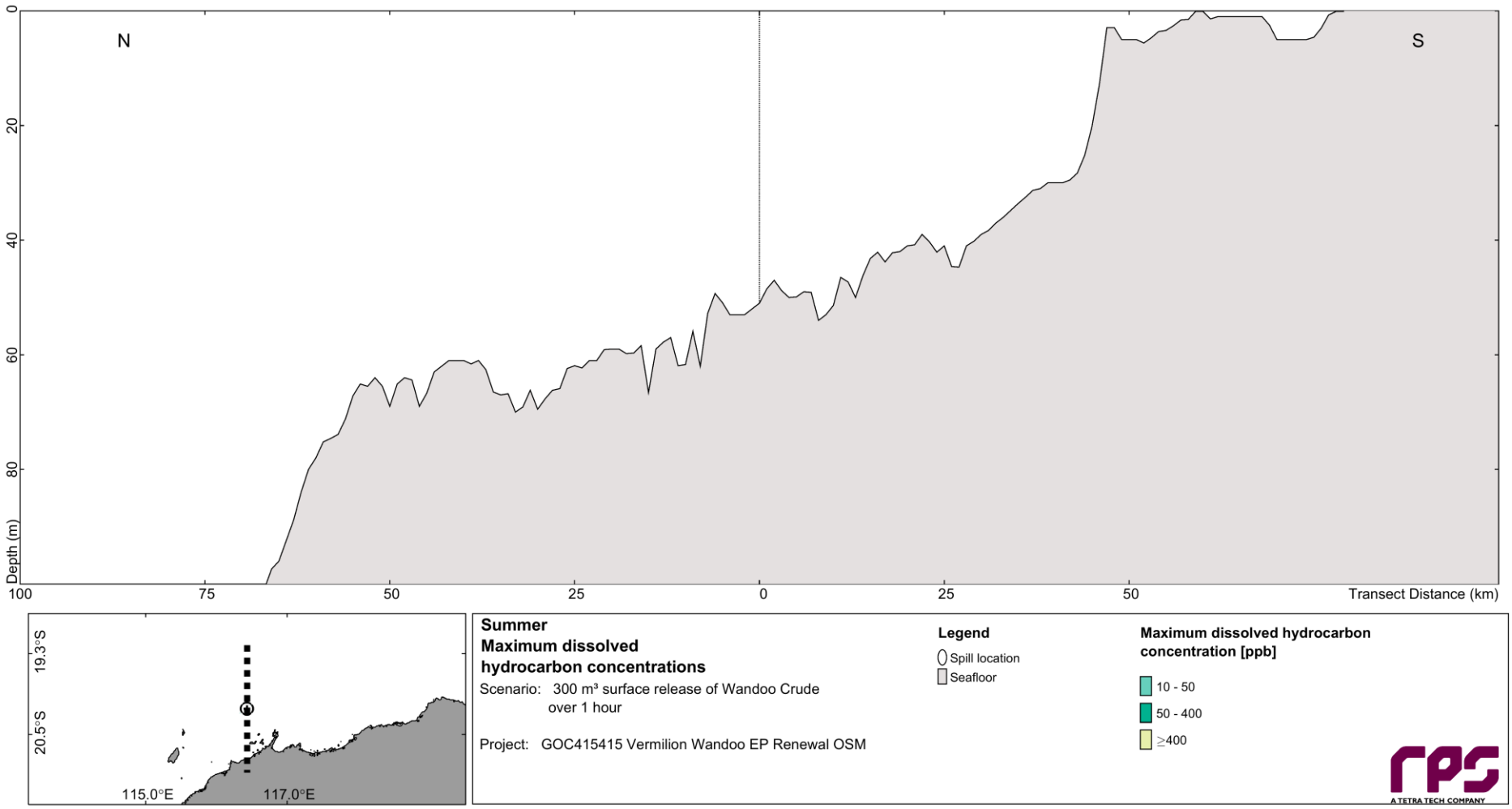


Figure 12.43 North-south cross-section transect of dissolved hydrocarbon concentrations exposure following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions. Results are underneath the spill location icon, therefore, are not visible.

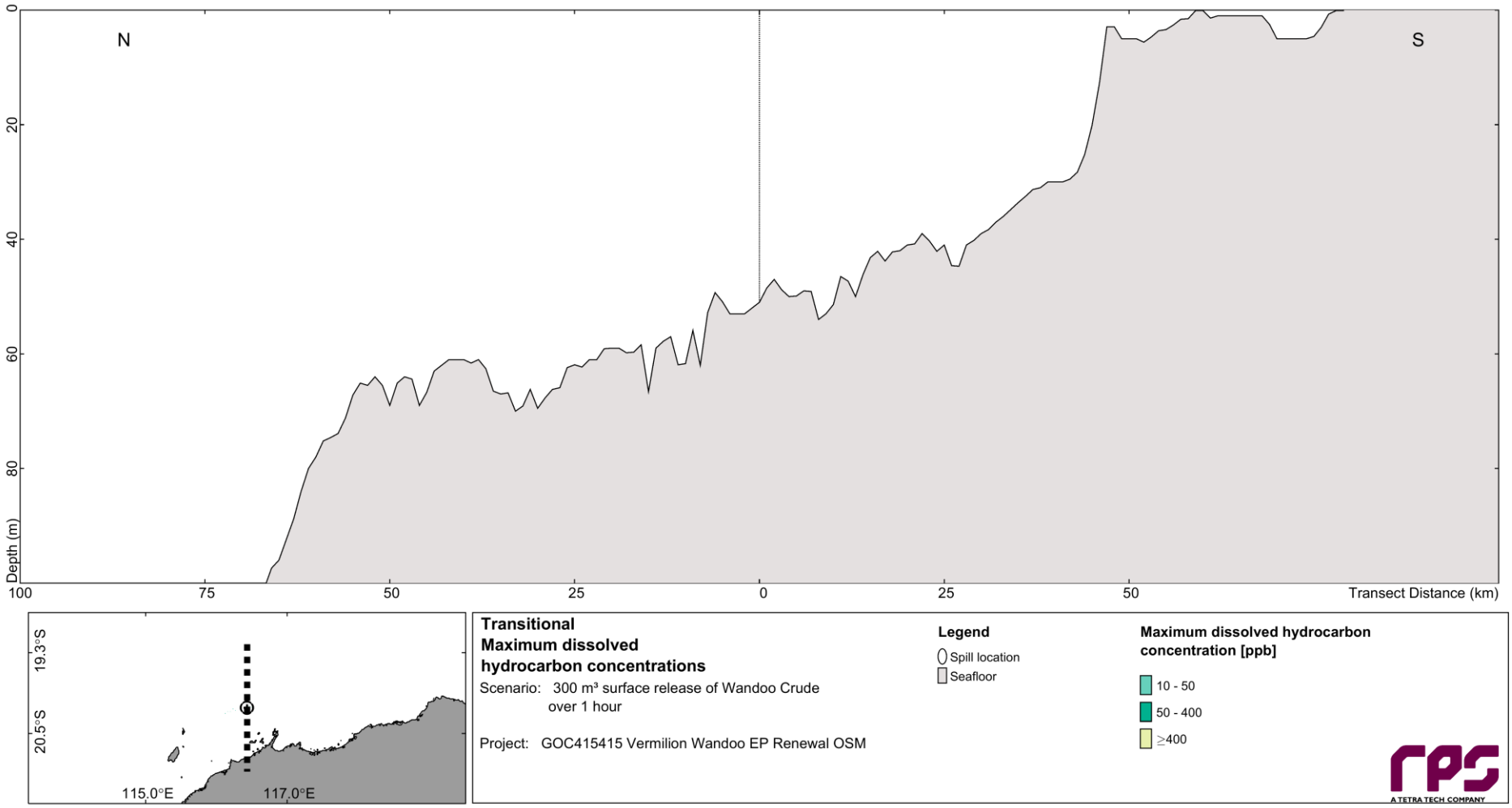


Figure 12.44 North-south cross-section transect of dissolved hydrocarbon concentrations exposure following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions. Results are underneath the spill location icon, therefore, are not visible.

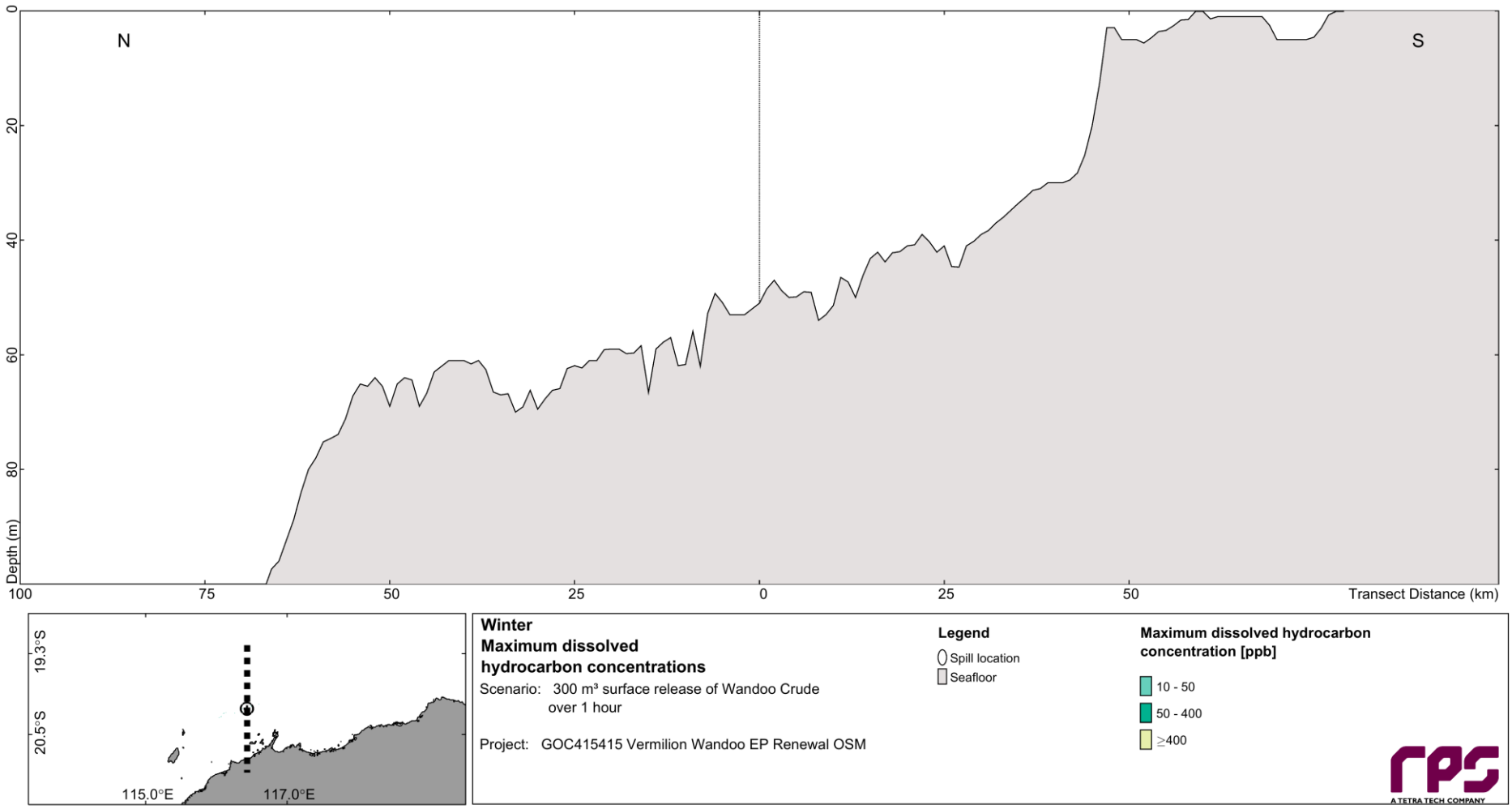


Figure 12.45 North-south cross-section transect of dissolved hydrocarbon concentrations exposure following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions. Results are underneath the spill location icon, therefore, are not visible.

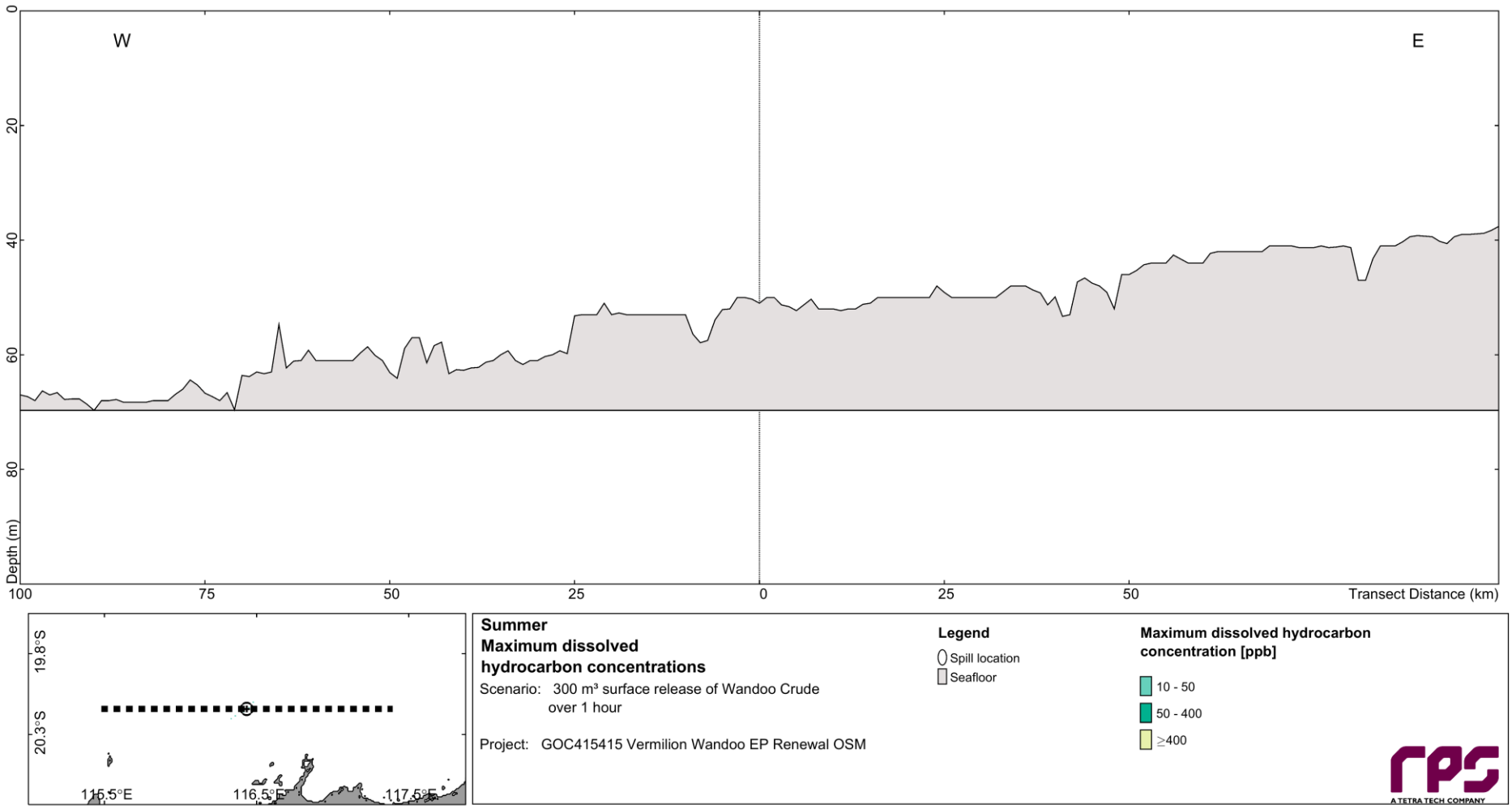


Figure 12.46 East-west cross-section transect of dissolved hydrocarbon concentrations exposure following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions. Results are underneath the spill location icon, therefore, are not visible.

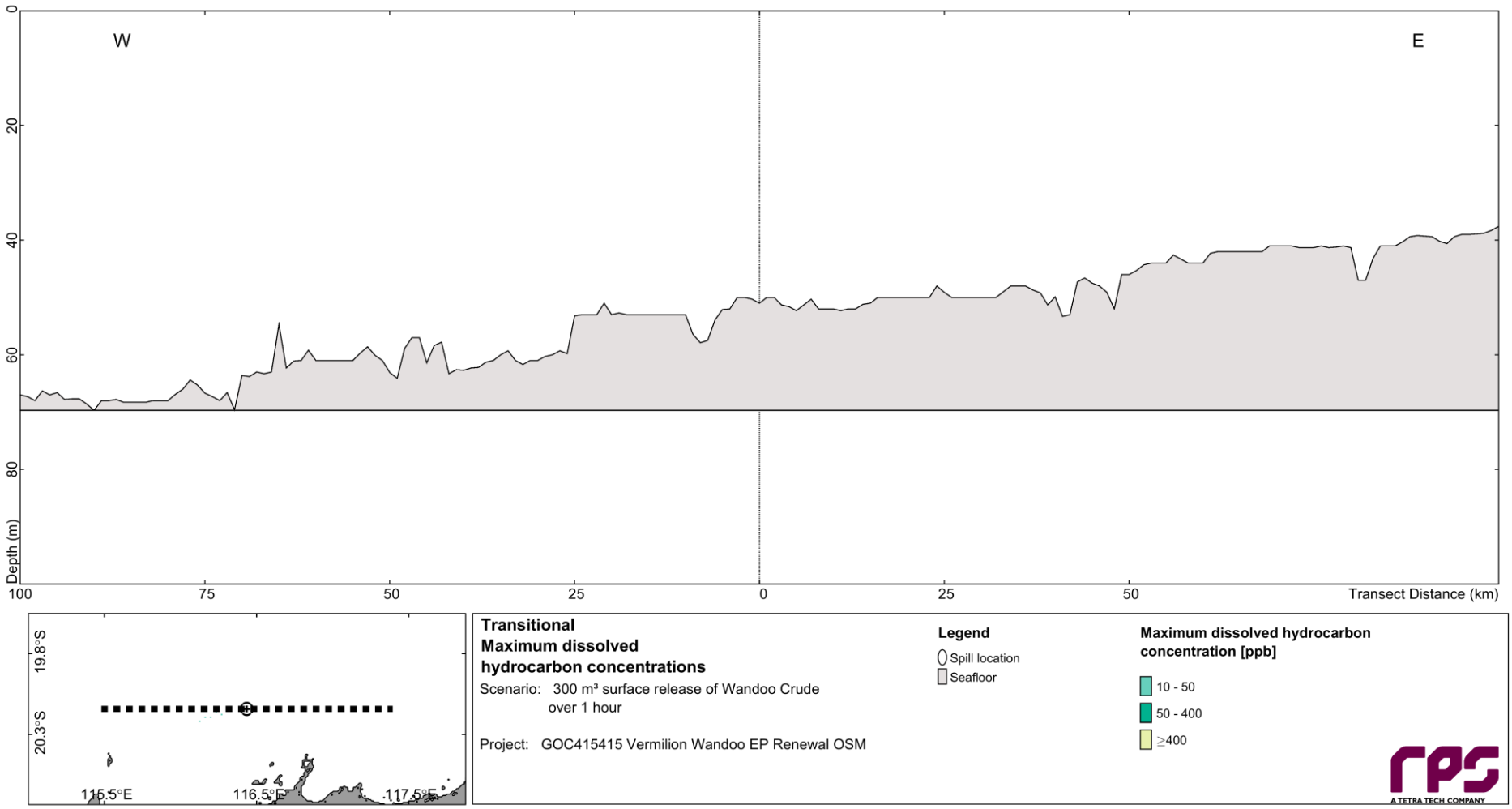


Figure 12.47 East-west cross-section transect of dissolved hydrocarbon concentrations exposure following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions. Results are underneath the spill location icon, therefore, are not visible.

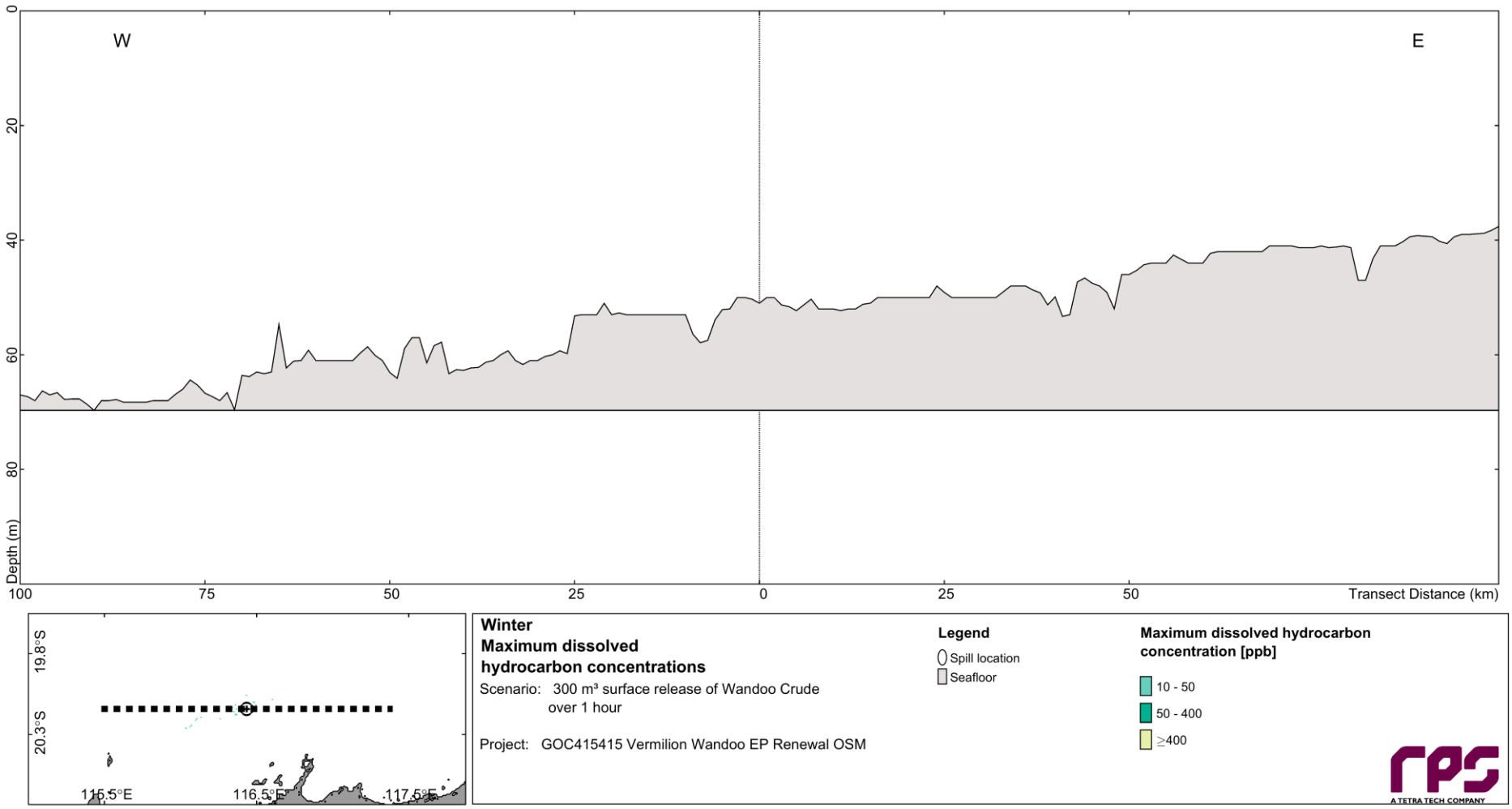


Figure 12.48 East-west cross-section transect of dissolved hydrocarbon concentrations exposure following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions. Results are underneath the spill location icon, therefore, are not visible.

12.1.5.2 Entrained Hydrocarbons

Table 12-8 summarises the maximum distances from the release location to entrained hydrocarbon thresholds for each season. Concentrations exceeding 10 ppb may potentially extend up to 504 km from the release location. As the threshold increases above 100 ppb and 1,000 ppb, the maximum distance decreases to 326 km and 56 km, respectively.

Table 12-9 summarises the receptors exposed to entrained hydrocarbons per season (either at, or above, receptors in the water column).

Montebello AMP recorded the overall highest probability of exposure to concentrations at, or above 10 ppb at 63% during winter conditions. During transitional conditions, the highest probability dropped to 52% for the same receptor. In summer, the highest probability was 23% for Glomar Shoals.

Montebello AMP also recorded the fastest time to exposure at, or above, 10 ppb at 20 hours in summer, 1 day 1 hour during transitional conditions, and 18 hours in winter. The highest recorded concentration was 1,243 ppb at Montebello AMP during winter.

Figure 12.49 to Figure 12.51 illustrate the zones of exposure to entrained hydrocarbons for each season, whilst Figure 12.52 to Figure 12.69 display the minimum exposure times and the probability for each threshold and season.

Seasonal cross-sectional transects (north-south and east-west) of the maximum entrained hydrocarbons in the vicinity of the release site, are presented in Figure 12.70 to Figure 12.75.

Table 12-8 Maximum distances from the release location to entrained hydrocarbon exposure thresholds following a surface release of crude from the offtake export system. Results were calculated from 100 spill simulations per season.

Season	Distance and direction travelled	Entrained hydrocarbon exposure thresholds		
		10 ppb	100 ppb	1000 ppb
Summer	Maximum distance (km) from release location	454	184	42
	Direction	Southwest	Southwest	West
Transitional	Maximum distance (km) from release location	504	192	46
	Direction	Southwest	Southwest	West
Winter	Maximum distance (km) from release location	445	326	56
	Direction	Southwest	Southwest	West

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Table 12-9 Receptors predicted to be exposed by entrained hydrocarbons following a surface release of crude from the offtake export system. Results were calculated from100 spill simulations per season.

Category	Name	Summer								Transitional								Winter							
		Probability (%) of entrained concentration			Minimum time before entrained hydrocarbon exposure at			Maximum entrained hydrocarbon concentration (ppb)		Probability (%) of entrained concentration			Minimum time before entrained hydrocarbon exposure at			Maximum entrained hydrocarbon concentration (ppb)		Probability (%) of dissolved concentration			Minimum time before entrained hydrocarbon exposure at			Maximum entrained hydrocarbon concentration (ppb)	
		≥ 10 ppb	≥ 100 ppb	≥ 1,000 ppb	≥ 10 ppb	≥ 100 ppb	≥ 1,000 ppb	averaged over all simulations	in the worst replicate	≥ 10 ppb	≥ 100 ppb	≥ 1,000 ppb	≥ 10 ppb	≥ 100 ppb	≥ 1,000 ppb	averaged over all simulations	in the worst replicate	≥ 10 ppb	≥ 100 ppb	≥ 1,000 ppb	≥ 10 ppb	≥ 100 ppb	≥ 1,000 ppb	averaged over all simulations	in the worst replicate
AMP	Dampier	2	NC	NC	10 d, 1 hrs	NC	NC	<1	23	1	NC	NC	13 d, 7 hrs	NC	NC	<1	17	NC	NC	NC	NC	NC	NC	NC	NC
	Gascoyne	1	NC	NC	20 d, 1 hrs	NC	NC	<1	14	7	NC	NC	11 d, 17 hrs	NC	NC	2	29	17	NC	NC	7 d, 22 hrs	NC	NC	5	80
	Montebello	20	5	NC	20 hrs	21 hrs	NC	18	735	52	16	NC	1 d, 1 hrs	1 d, 5 hrs	NC	59	912	63	28	1	18 hrs	19 hrs	22 hrs	104	1,243
KEF	Ancient coastline at 125 m depth contour	6	1	NC	2 d, 4 hrs	4 d, 11 hrs	NC	2	119	7	NC	NC	4 d, 12 hrs	NC	NC	3	77	21	2	NC	4 d, 6 hrs	5 d, 16 hrs	NC	10	239
	Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	1	NC	NC	20 d, 14 hrs	NC	NC	<1	14	7	NC	NC	7 d, 23 hrs	NC	NC	3	39	17	2	NC	6 d, 0 hrs	6 d, 4 hrs	NC	9	175
	Commonwealth waters adjacent to Ningaloo Reef	1	NC	NC	20 d, 5 hrs	NC	NC	<1	13	4	NC	NC	11 d, 13 hrs	NC	NC	2	48	19	1	NC	7 d, 0 hrs	7 d, 6 hrs	NC	7	164
	Continental Slope Demersal Fish Communities	2	1	NC	4 d, 13 hrs	4 d, 17 hrs	NC	2	115	7	NC	NC	6 d, 2 hrs	NC	NC	2	75	17	2	NC	6 d, 18 hrs	7 d, 0 hrs	NC	6	145
	Exmouth Plateau	NC	NC	NC	NC	NC	NC	<1	4	NC	NC	NC	NC	NC	NC	<1	6	2	NC	NC	15 d, 18 hrs	NC	NC	<1	23
	Glomar Shoals	23	4	NC	2 d, 3 hrs	2 d, 6 hrs	NC	15	250	17	3	NC	2 d, 0 hrs	3 d, 1 hrs	NC	7	181	8	2	NC	2 d, 2 hrs	2 d, 21 hrs	NC	7	246
MMA	Muiron Islands	1	NC	NC	14 d, 17 hrs	NC	NC	<1	16	5	NC	NC	10 d, 18 hrs	NC	NC	2	55	16	NC	NC	6 d, 17 hrs	NC	NC	6	70
MP	Barrow Island	3	NC	NC	6 d, 19 hrs	NC	NC	<1	45	9	1	NC	3 d, 21 hrs	3 d, 22 hrs	NC	3	103	14	NC	NC	5 d, 4 hrs	NC	NC	5	71
	Montebello Islands	8	1	NC	2 d, 5 hrs	6 d, 7 hrs	NC	3	109	24	2	NC	2 d, 15 hrs	3 d, 10 hrs	NC	11	188	31	4	NC	2 d, 4 hrs	2 d, 7 hrs	NC	14	195
	Ningaloo	1	NC	NC	20 d, 5 hrs	NC	NC	<1	13	4	NC	NC	11 d, 13 hrs	NC	NC	2	49	19	1	NC	7 d, 0 hrs	7 d, 6 hrs	NC	7	164
NR	Lowendal Islands	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	5	NC	NC	6 d, 20 hrs	NC	NC	2	30
RSB	Brewis Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	16 d, 11 hrs	NC	NC	<1	14
	Combe Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	14 d, 20 hrs	NC	NC	<1	18
	Dailey Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	7	NC	NC	9 d, 19 hrs	NC	NC	4	51
	Fairway Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	12 d, 12 hrs	NC	NC	2	19
	Glomar Shoal	3	NC	NC	7 d, 3 hrs	NC	NC	2	32	7	NC	NC	5 d, 8 hrs	NC	NC	2	35	1	NC	NC	4 d, 4 hrs	NC	NC	<1	20
	Hammersley Shoal	1	NC	NC	11 d, 12 hrs	NC	NC	<1	12	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Hood Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	6	NC	NC	9 d, 16 hrs	NC	NC	3	35
	Madeleine Shoals	1	NC	NC	10 d, 0 hrs	NC	NC	<1	22	1	NC	NC	13 d, 7 hrs	NC	NC	<1	16	NC	NC	NC	NC	NC	NC	NC	NC
	Montebello Shoals	4	NC	NC	5 d, 6 hrs	NC	NC	2	29	7	1	NC	3 d, 15 hrs	3 d, 17 hrs	NC	4	172	17	NC	NC	4 d, 8 hrs	NC	NC	6	77
	Ningaloo Reef	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	18 d, 7 hrs	NC	NC	<1	36	4	NC	NC	20 d, 19 hrs	NC	NC	2	25

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	Otway Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	10 d, 5 hrs	NC	NC	2	28
	Outtrim Patches	1	NC	NC	15 d, 6 hrs	NC	NC	<1	11	2	NC	NC	10 d, 19 hrs	NC	NC	2	32	13	NC	NC	9 d, 13 hrs	NC	NC	5	48
	Penguin Bank	2	NC	NC	11 d, 19 hrs	NC	NC	<1	20	5	NC	NC	6 d, 1 hrs	NC	NC	2	52	11	NC	NC	8 d, 13 hrs	NC	NC	4	38
	Poivre Reef	3	NC	NC	9 d, 16 hrs	NC	NC	<1	29	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	9 d, 0 hrs	NC	NC	2	24
	Rankin Bank	4	NC	NC	10 d, 11 hrs	NC	NC	<1	14	1	NC	NC	19 d, 15 hrs	NC	NC	2	12	2	NC	NC	9 d, 11 hrs	NC	NC	2	63
	Rosily Shoals	1	NC	NC	20 d, 18 hrs	NC	NC	<1	12	2	NC	NC	26 d, 9 hrs	NC	NC	<1	15	8	NC	NC	9 d, 4 hrs	NC	NC	3	28
	Trap Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	3	NC	NC	11 d, 7 hrs	NC	NC	2	23
	Tryal Rocks	7	1	NC	1 d, 19 hrs	2 d, 12 hrs	NC	4	108	30	2	NC	2 d, 18 hrs	3 d, 0 hrs	NC	13	189	44	6	NC	2 d, 13 hrs	2 d, 20 hrs	NC	23	204
State and Territory Waters	Western Australia	8	1	NC	2 d, 5 hrs	4 d, 6 hrs	NC	3	144	24	3	NC	2 d, 7 hrs	2 d, 9 hrs	NC	11	292	31	7	NC	1 d, 14 hrs	2 d, 0 hrs	NC	21	336

NC: No contact to receptor predicted for specified threshold.

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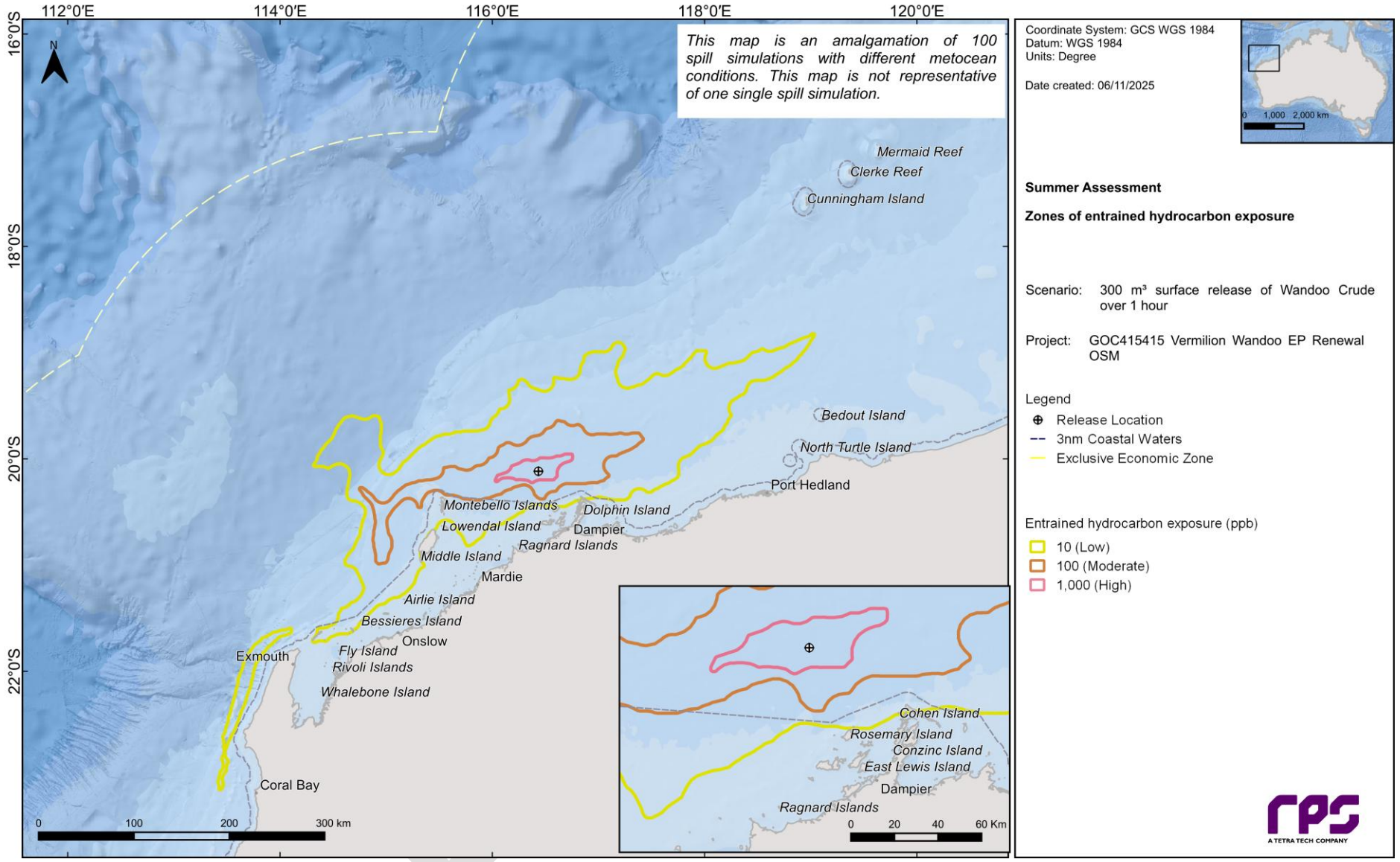


Figure 12.49 Predicted zones of entrained hydrocarbon exposure following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

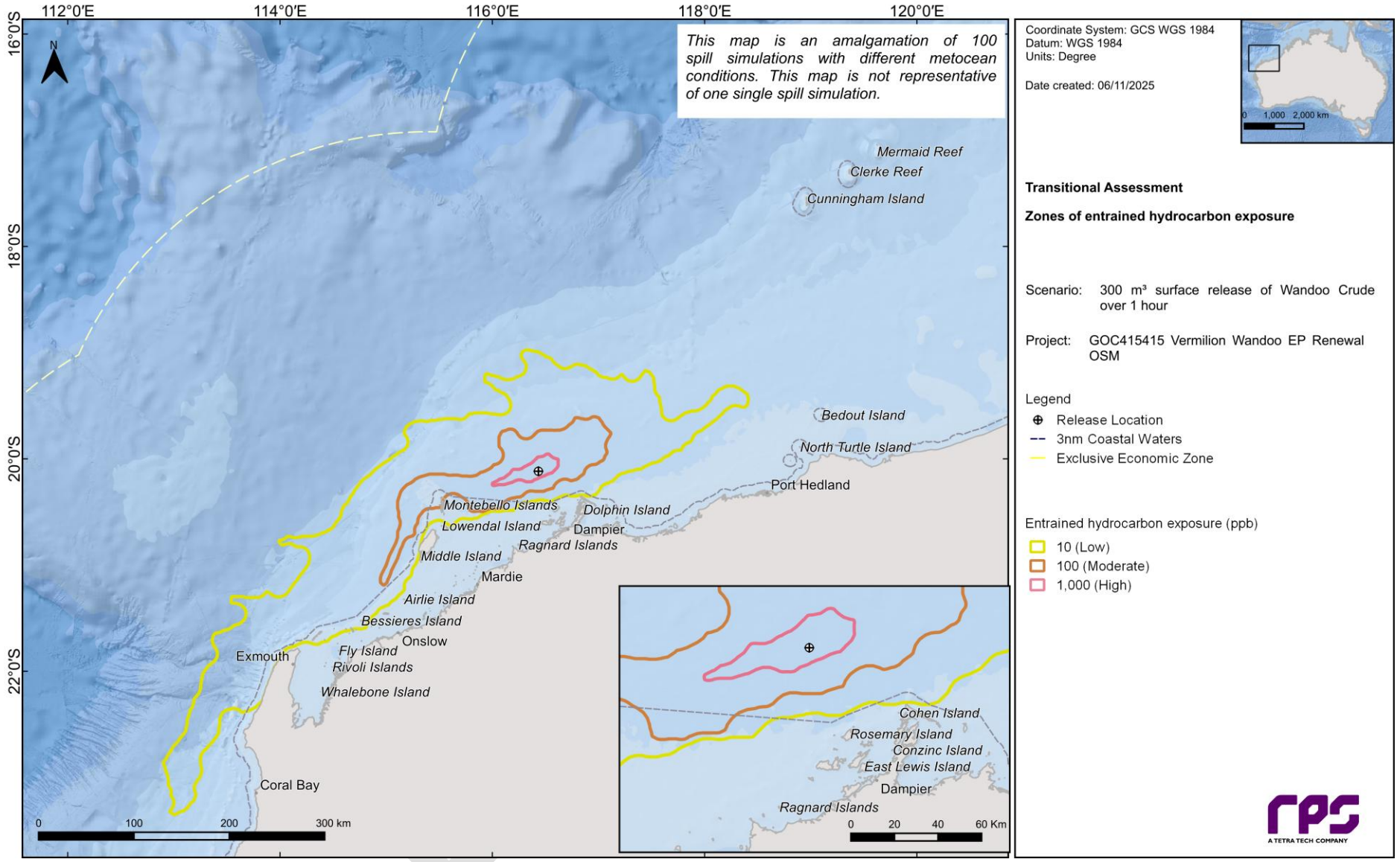


Figure 12.50 Predicted zones of entrained hydrocarbon exposure following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

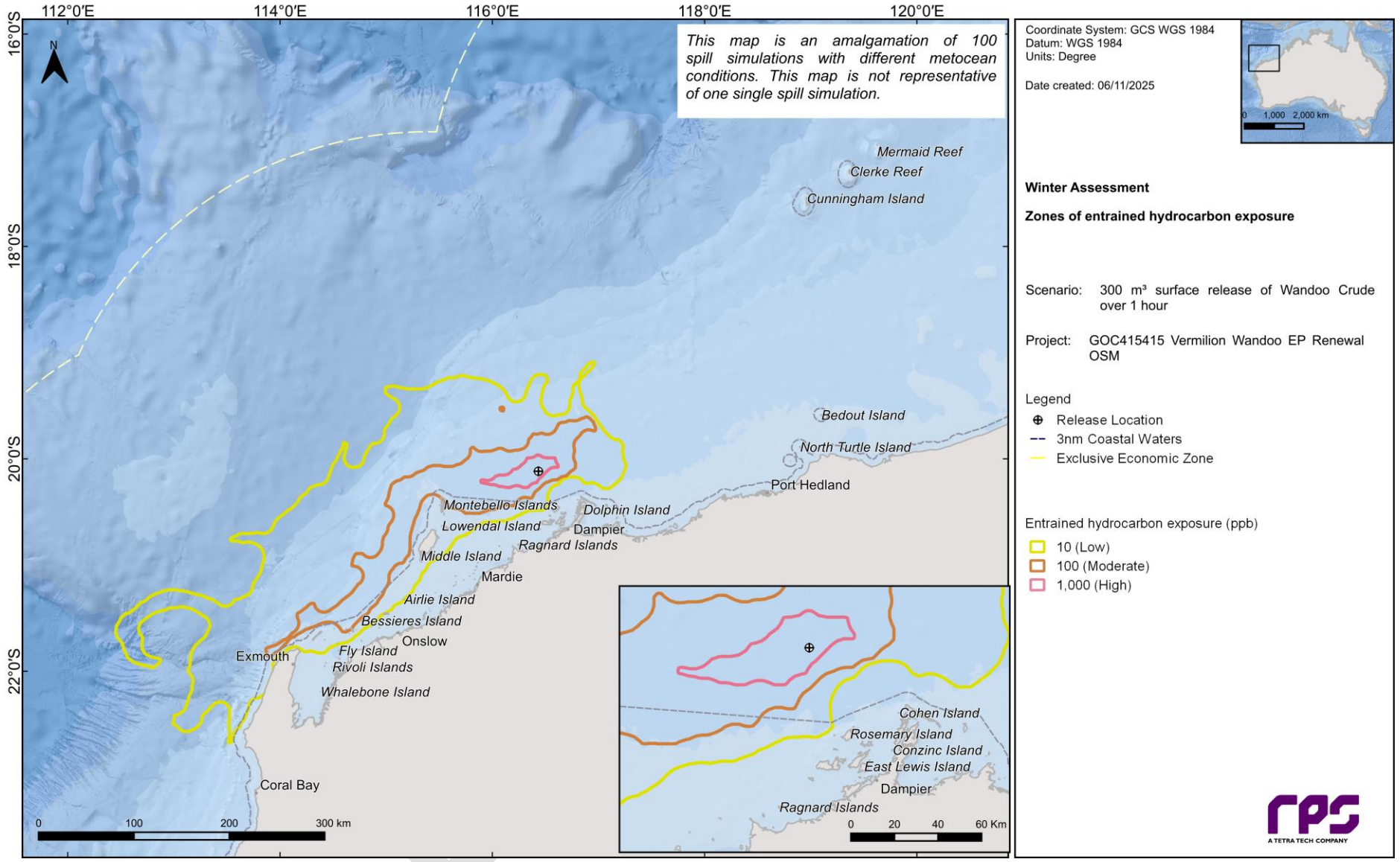


Figure 12.51 Predicted zones of entrained hydrocarbon exposure following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

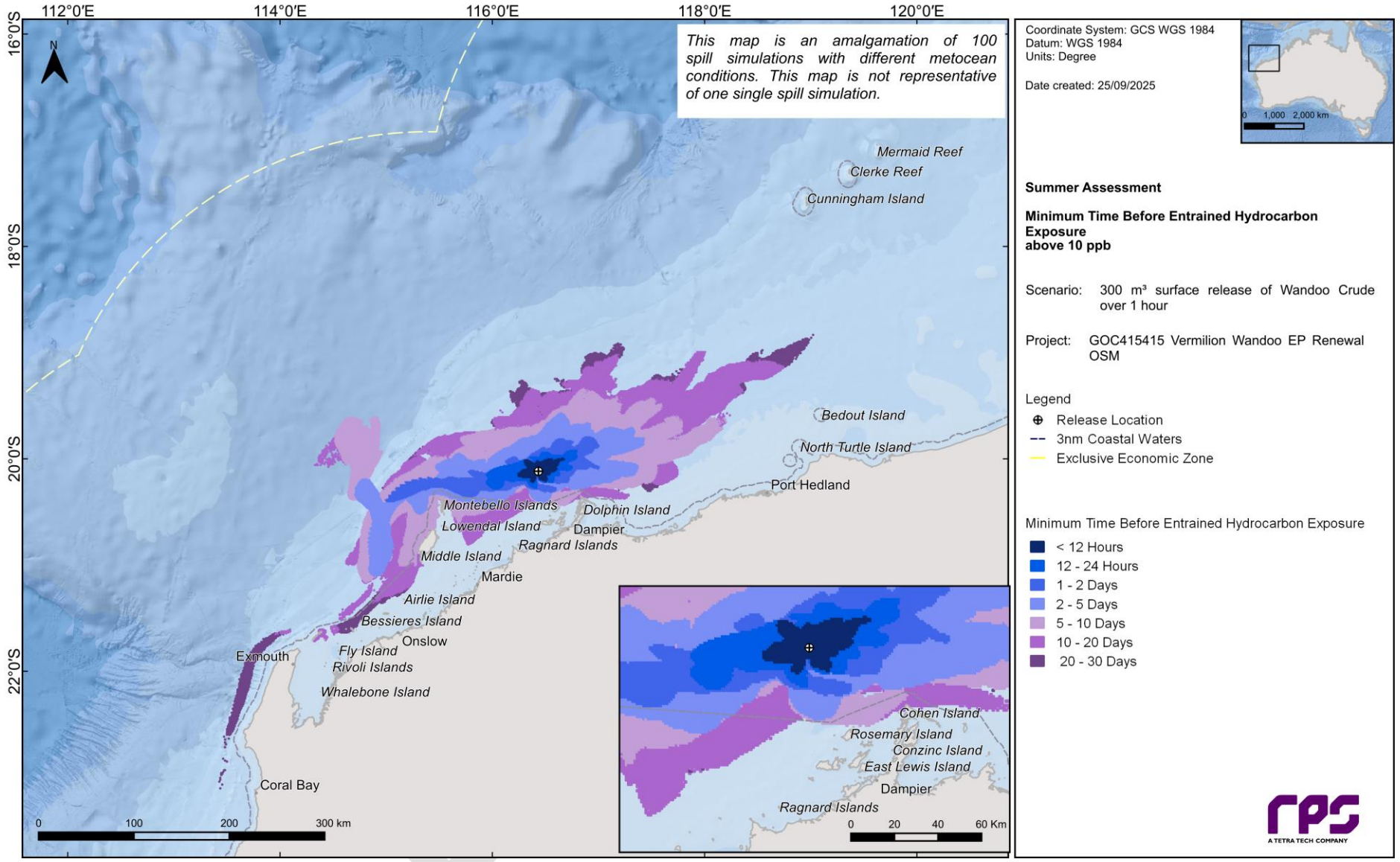


Figure 12.52 Minimum time before entrained hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

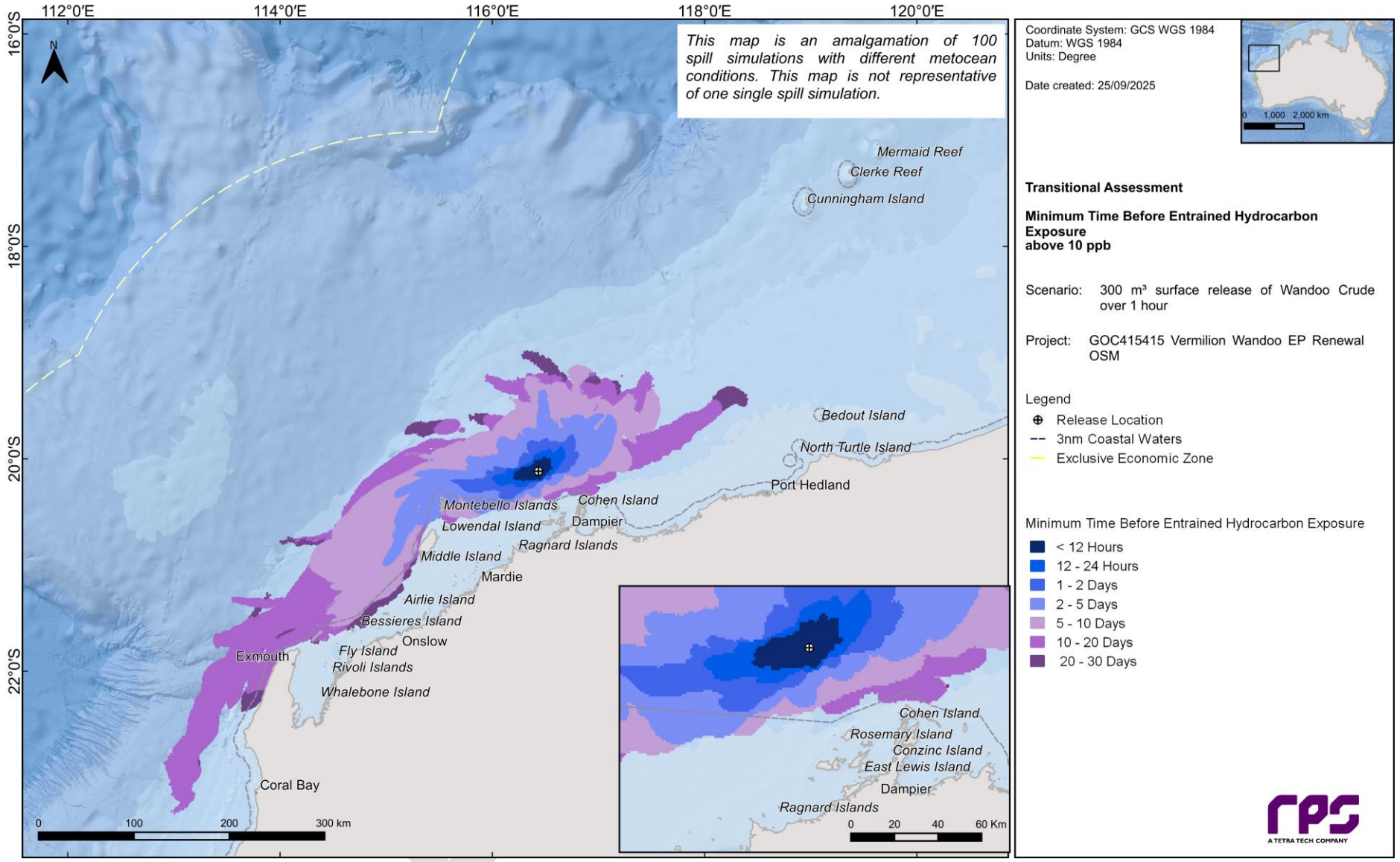


Figure 12.53 Minimum time before entrained hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

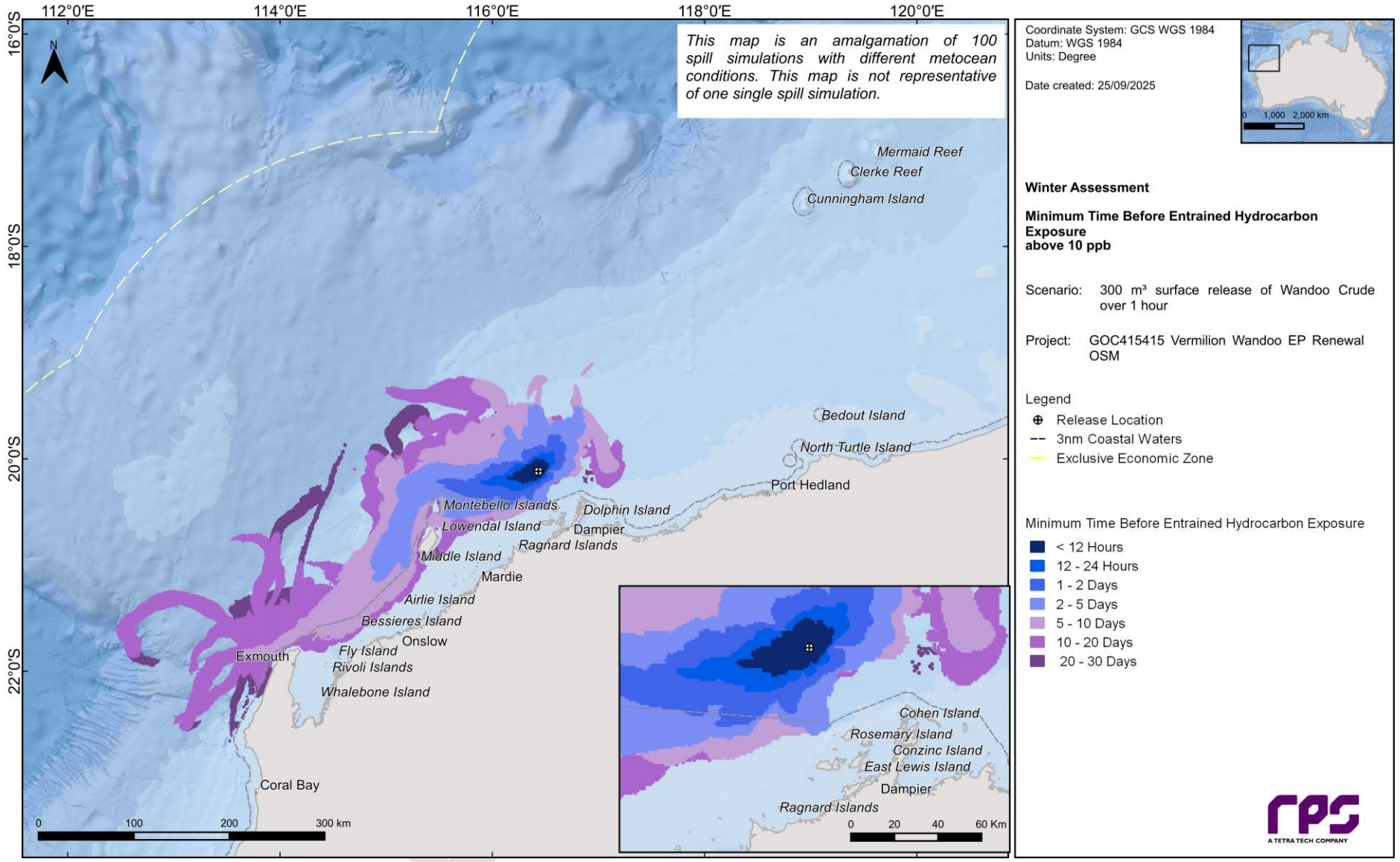


Figure 12.54 Minimum time before entrained hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

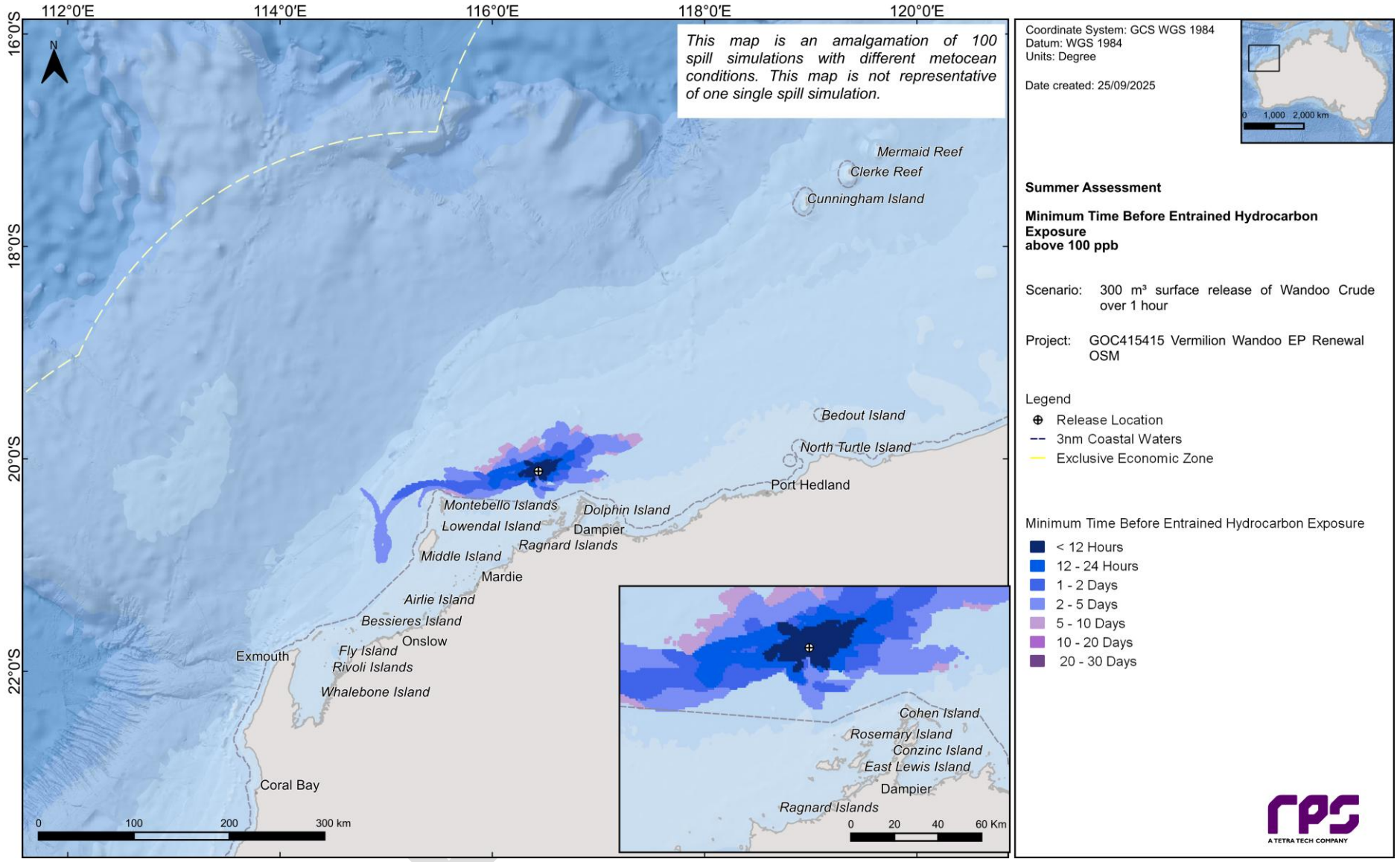


Figure 12.55 Minimum time before entrained hydrocarbon exposure at, or above, 100 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

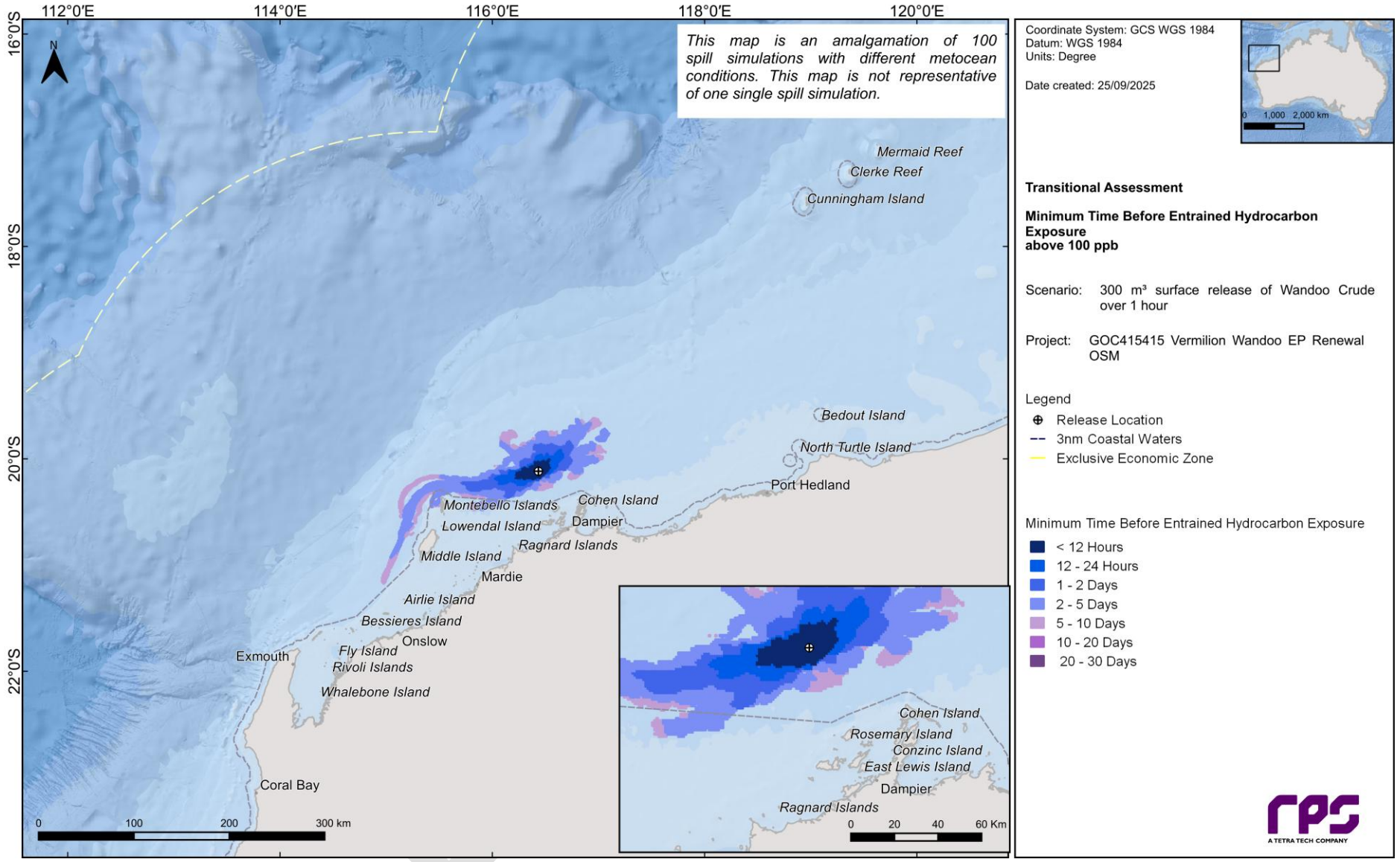


Figure 12.56 Minimum time before entrained hydrocarbon exposure at, or above, 100 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

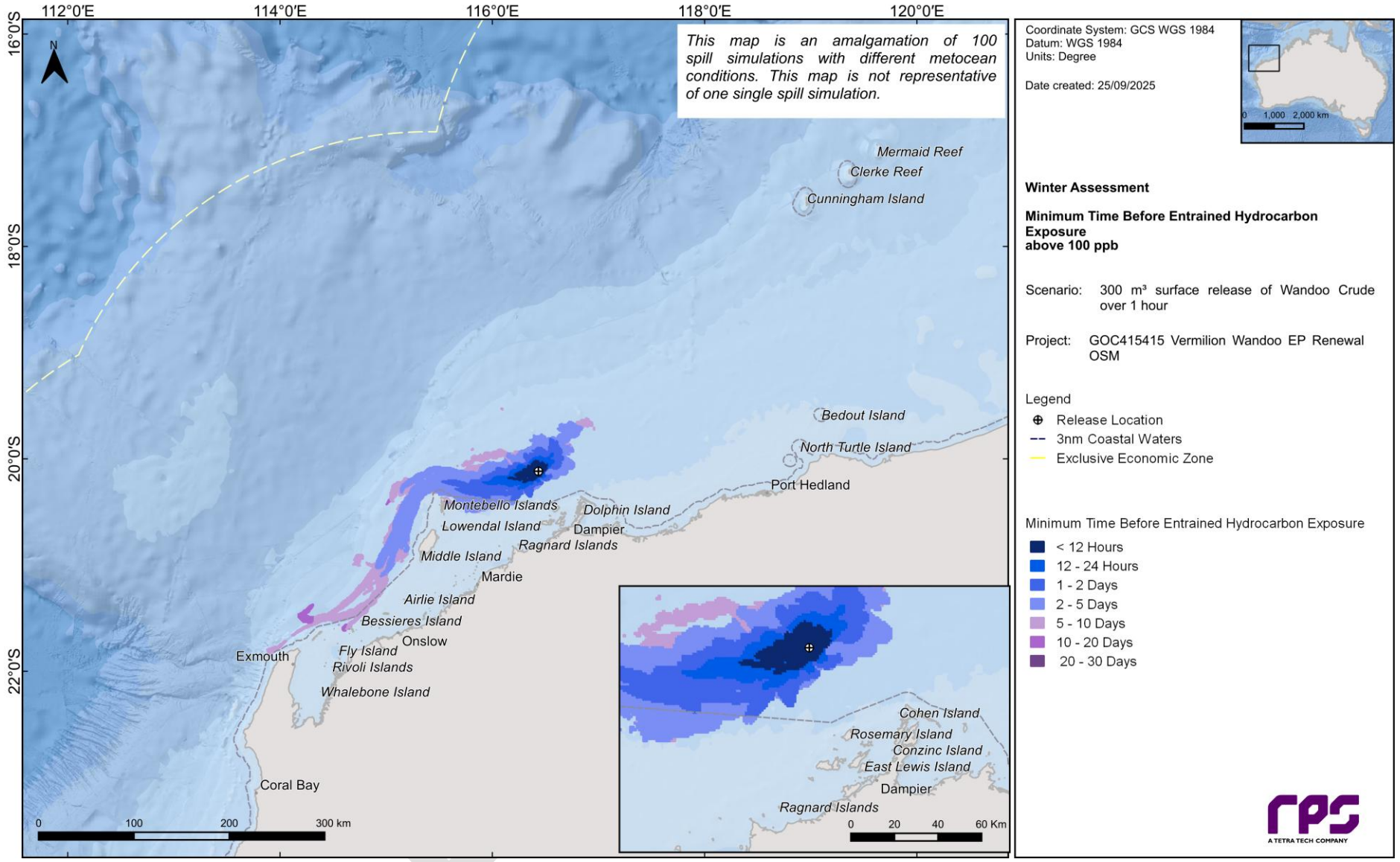


Figure 12.57 Minimum time before entrained hydrocarbon exposure at, or above, 100 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

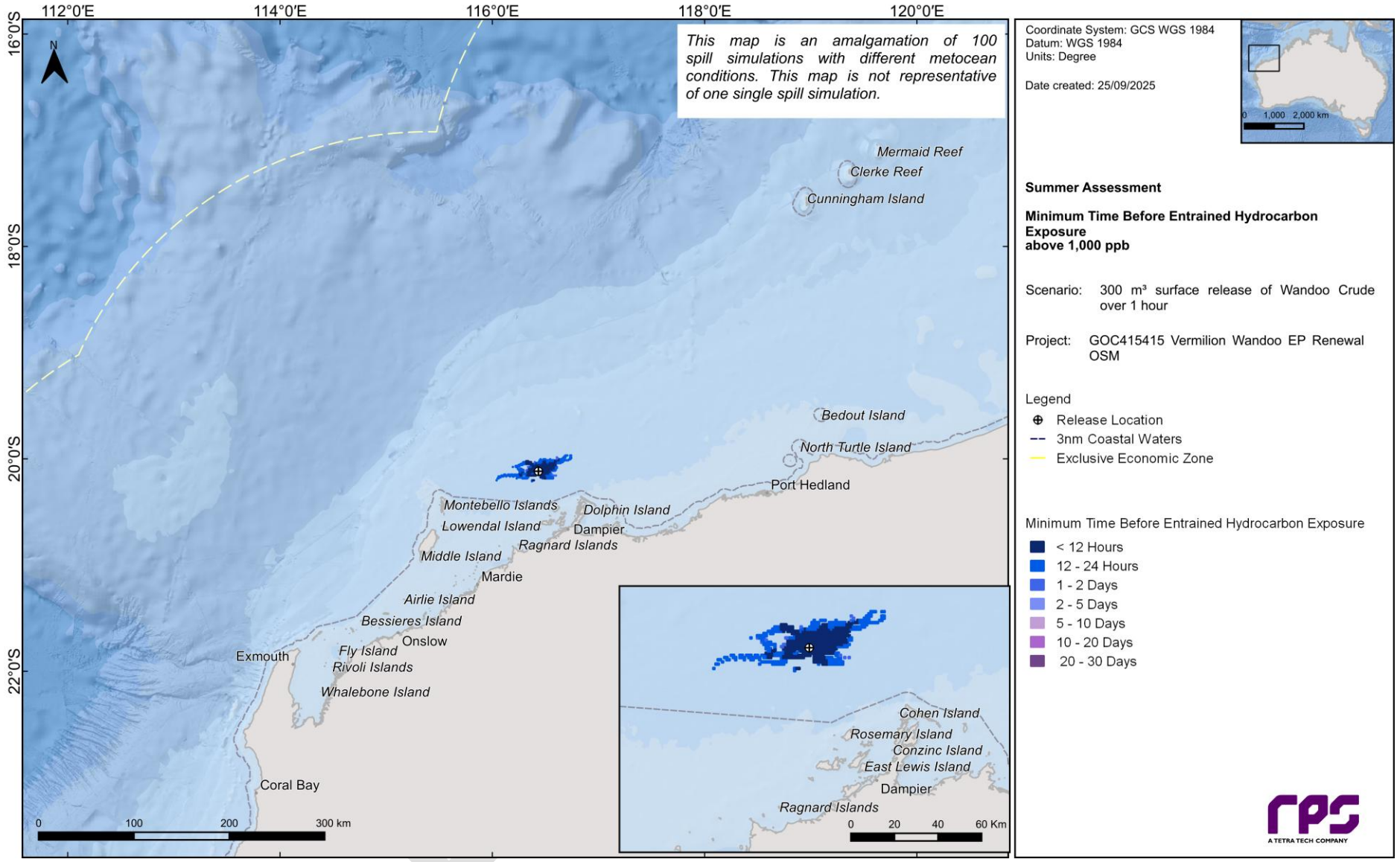


Figure 12.58 Minimum time before entrained hydrocarbon exposure at, or above, 1,000 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

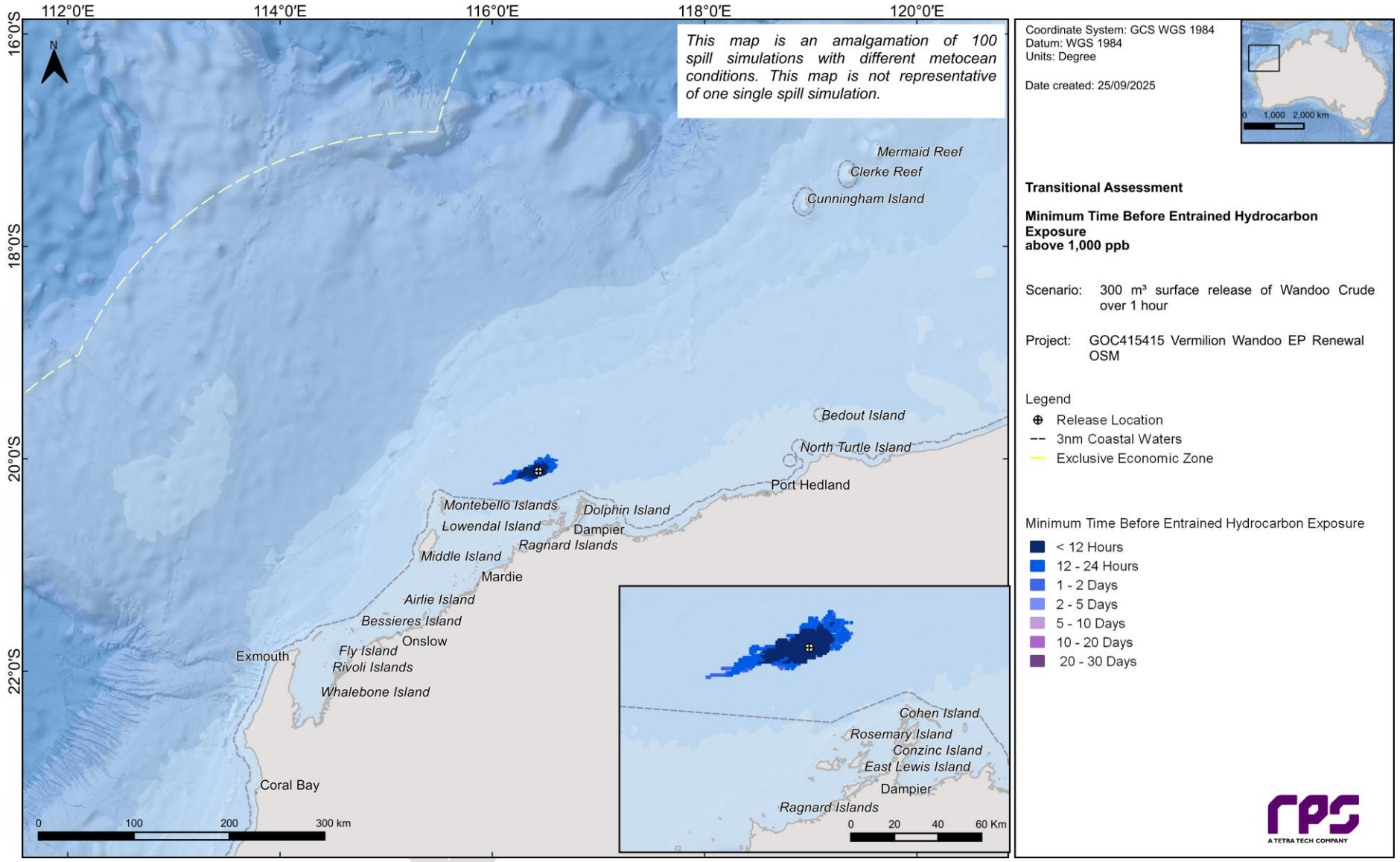


Figure 12.59 Minimum time before entrained hydrocarbon exposure at, or above, 1,000 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

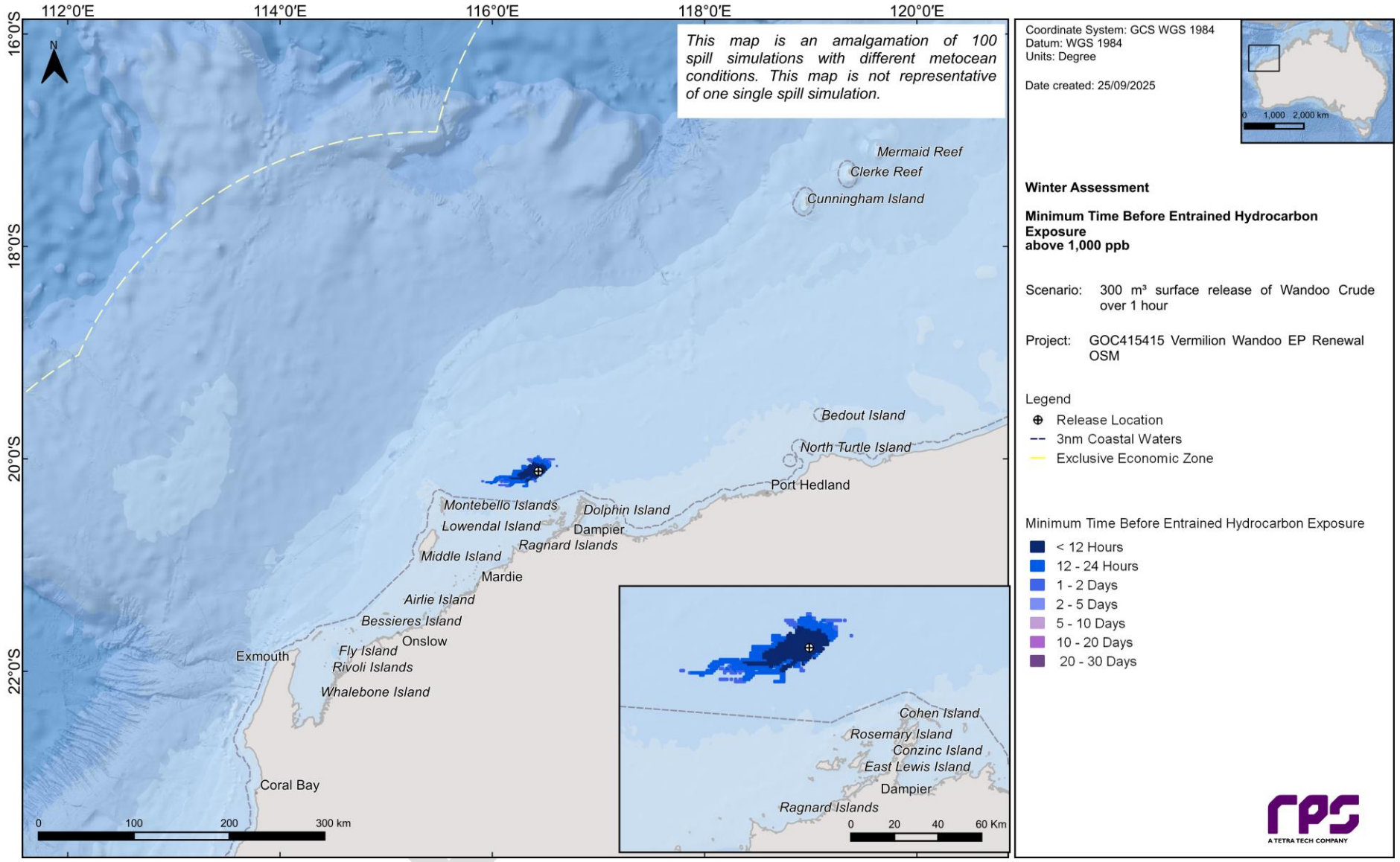


Figure 12.60 Minimum time before entrained hydrocarbon exposure at, or above, 1,000 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

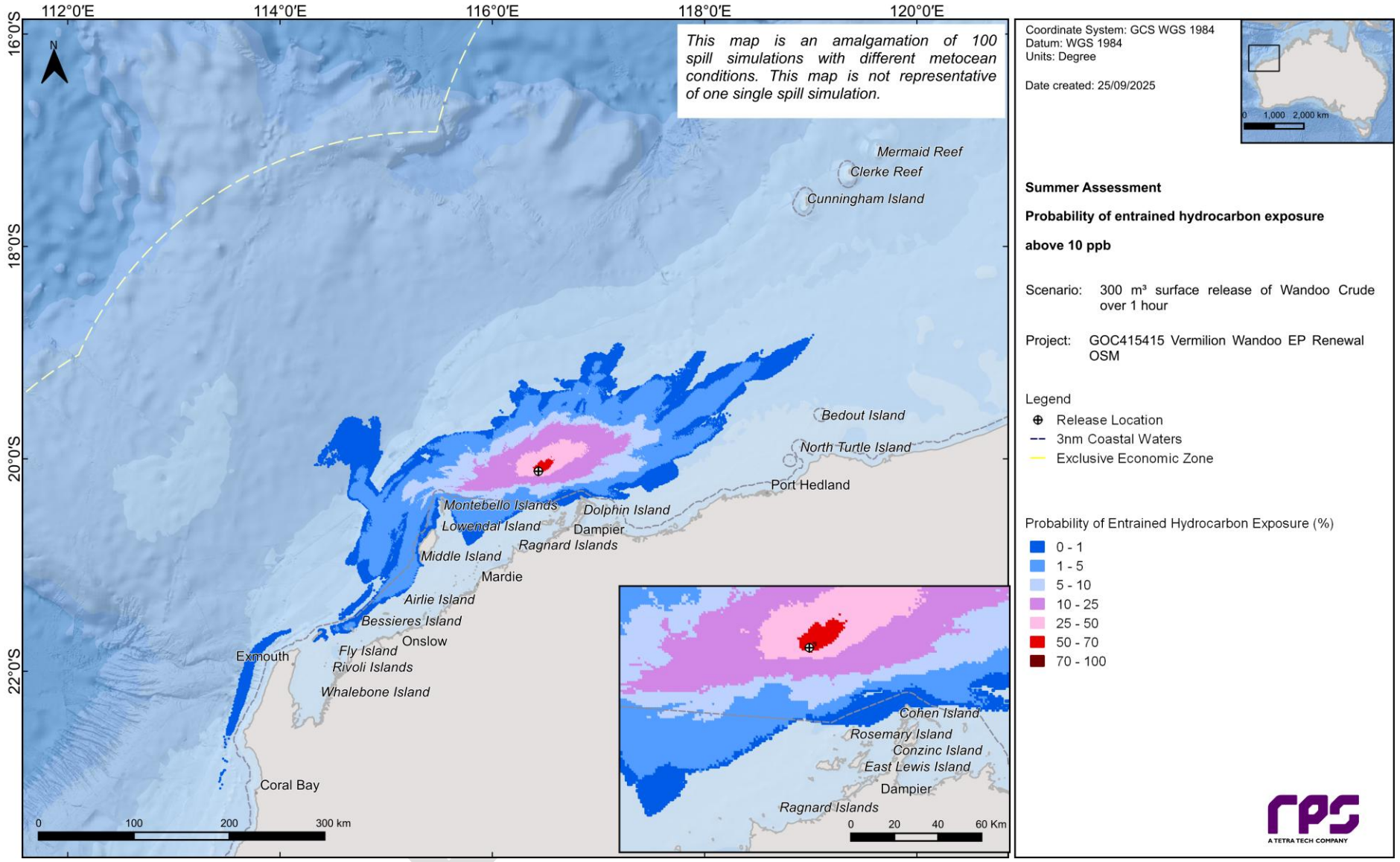


Figure 12.61 Probability of entrained hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

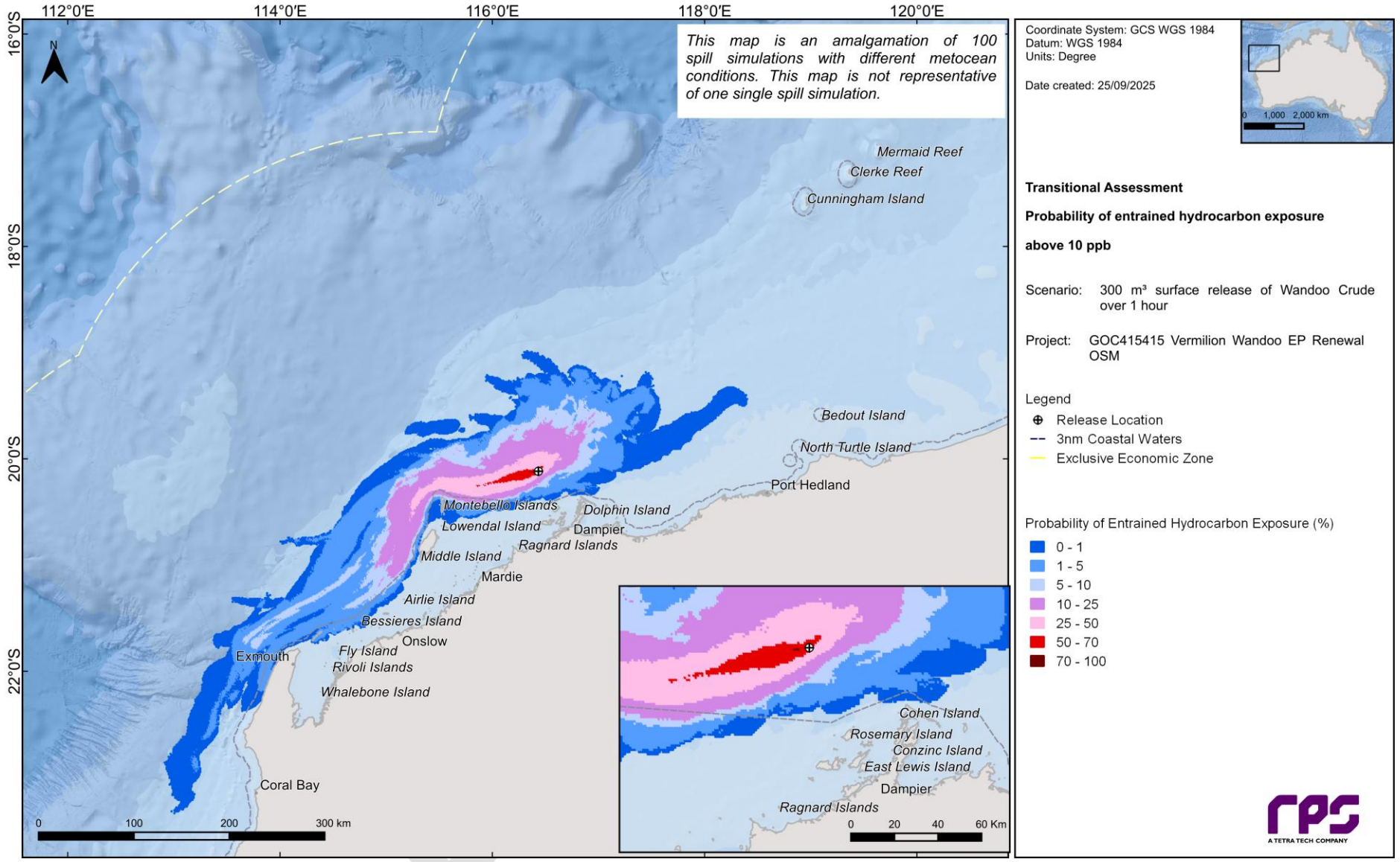


Figure 12.62 Probability of entrained hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

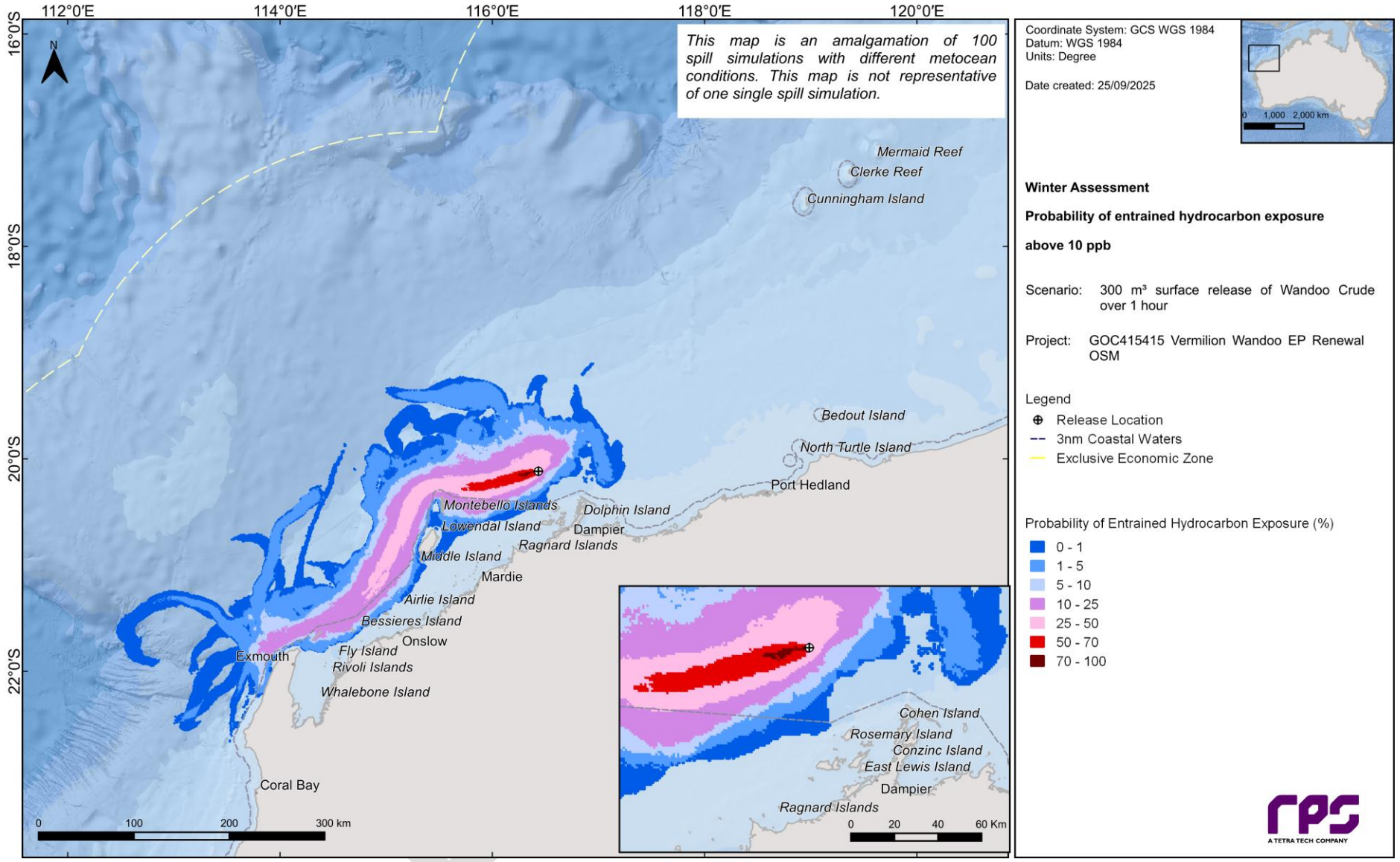


Figure 12.63 Probability of entrained hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

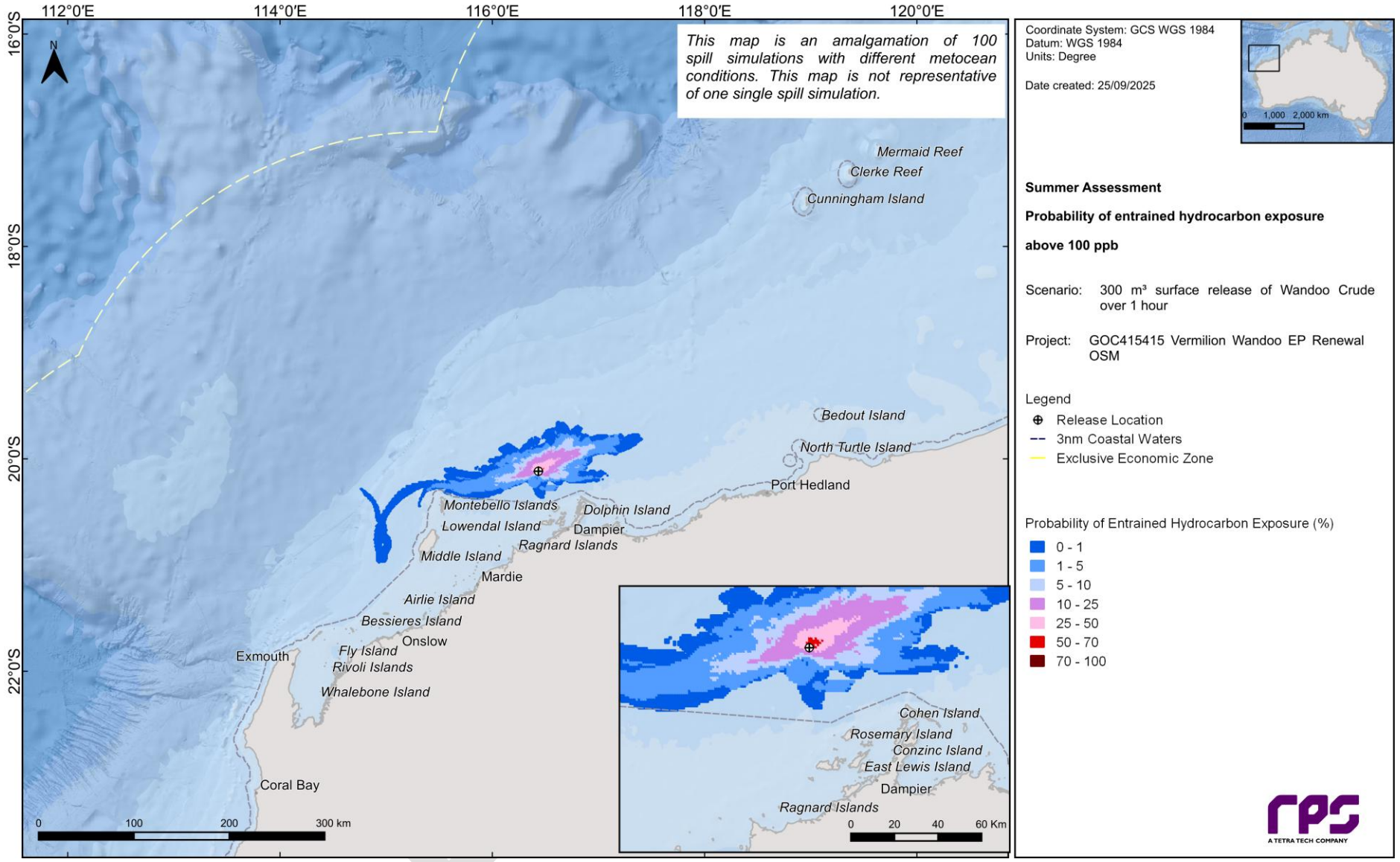


Figure 12.64 Probability of entrained hydrocarbon exposure at, or above, 100 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

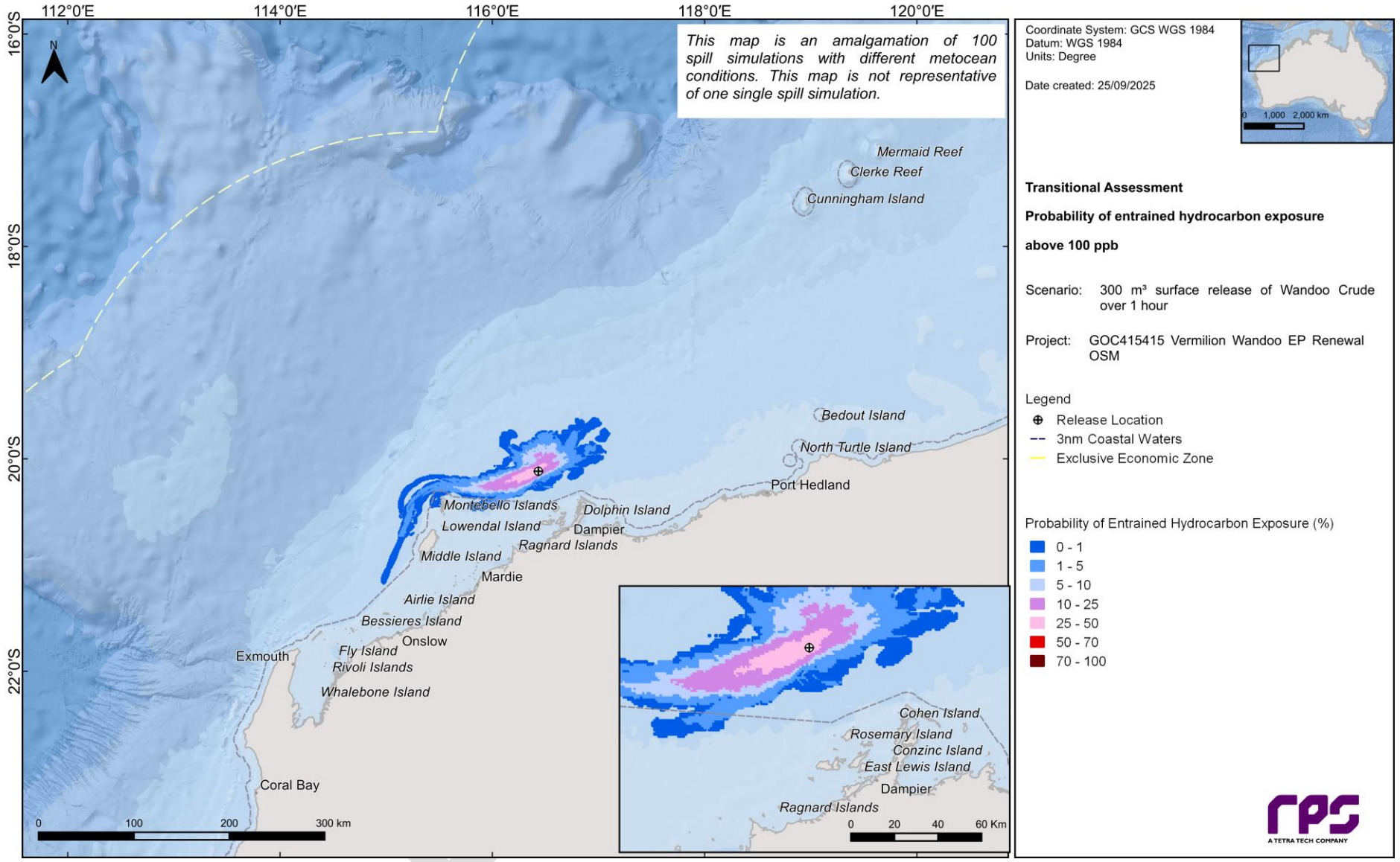


Figure 12.65 Probability of entrained hydrocarbon exposure at, or above, 100 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

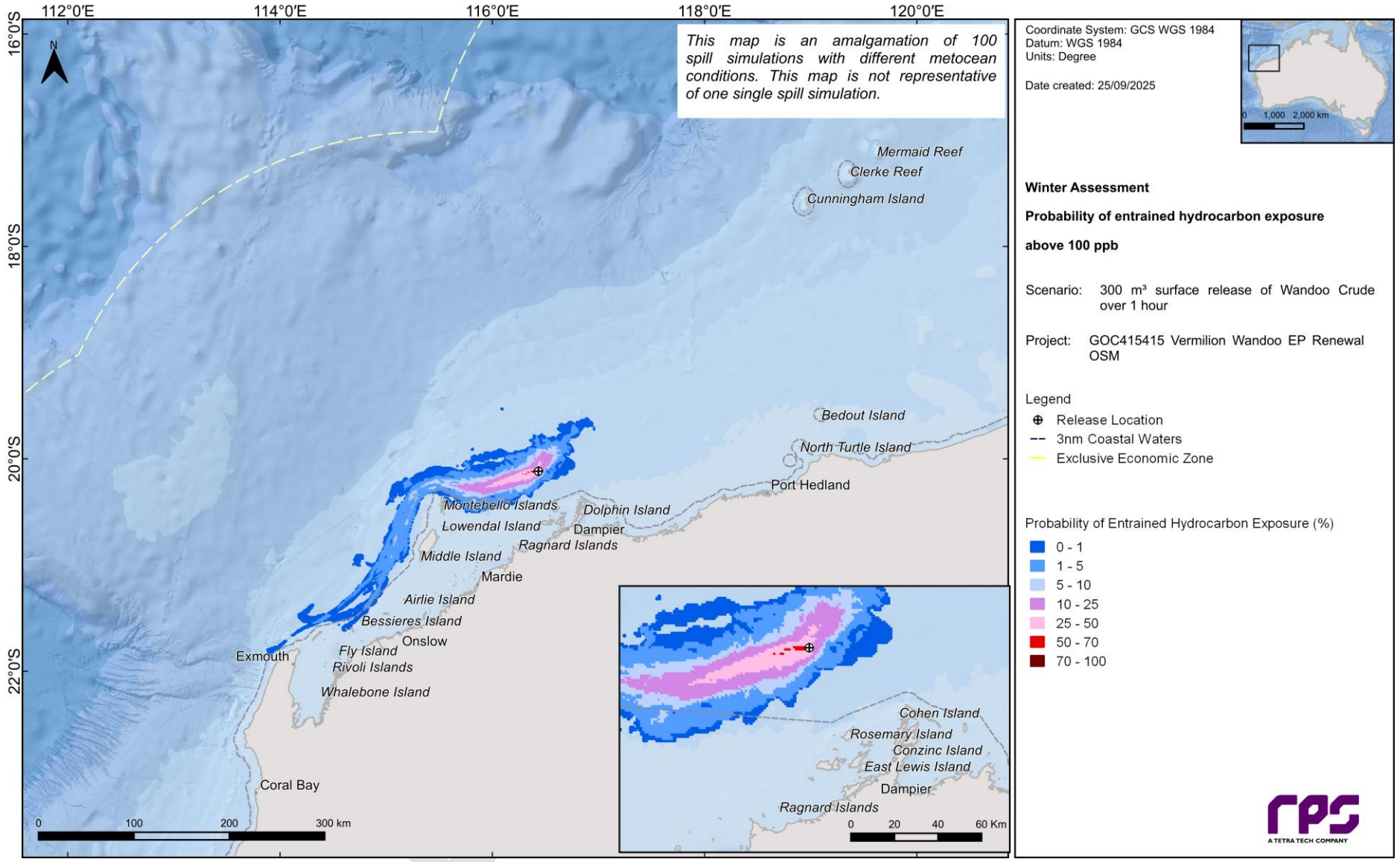


Figure 12.66 Probability of entrained hydrocarbon exposure at, or above, 100 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

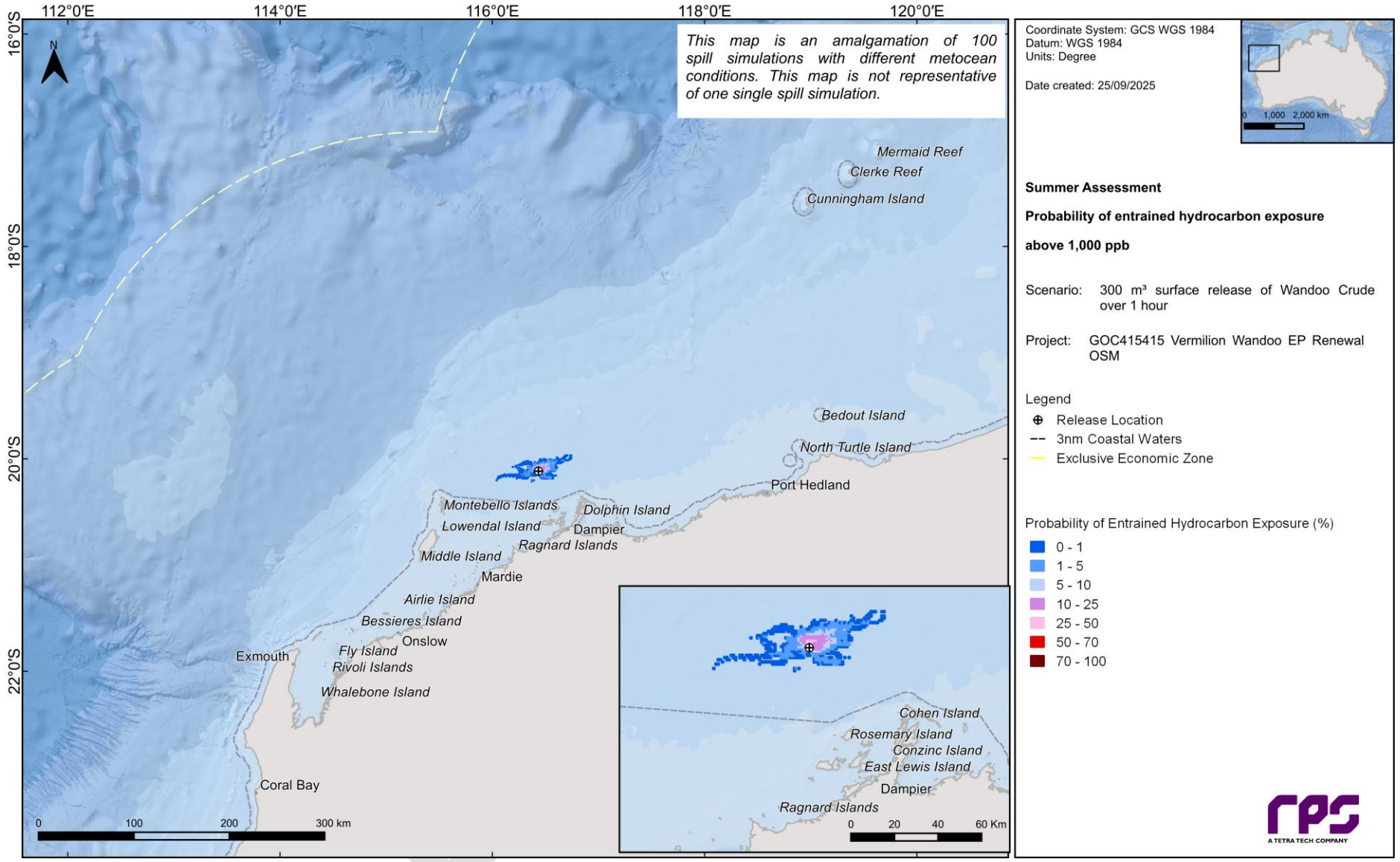


Figure 12.67 Probability of entrained hydrocarbon exposure at, or above, 1,000 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

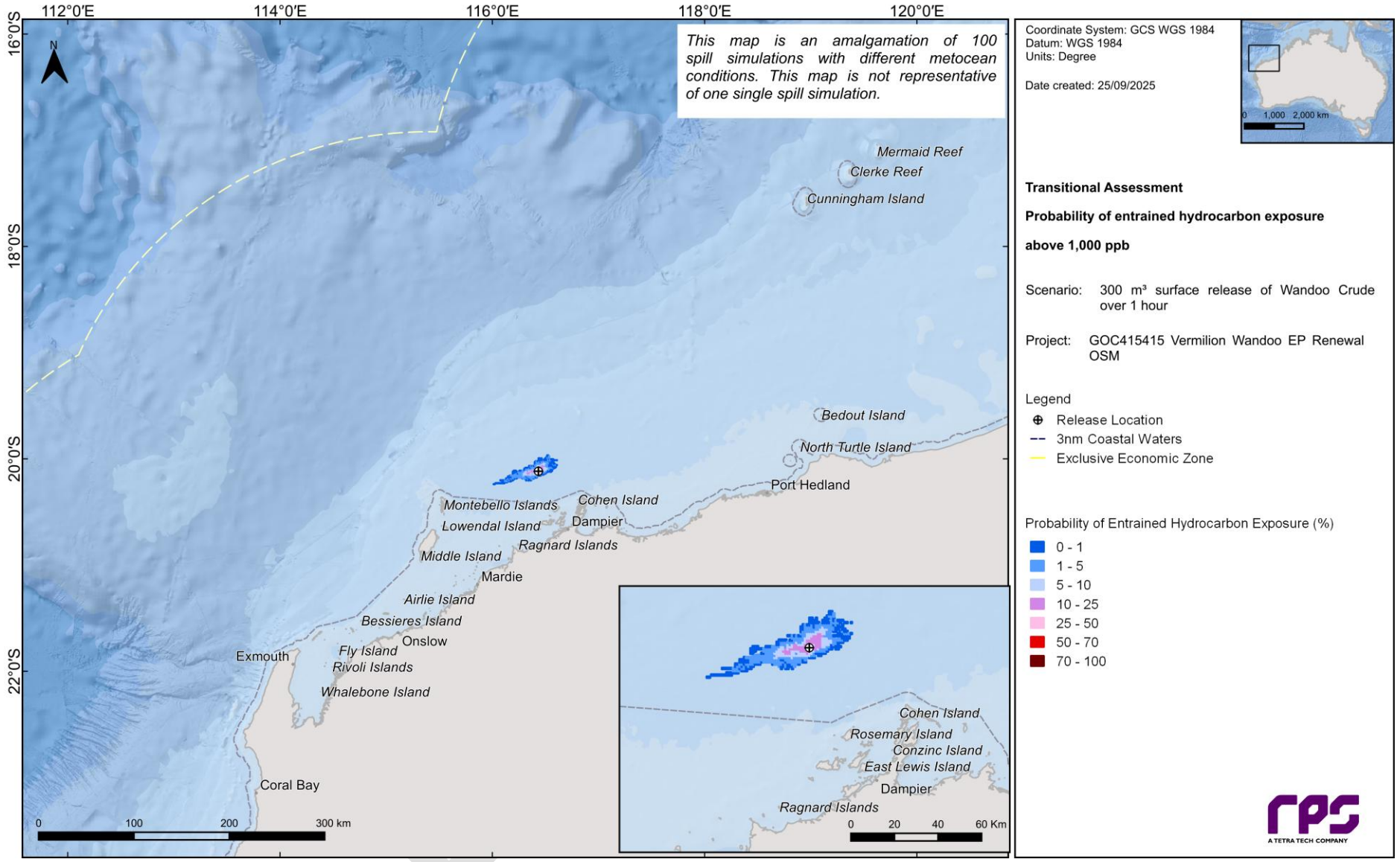


Figure 12.68 Probability of entrained hydrocarbon exposure at, or above, 1,000 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

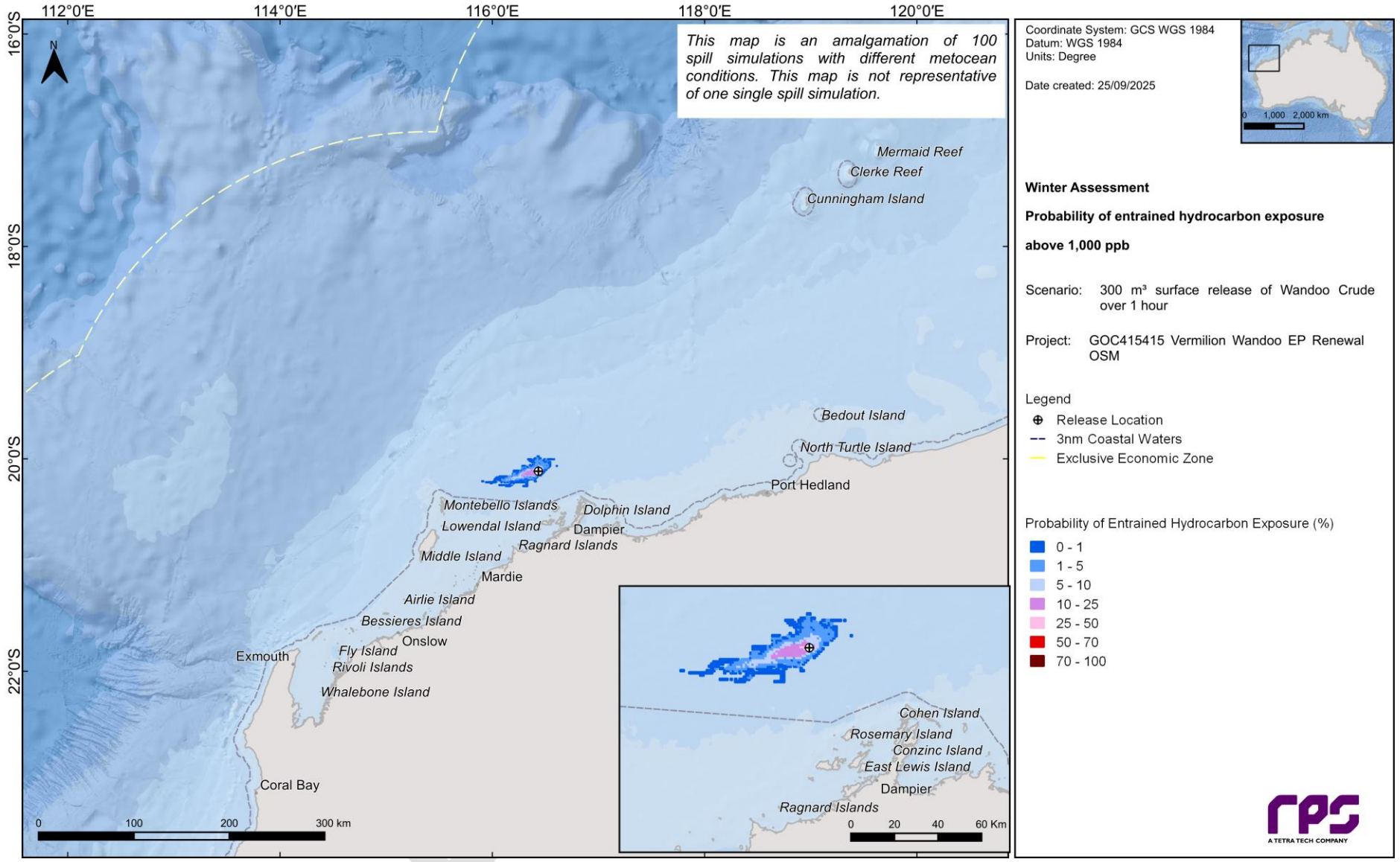


Figure 12.69 Probability of entrained hydrocarbon exposure at, or above, 1,000 ppb following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

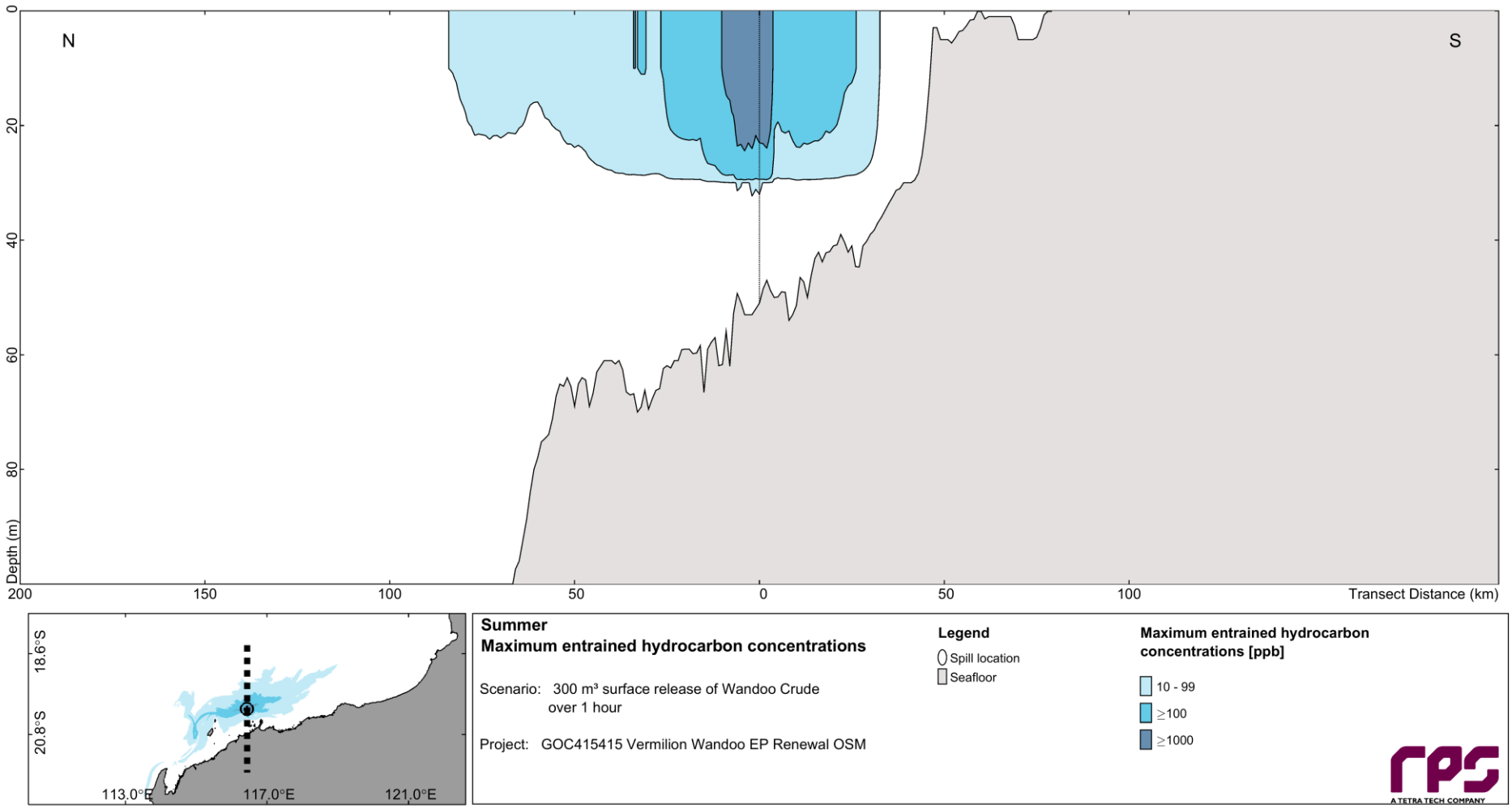


Figure 12.70 North-south cross-section transect of entrained hydrocarbon concentrations following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

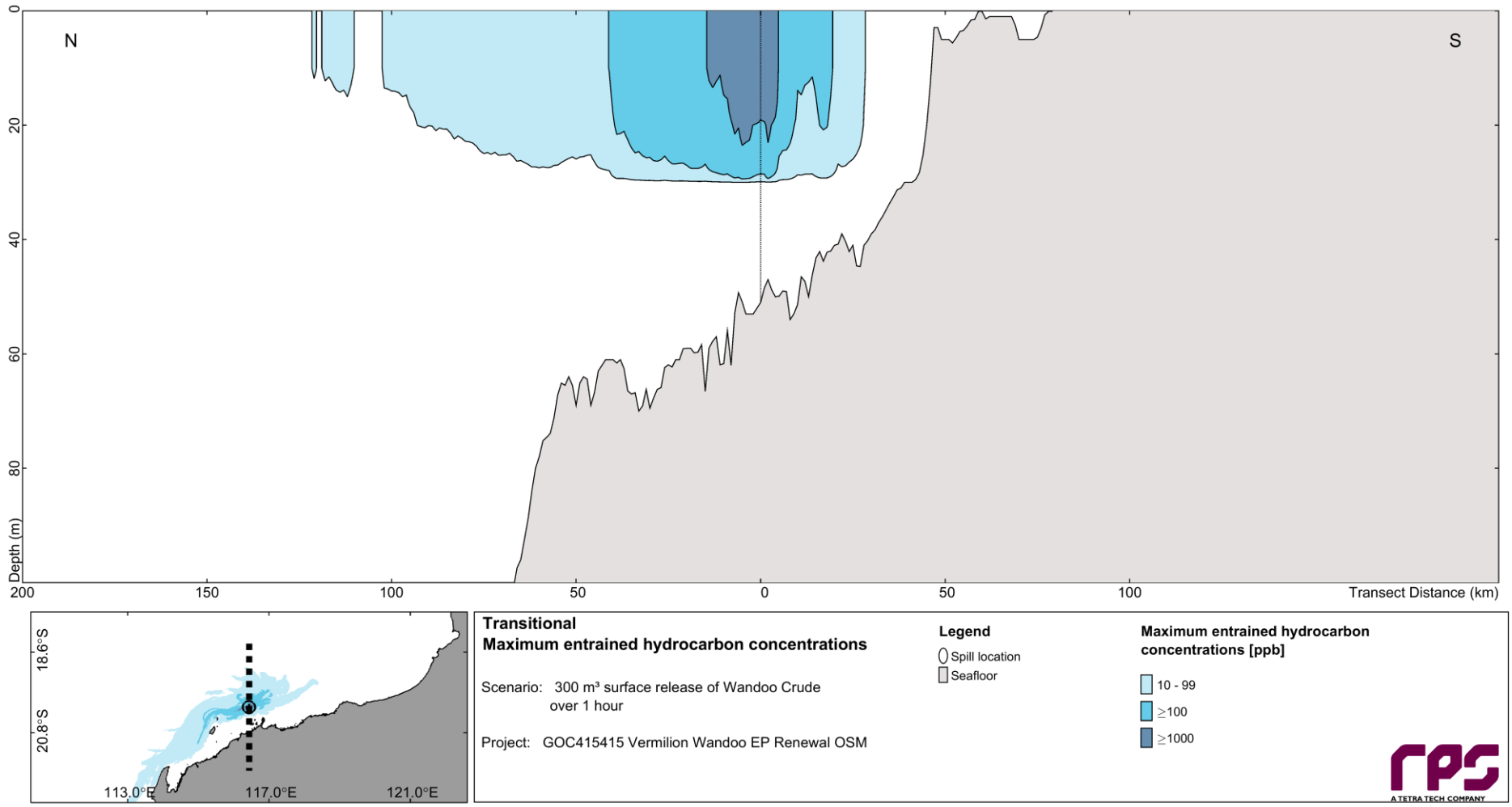


Figure 12.71 North-south cross-section transect of entrained hydrocarbon concentrations following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

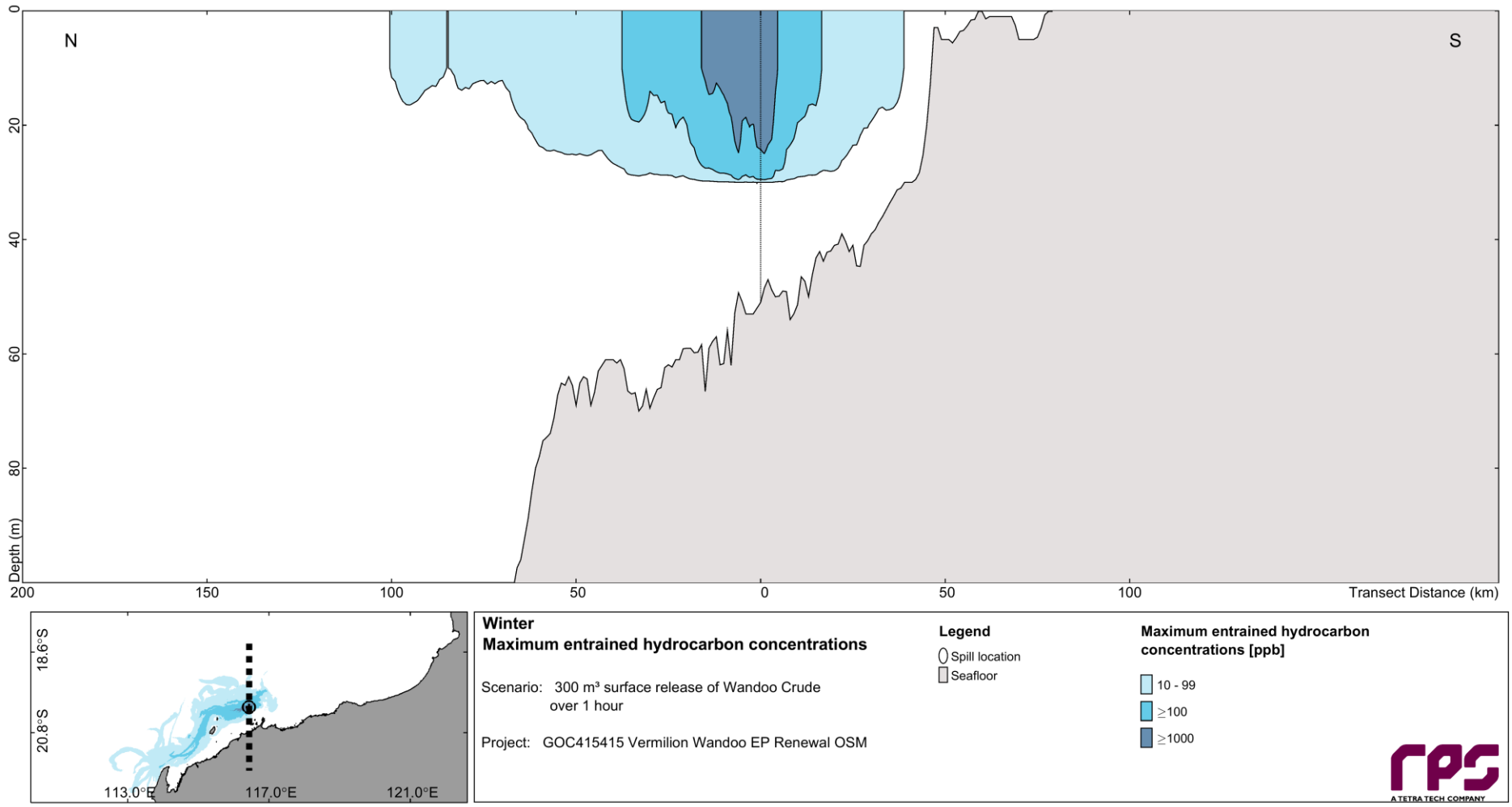


Figure 12.72 North-south cross-section transect of entrained hydrocarbon concentrations following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

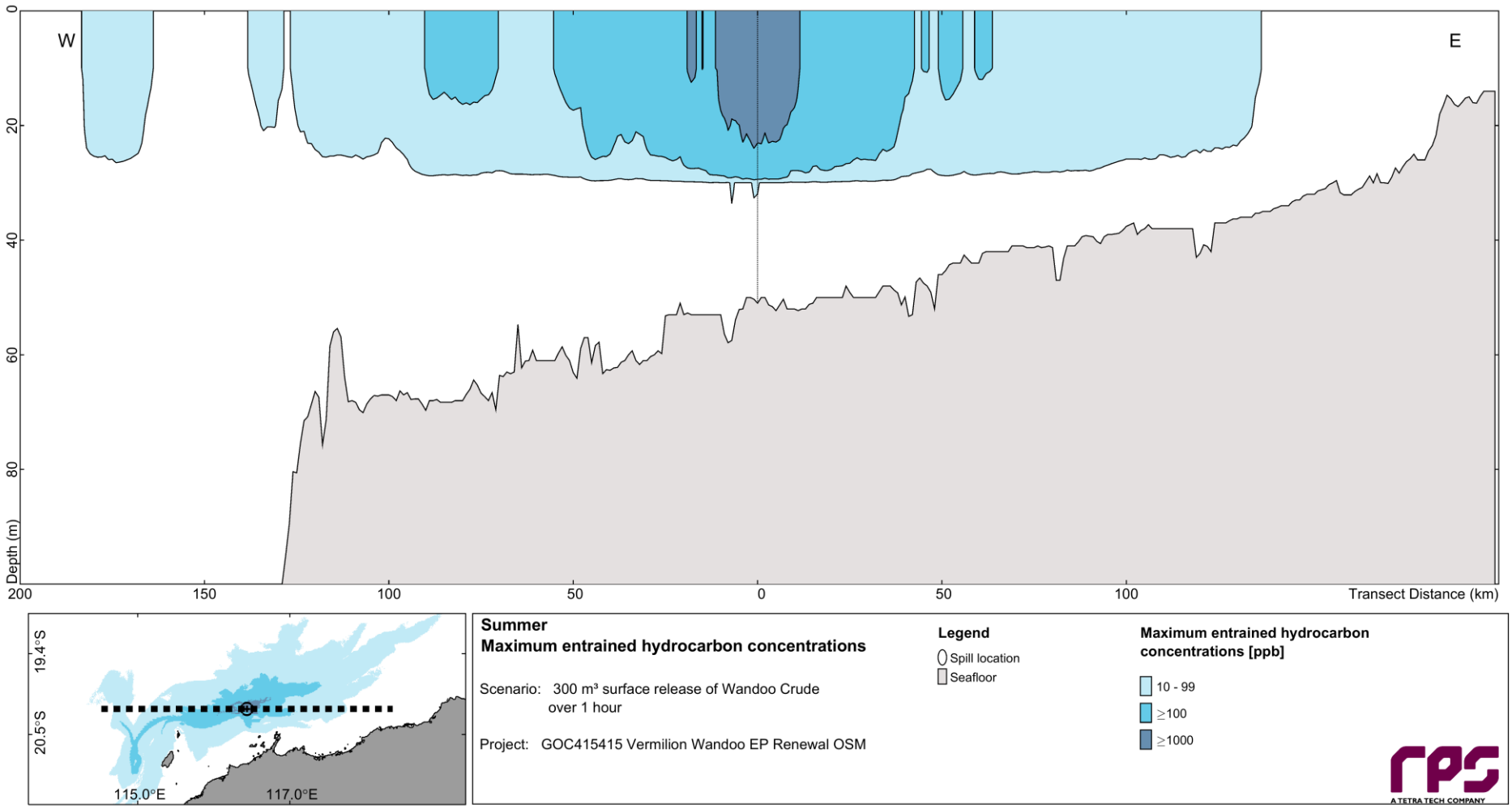


Figure 12.73 East-west cross-section transect of entrained hydrocarbon concentrations following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during summer conditions.

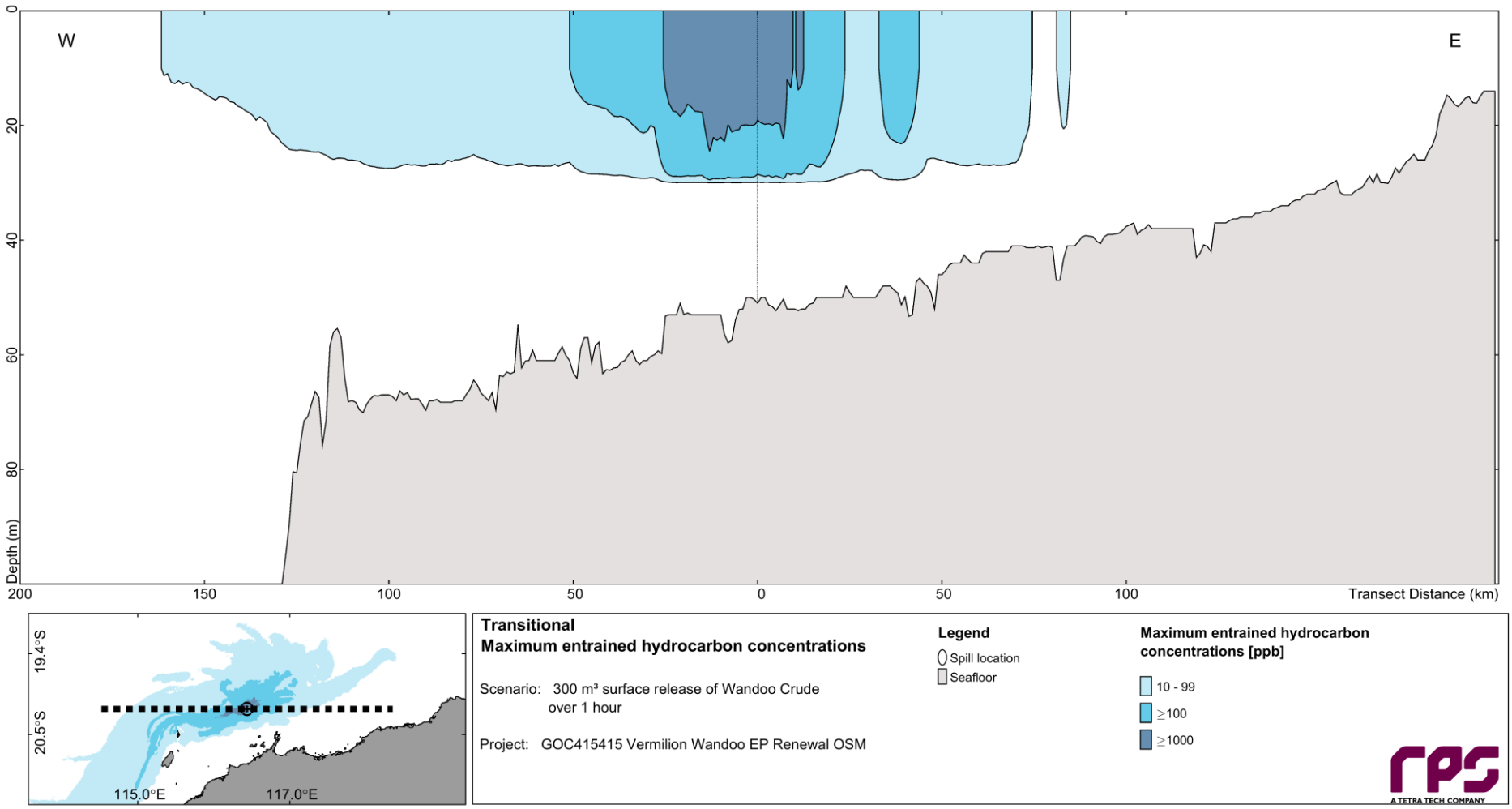


Figure 12.74 East-west cross-section transect of entrained hydrocarbon concentrations following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during transitional conditions.

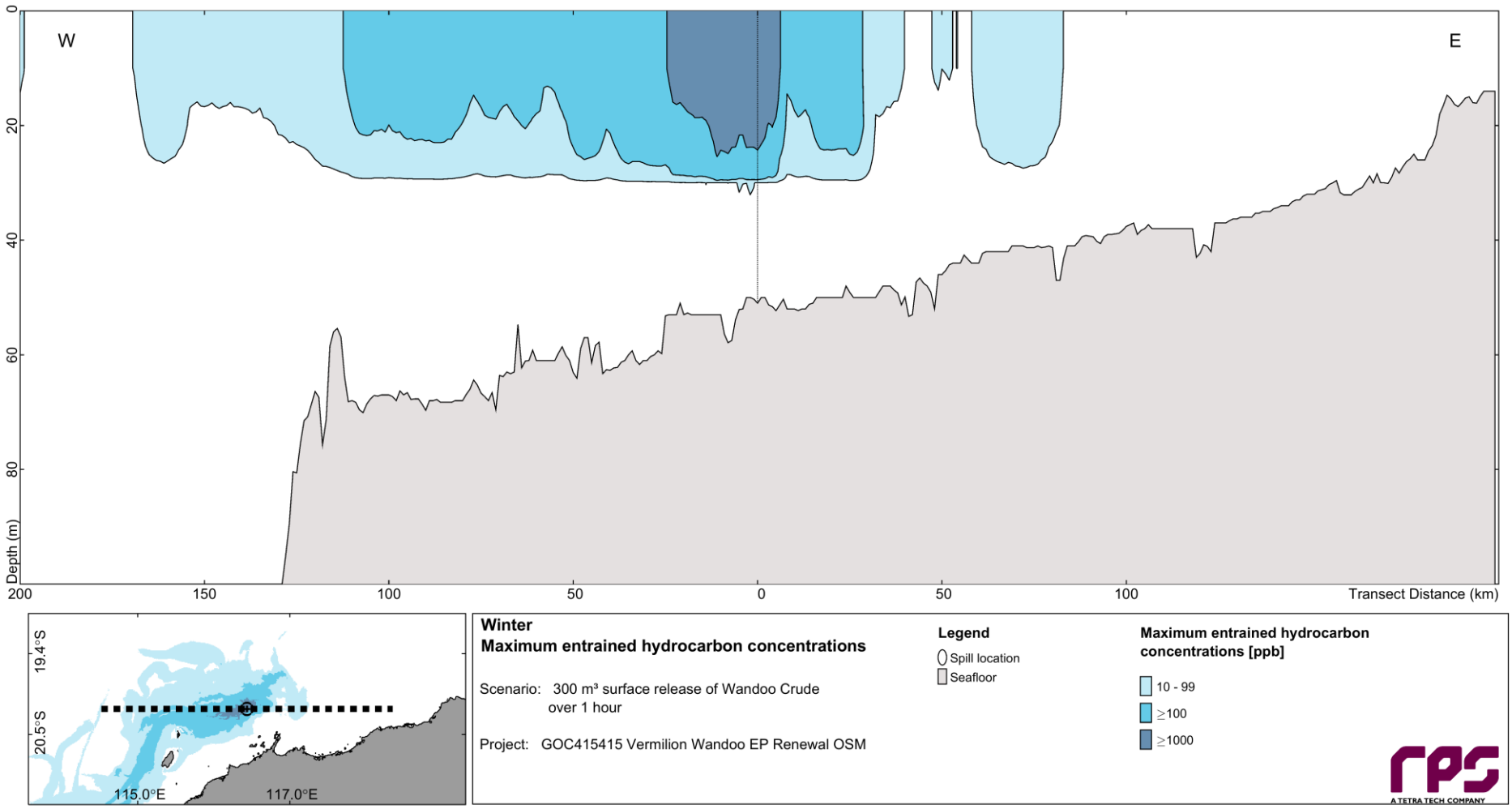


Figure 12.75 East-west cross-section transect of entrained hydrocarbon concentrations following a surface release of crude from the offtake export system. The results were calculated from 100 spill simulations that commenced during winter conditions.

13 MODELLING RESULTS: RELEASE OF MGO FROM WANDOO B'S SHAFT 2

This scenario investigated the potential exposure from a 2,200 m^3 surface release of MGO over 12 hours resulting from Wandoo B's Shaft 2. The MGO was tracked for 50 days from the commencement of the spill to allow the concentrations to decrease below the lowest reporting thresholds. The modelling for this scenario assumed no mitigation efforts are undertaken to collect or otherwise affect the natural transport and weathering.

13.1 Stochastic Analysis

13.1.1 Socio-Economic and Ecological EMBAs

Figure 13.1 and Figure 13.2 illustrate the socio-economic and ecological EMBAs following a surface release of MGO from Wandoo B's Shaft 2. These figures represent the largest spatial extent predicted, derived by merging all three hundred spill simulations based on the defined thresholds (see Section 11.1.2) for each oil phase.

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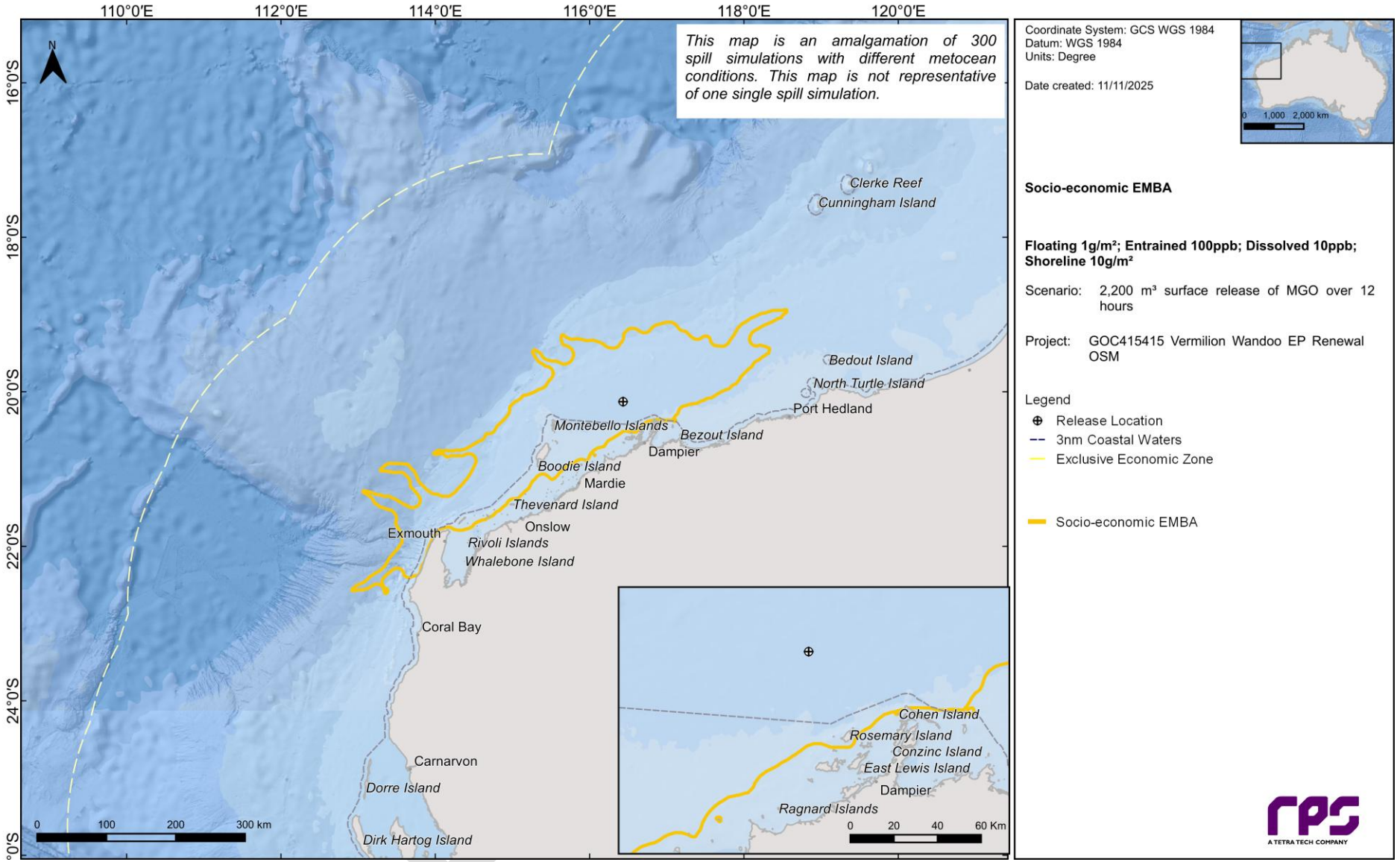


Figure 13.1 Socio-economic EMBA following a surface release of MGO from Wandoo B's Shaft 2. The EMBA was determined by merging the results of all 300 simulations.

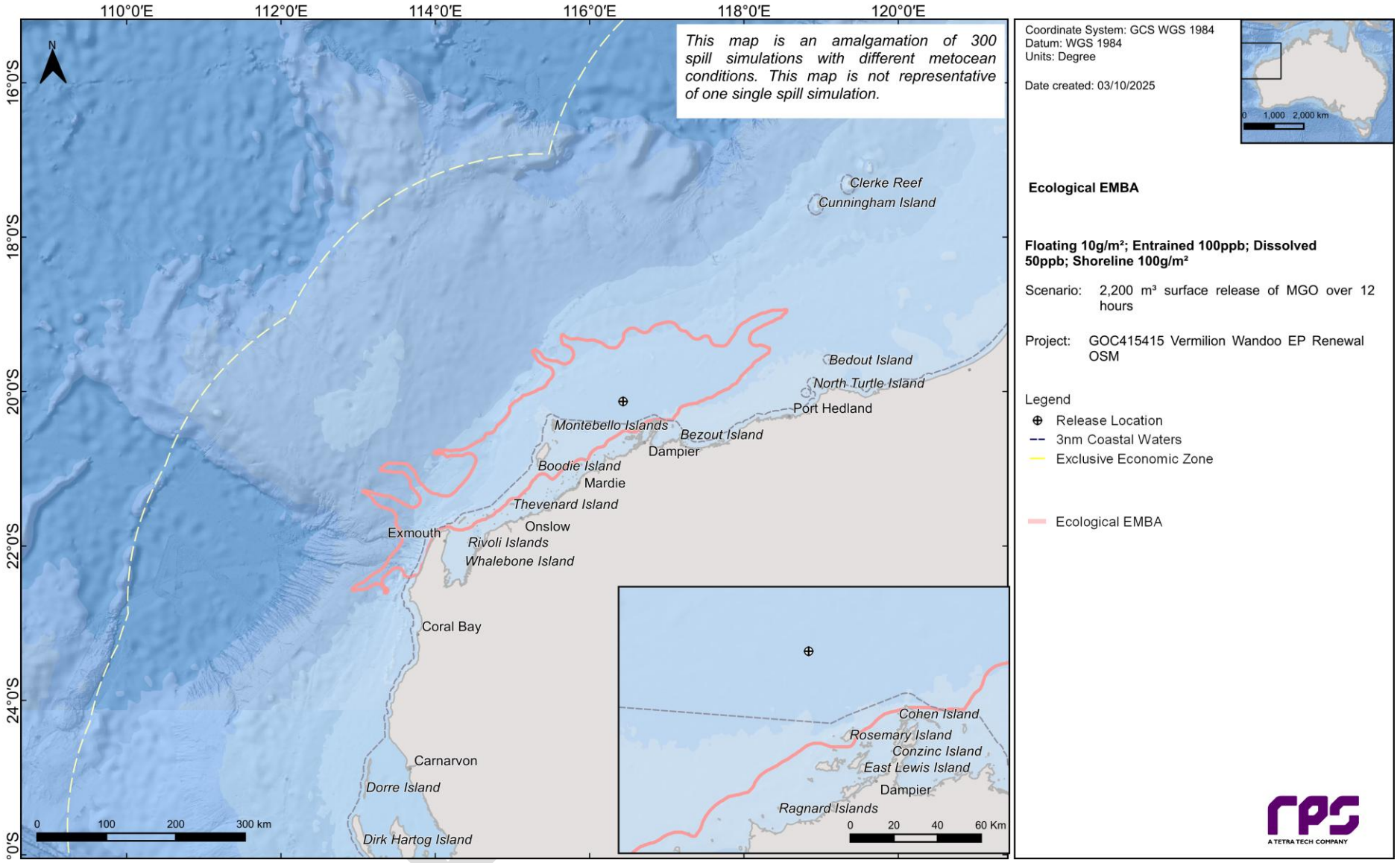


Figure 13.2 Ecological EMBA following a surface release of MGO from Wandoo B's Shaft 2. The EMBA was determined by merging the results of all 300 simulations.

13.1.2 Scientific Monitoring Planning Area

Figure 13.3 illustrates the SMPA following a surface release of MGO from Wandoo B's Shaft 2. These figure represent the largest spatial extent predicted, derived by merging all three hundred spill simulations based on the defined thresholds (see Section 11.1.2) for each oil phase.

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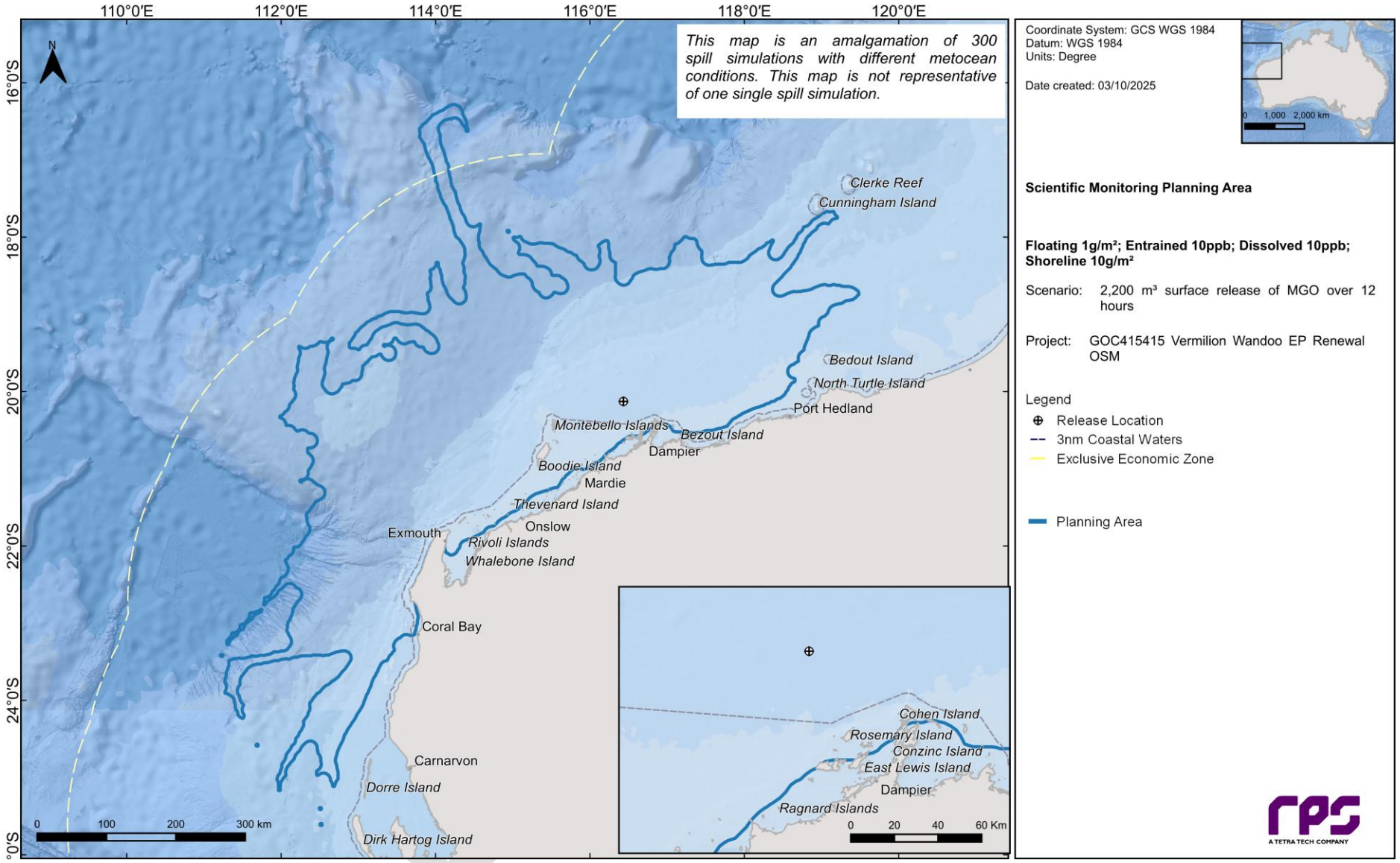


Figure 13.3 Scientific monitoring planning area following a surface release of MGO from Wandoo B's Shaft 2. The SMPA was determined by merging the results of all 300 simulations.

13.1.3 Floating Oil Exposure

Table 13-1 summarises the maximum distances from the release location to floating oil exposure thresholds for each season. Concentrations exceeding 1 g/m^2 could extend up to 166 km from the release location. The maximum distances reduced to 33 km and 24 km as the threshold increases to 10 g/m^2 and 50 g/m^2, respectively.

Table 13-3 presents the receptors predicted to be exposed by floating oil for each season. Montebello AMP was the only receptor to be exposed at, or above, 1 g/m^2 during the summer and winter conditions at 1%. The fastest time to exposure was 2 day 3 hours, for the spill commencing during winter conditions.

Figure 13.4 to Figure 13.6 illustrate the extent floating oil exposure zones for each season. Figure 13.7 to Figure 13.24 depict the seasonal minimum times before exposure and probability of exposure for each threshold and season.

Table 13-1 Maximum distances from the release location to floating oil exposure thresholds following a surface release of MGO from Wandoo B's Shaft 2. Results were calculated from 100 spill simulations per season.

Season	Distance and direction travelled	Floating oil exposure thresholds		
		1 g/m^2	10 g/m^2	50 g/m^2
Summer	Maximum distance (km) from release location	50	29	17
	Direction	West	West	Northeast
Transitional	Maximum distance (km) from release location	42	33	20
	Direction	West	West	East
Winter	Maximum distance (km) from release location	166	30	24
	Direction	Southwest	South	South

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Table 13-2 Receptors predicted to be exposed by floating oil following a surface release of MGO from Wandoo B's Shaft 2. Results were calculated from100 spill simulations per season.

Category	Name	Summer						Transitional						Winter					
		Probability (%) of floating oil at			Minimum times before floating oil exposure			Probability (%) of floating oil at			Minimum times before floating oil exposure			Probability (%) of floating oil at			Minimum times before floating oil exposure		
		≥ 1 g/m^2	≥ 10 g/m^2	≥ 50 g/m^2	≥ 1 g/m^2	≥ 10 g/m^2	≥ 50 g/m^2	≥ 1 g/m^2	≥ 10 g/m^2	≥ 50 g/m^2	≥ 1 g/m^2	≥ 10 g/m^2	≥ 50 g/m^2	≥ 1 g/m^2	≥ 10 g/m^2	≥ 50 g/m^2	≥ 1 g/m^2	≥ 10 g/m^2	≥ 50 g/m^2
AMP	Montebello	1	NC	NC	3 d, 9 hrs	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	2 d, 3 hrs	NC	NC
State and Territory Waters	Western Australia	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	1 d, 18 hrs	NC	NC

NC: No contact to receptor predicted for specified threshold.

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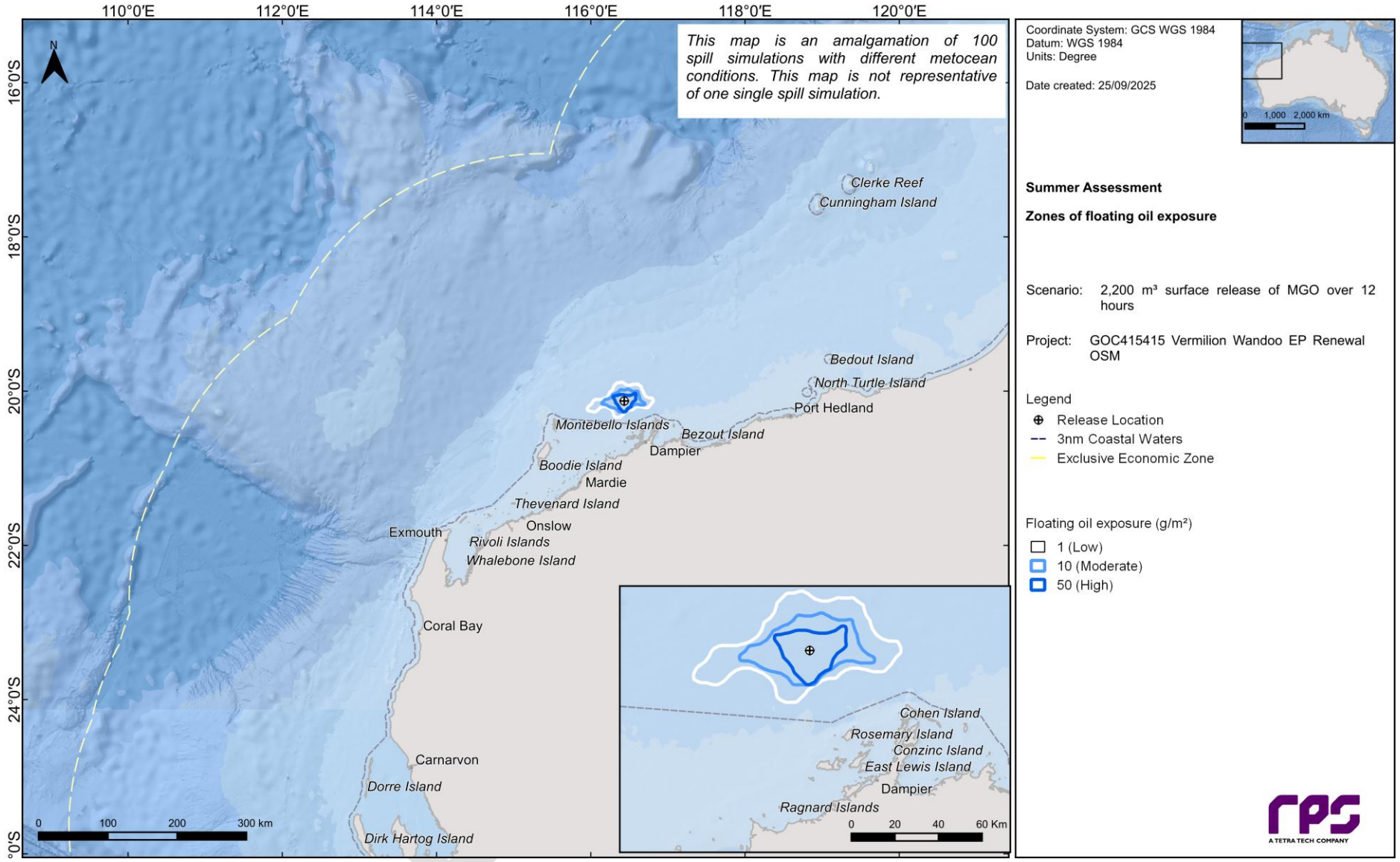


Figure 13.4 Predicted zones of floating oil exposure following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

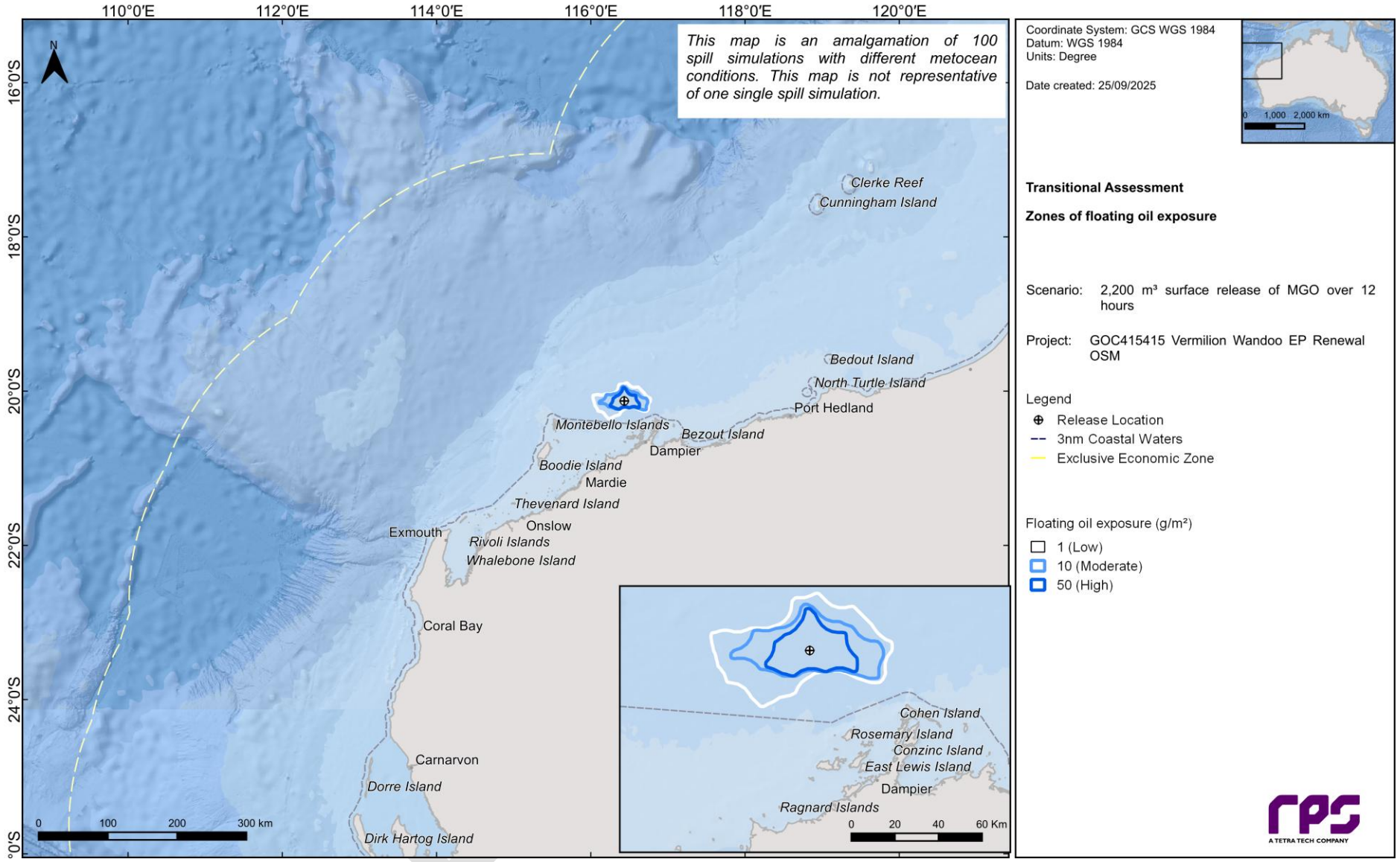


Figure 13.5 Predicted zones of floating oil exposure following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

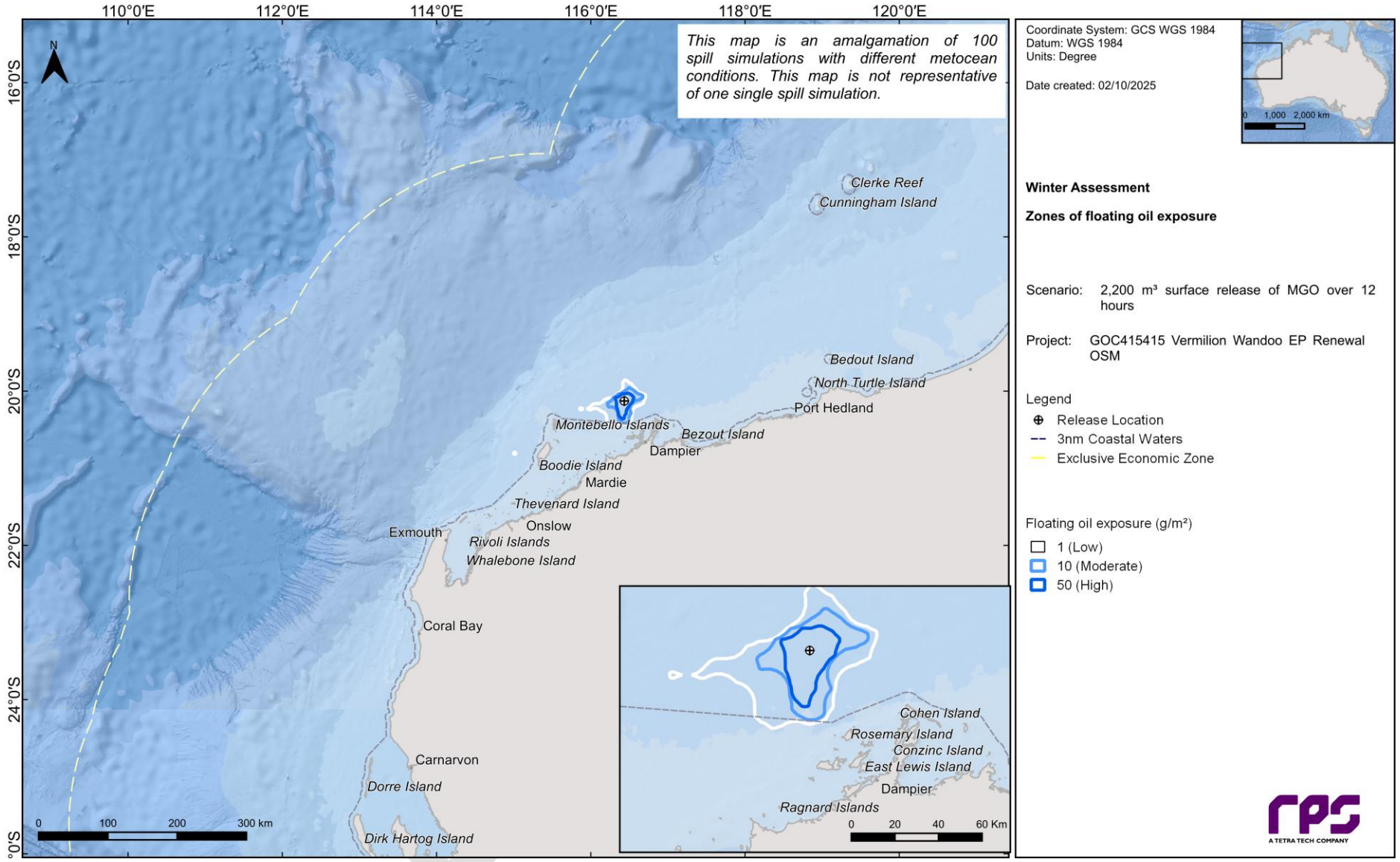


Figure 13.6 Predicted zones of floating oil exposure following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

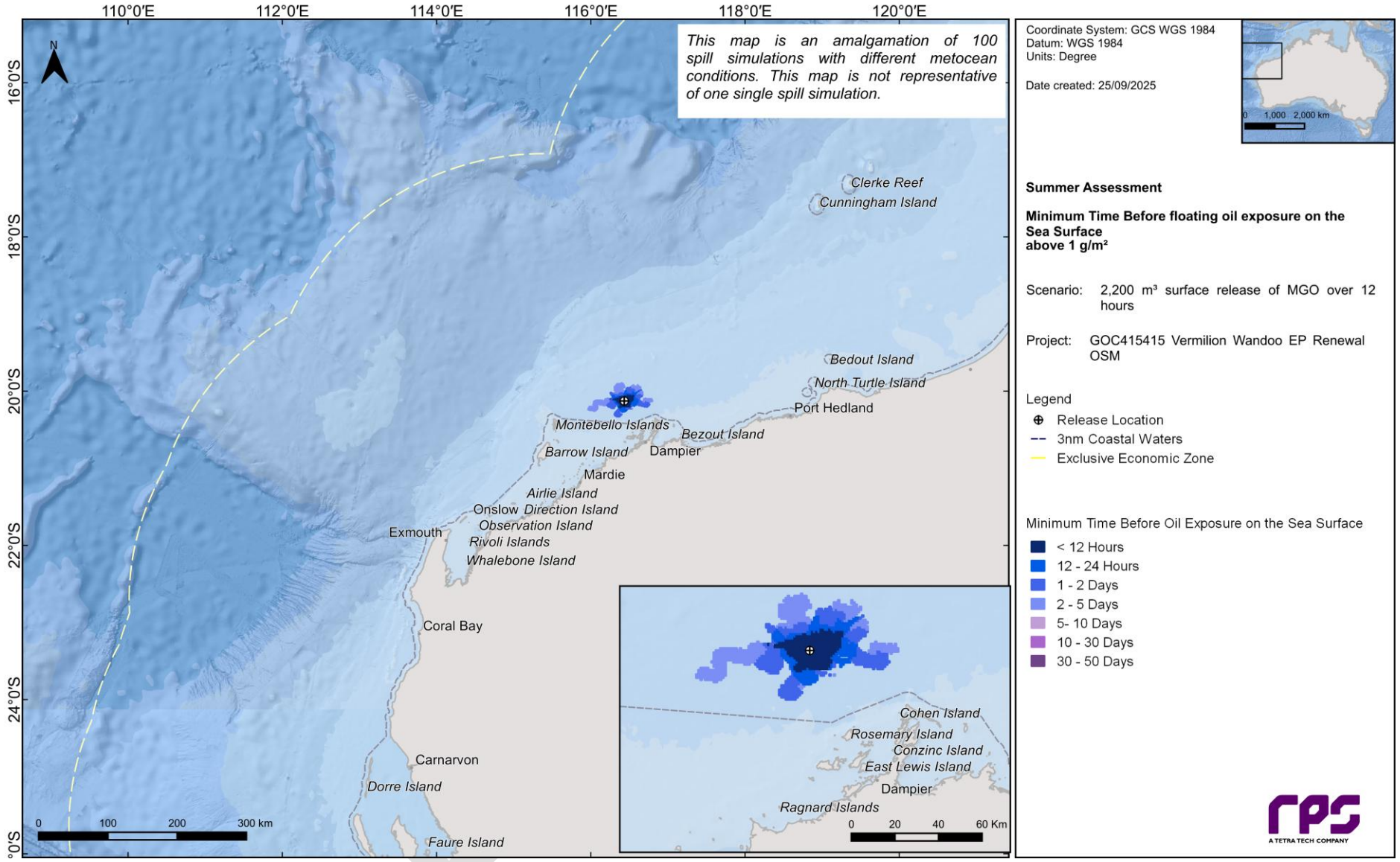


Figure 13.7 Minimum time before floating oil exposure at, or above, 1 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

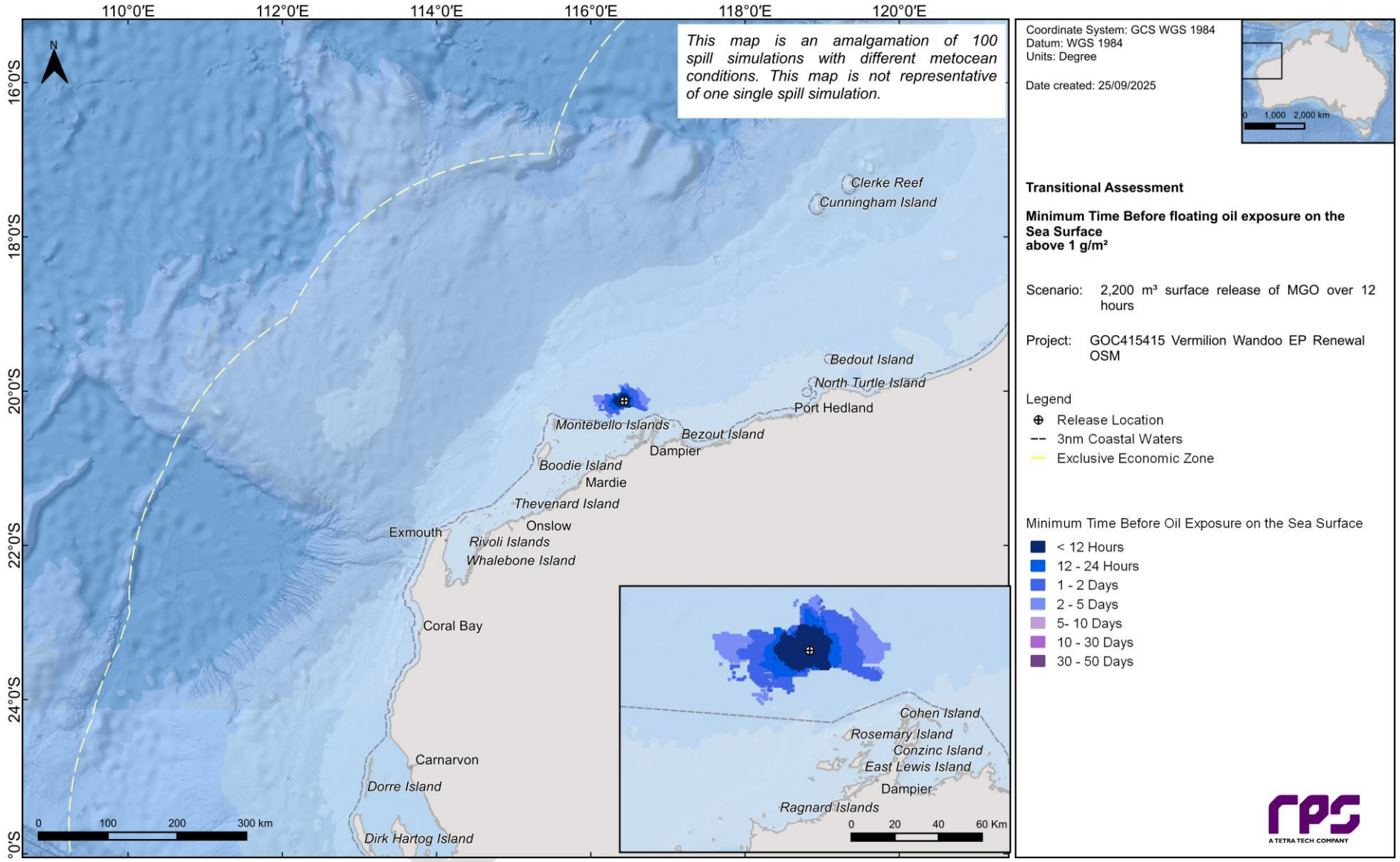


Figure 13.8 Minimum time before floating oil exposure at, or above, 1 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

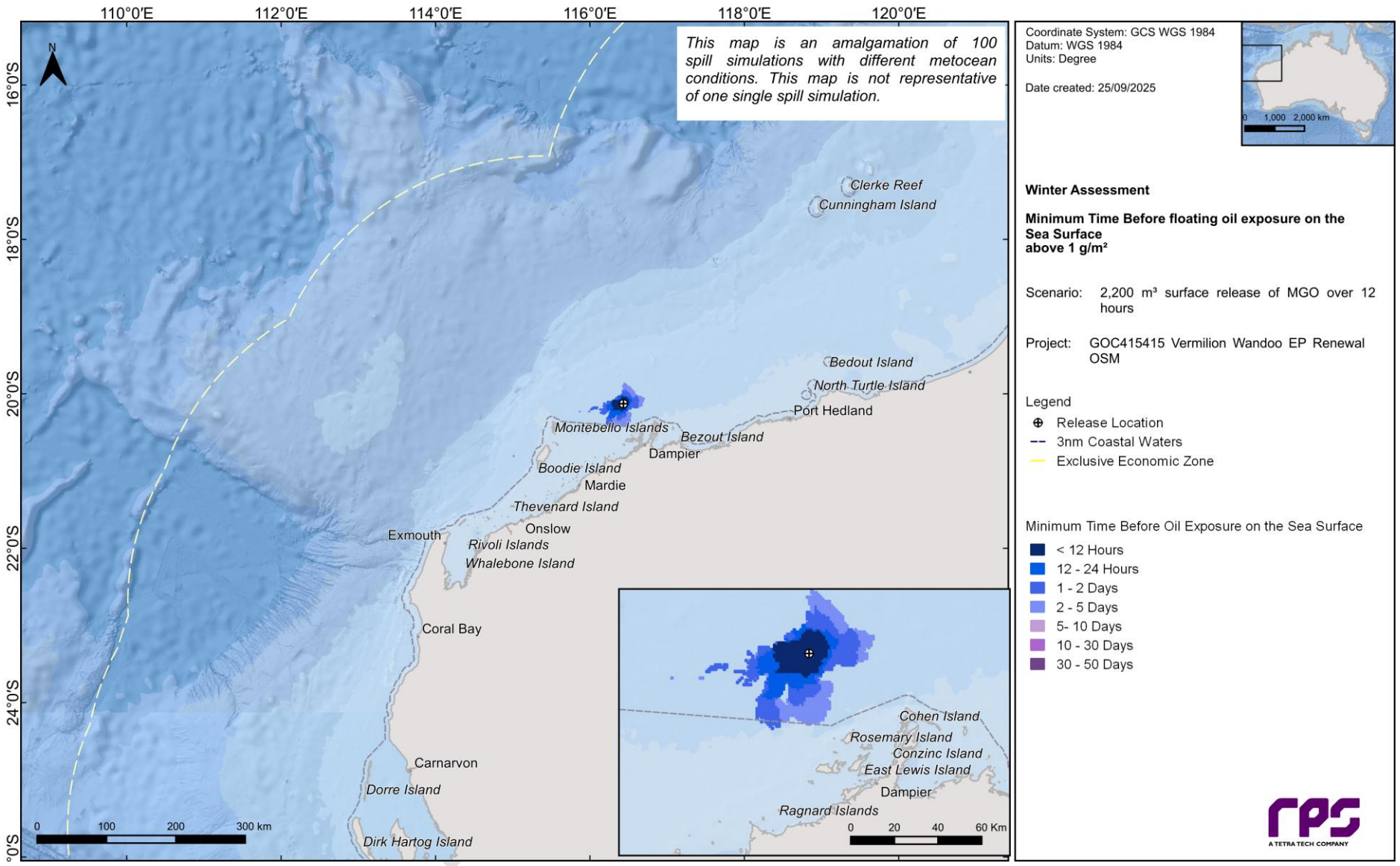


Figure 13.9 Minimum time before floating oil exposure at, or above, 1 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

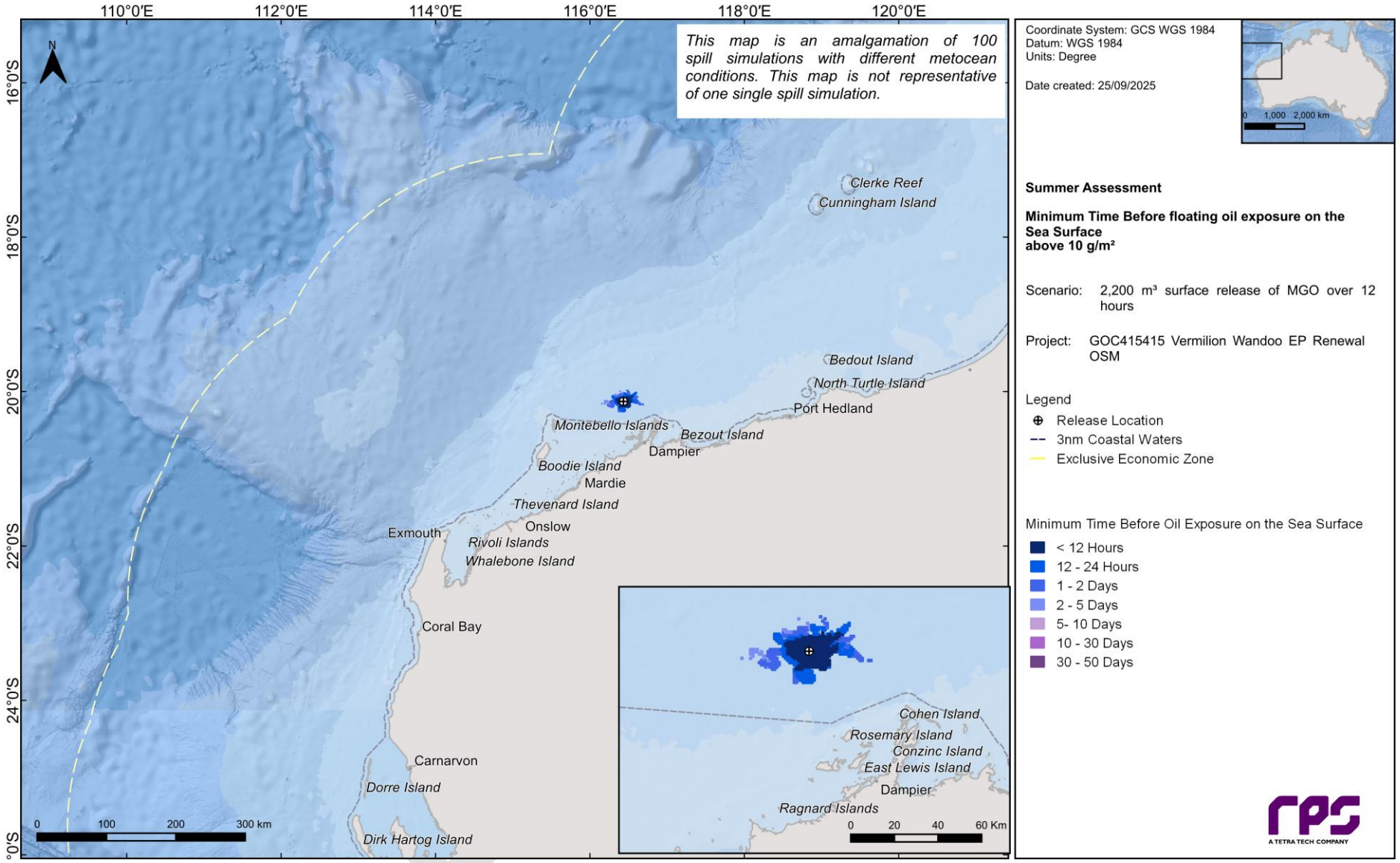


Figure 13.10 Minimum time before floating oil exposure at, or above, 10 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

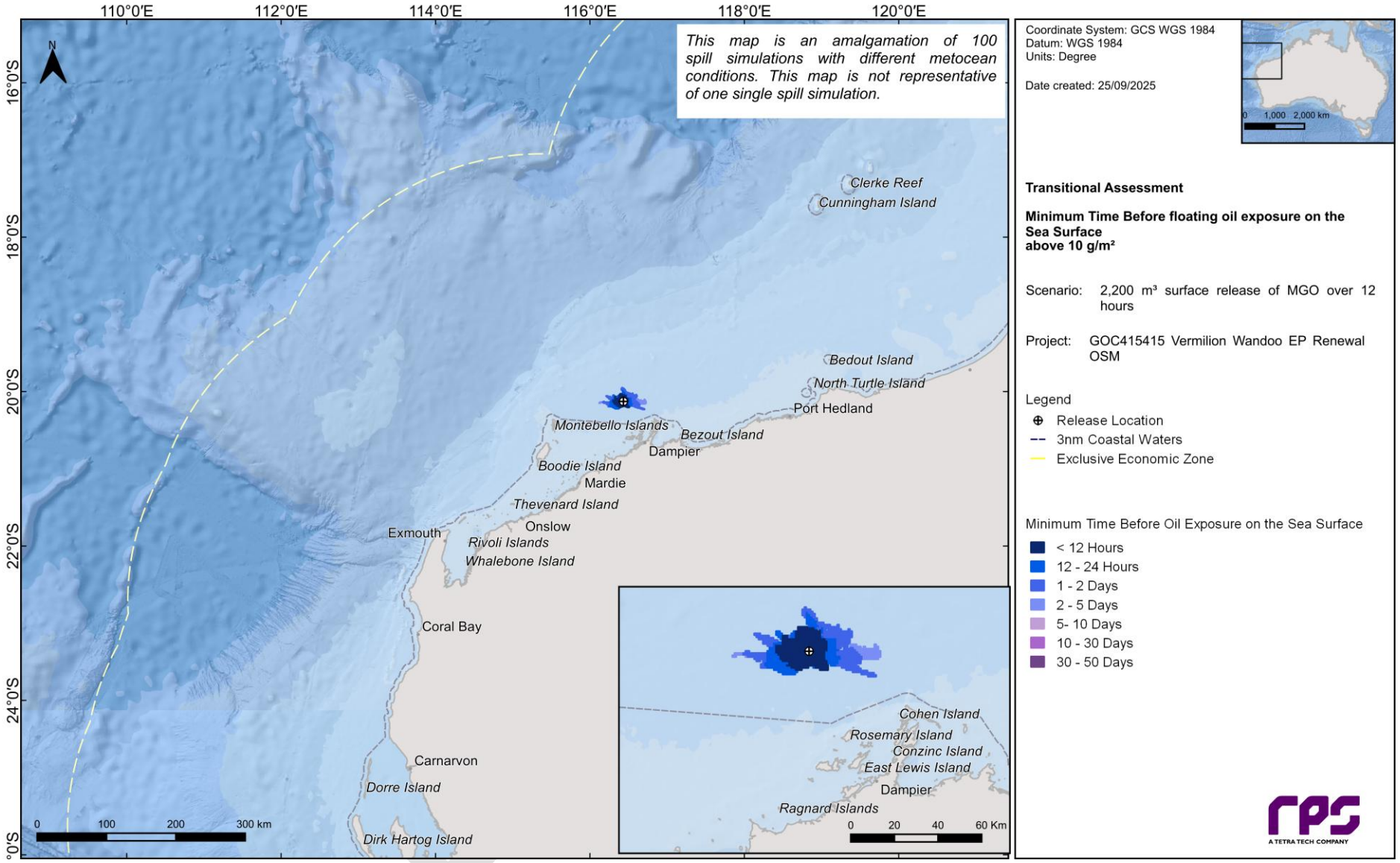


Figure 13.11 Minimum time before floating oil exposure at, or above, 10 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

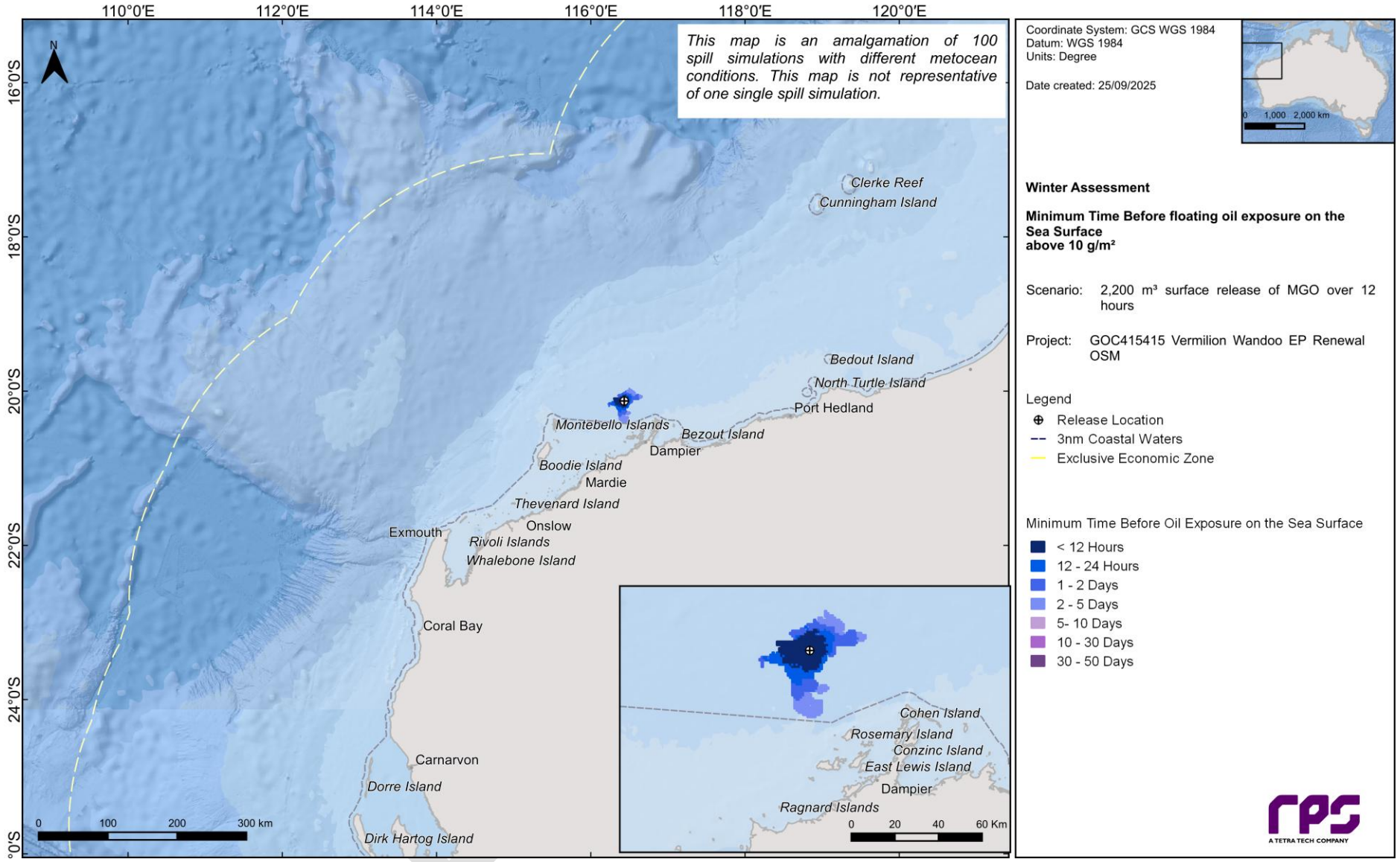


Figure 13.12 Minimum time before floating oil exposure at, or above, 10 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

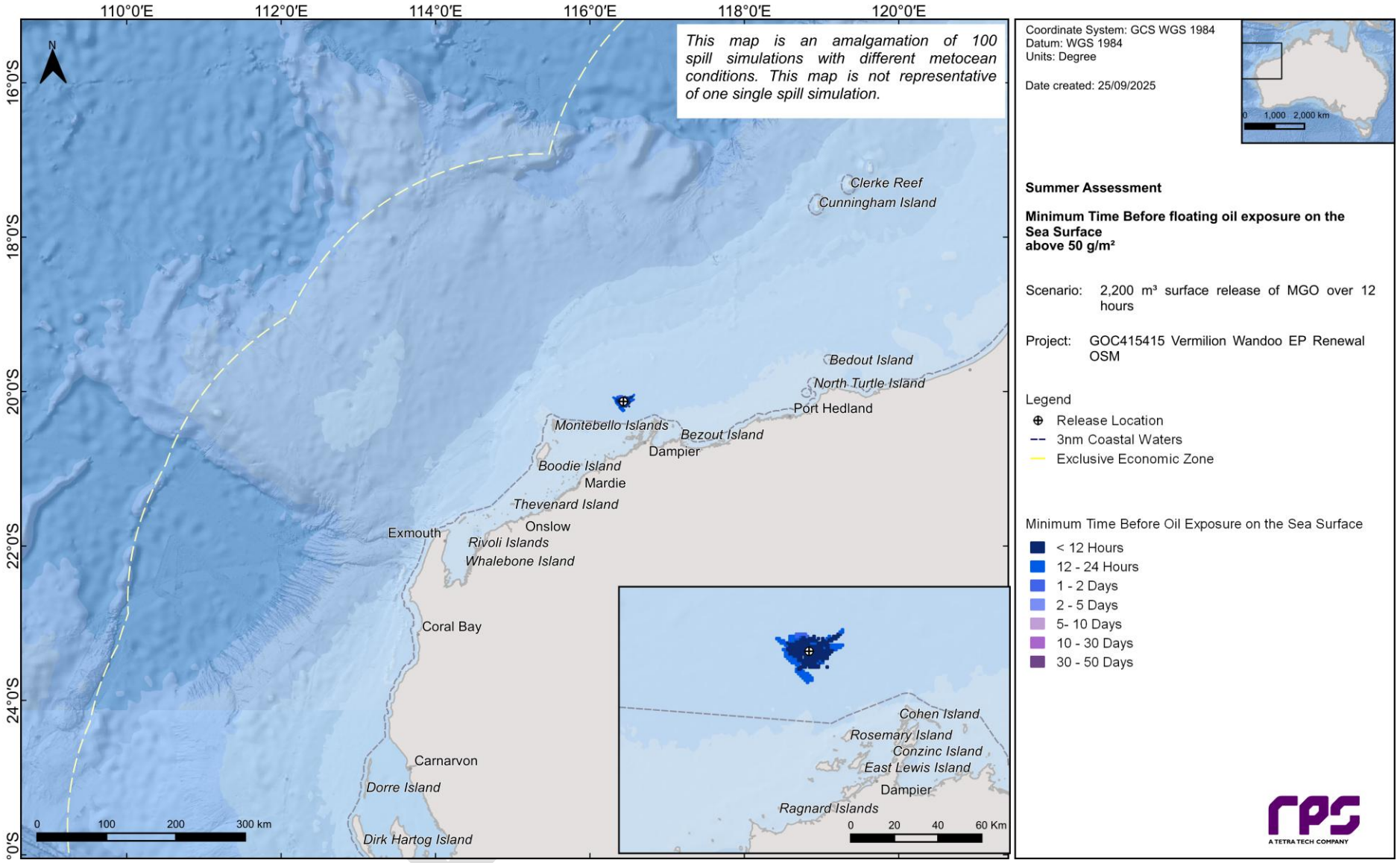


Figure 13.13 Minimum time before floating oil exposure at, or above, 50 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

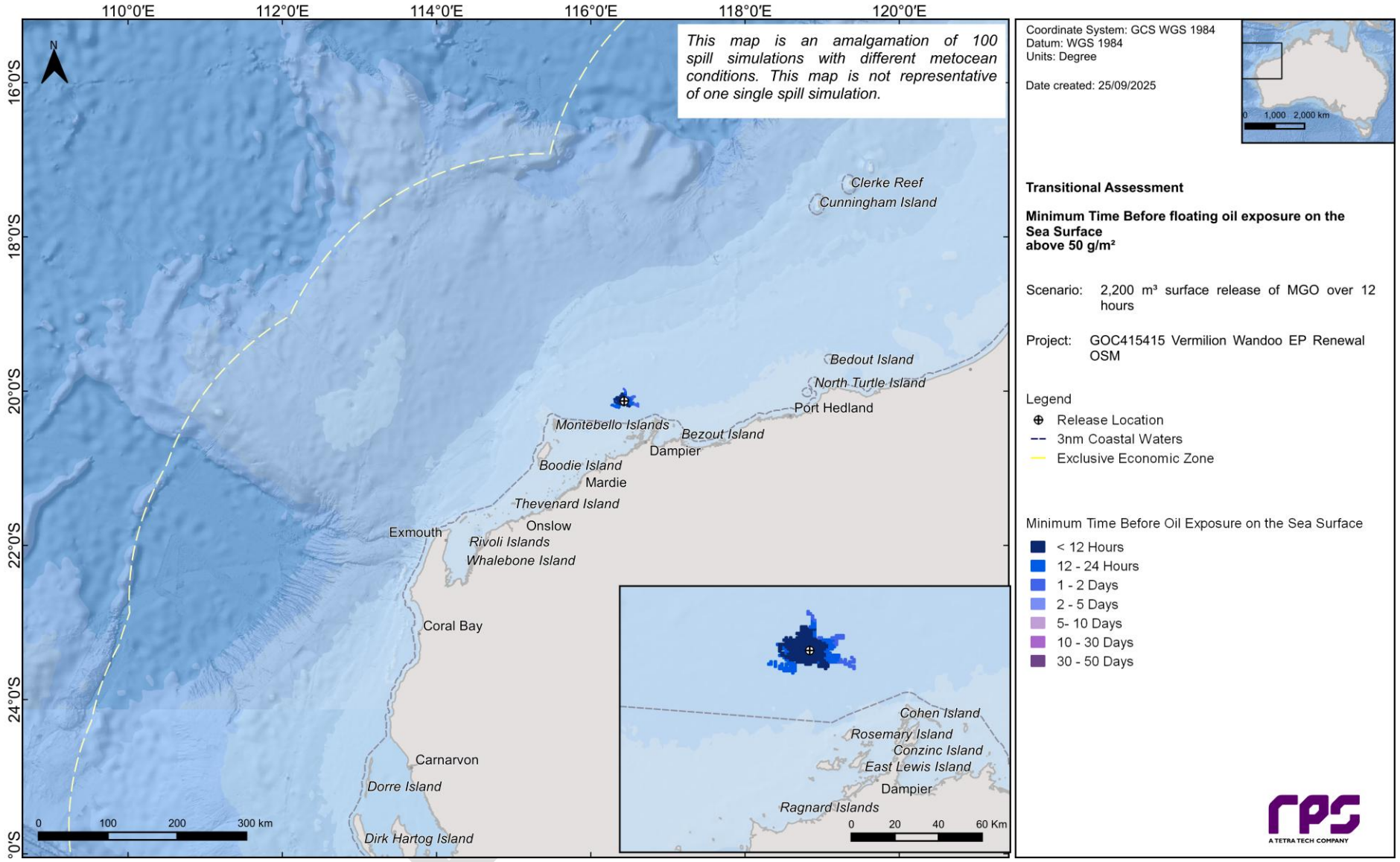


Figure 13.14 Minimum time before floating oil exposure at, or above, 50 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

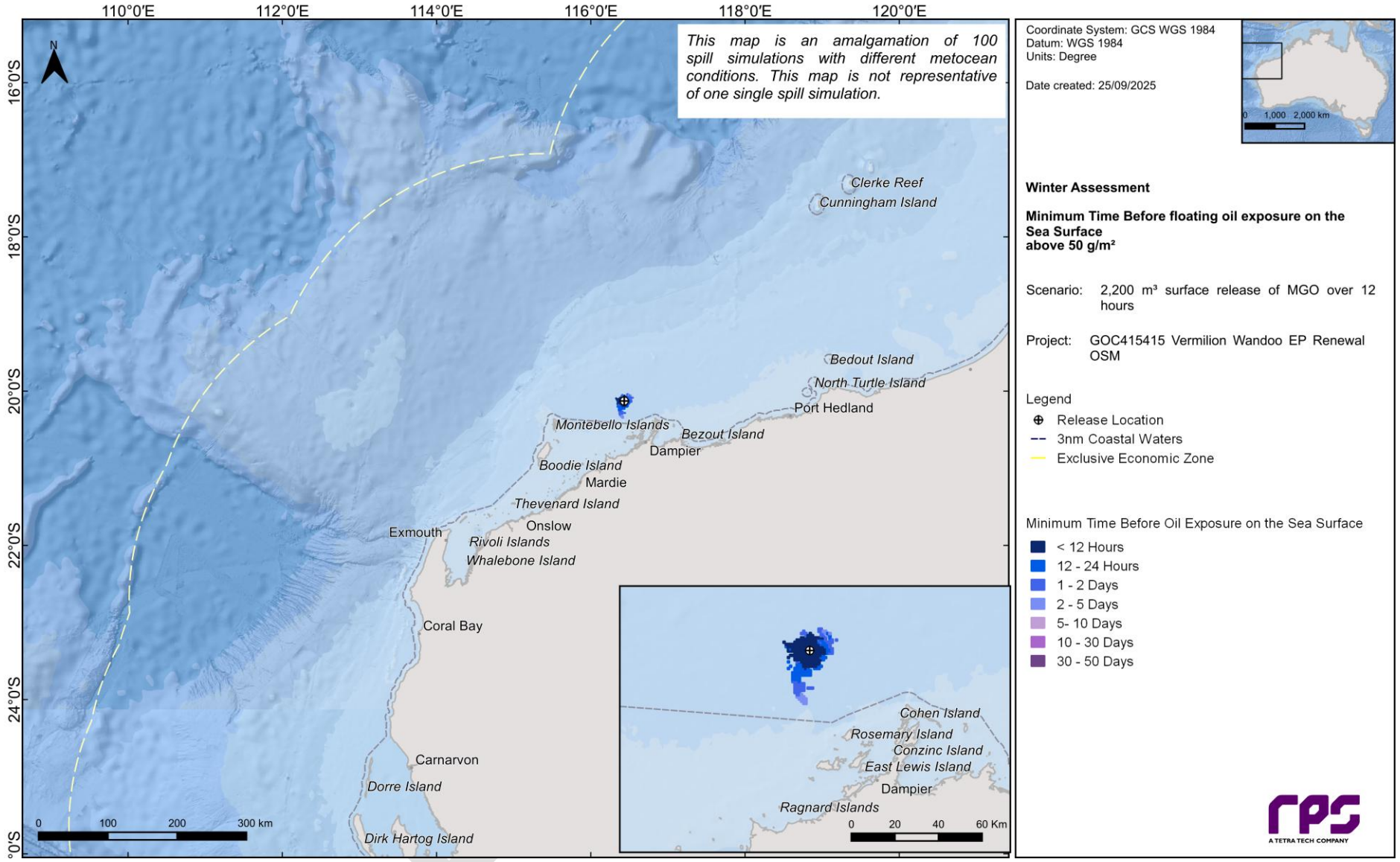


Figure 13.15 Minimum time before floating oil exposure at, or above, 50 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

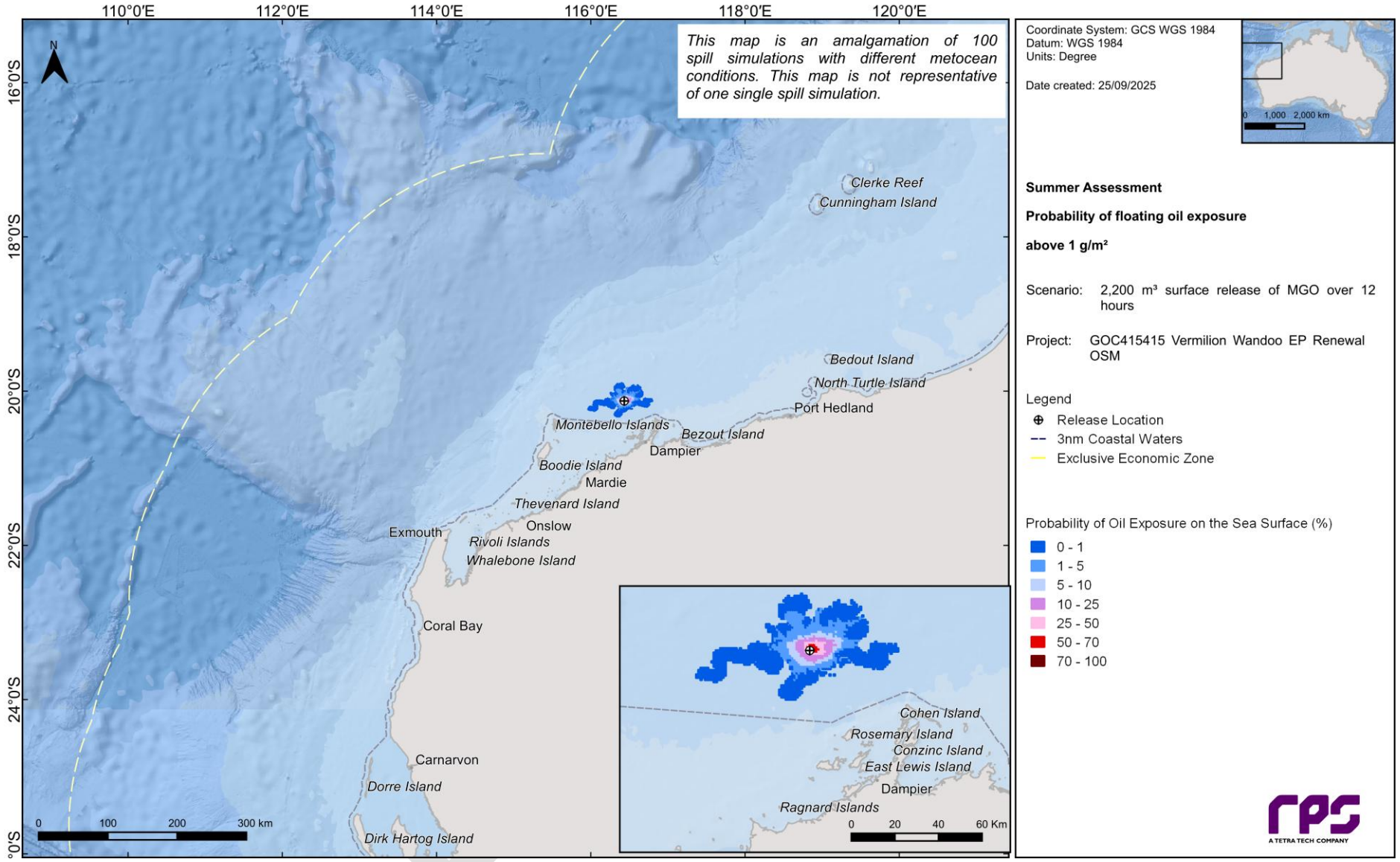


Figure 13.16 Probability of floating oil exposure at, or above, 1 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

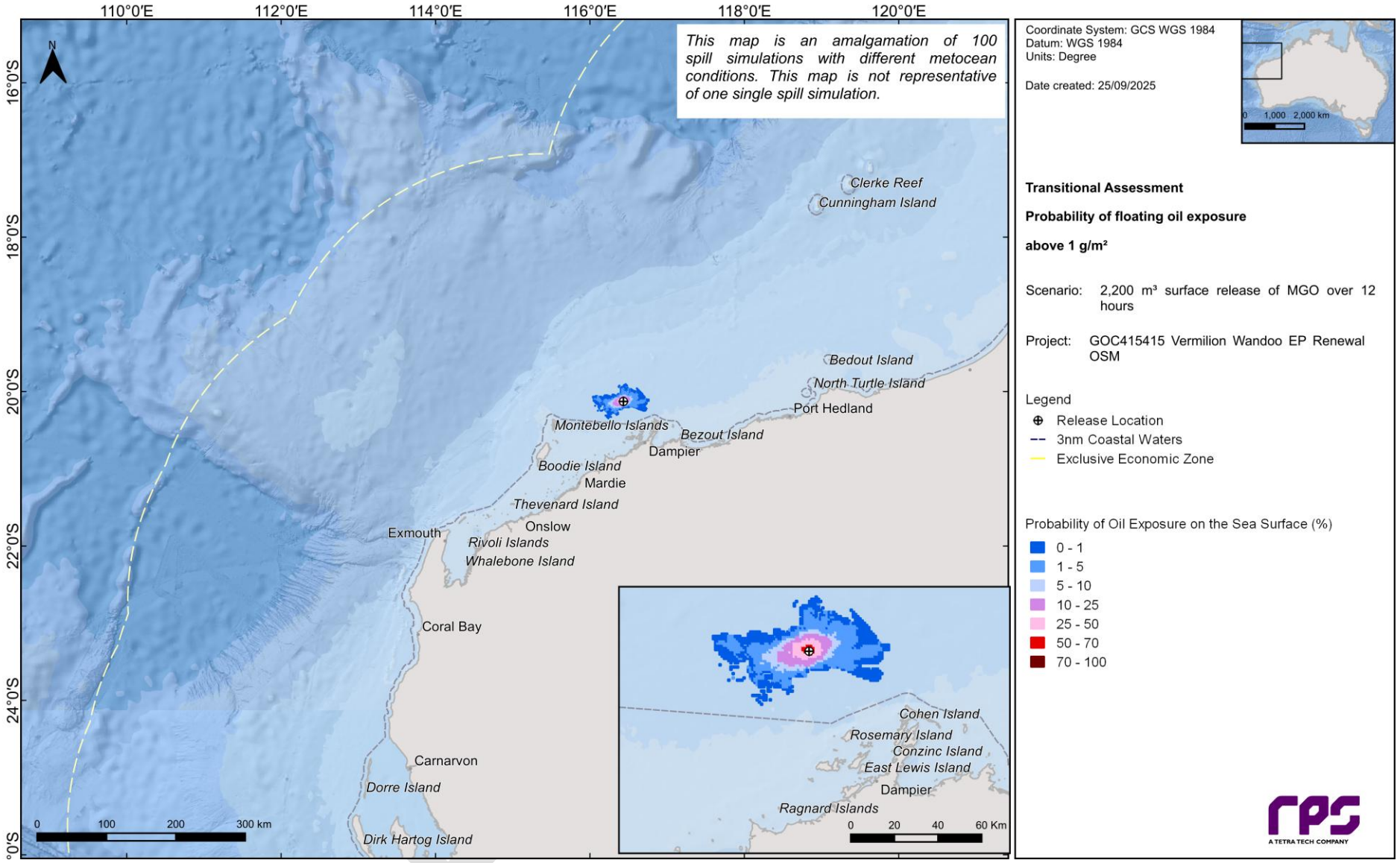


Figure 13.17 Probability of floating oil exposure at, or above, 1 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

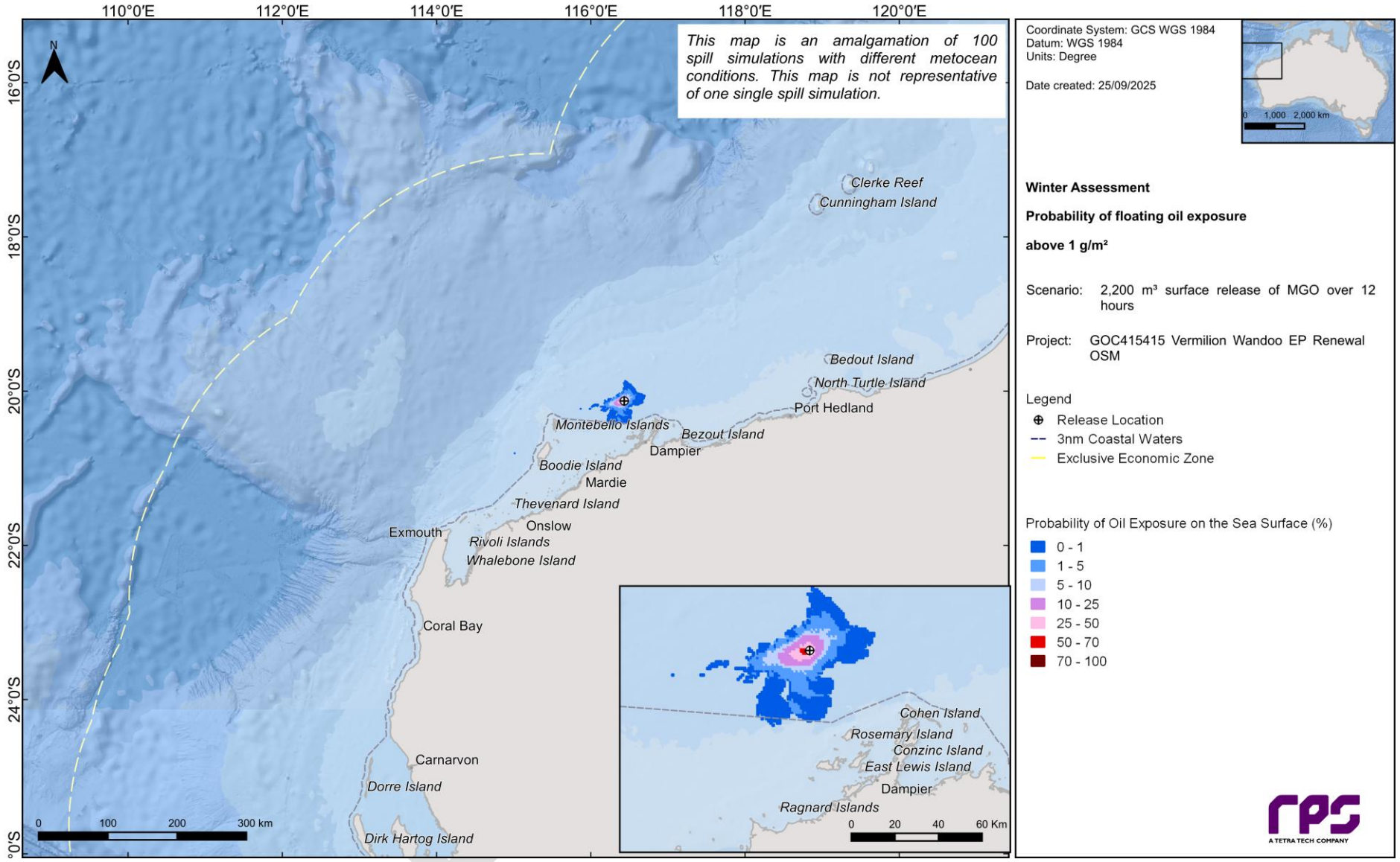


Figure 13.18 Probability of floating oil exposure at, or above, 1 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

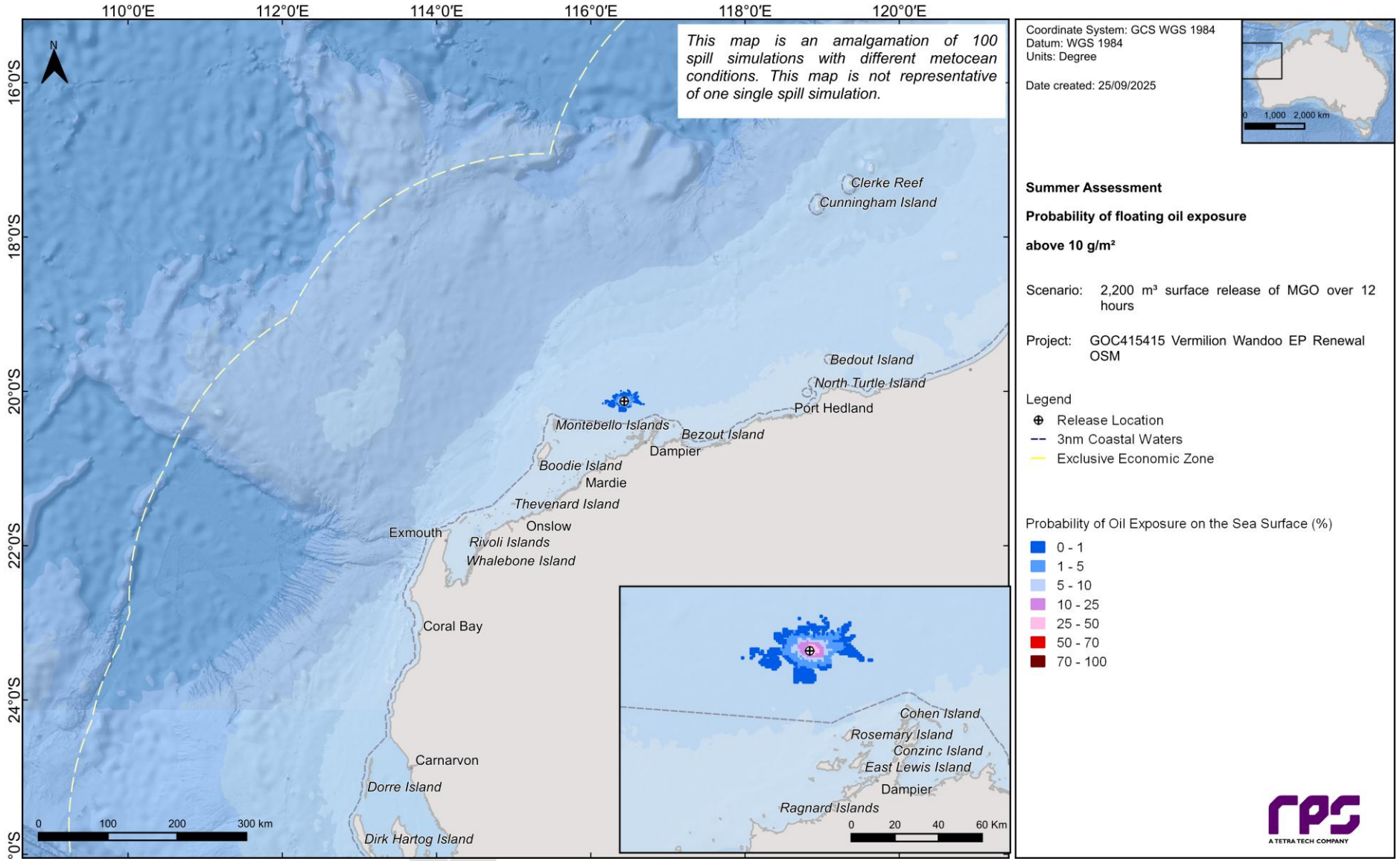


Figure 13.19 Probability of floating oil exposure at, or above, 10 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

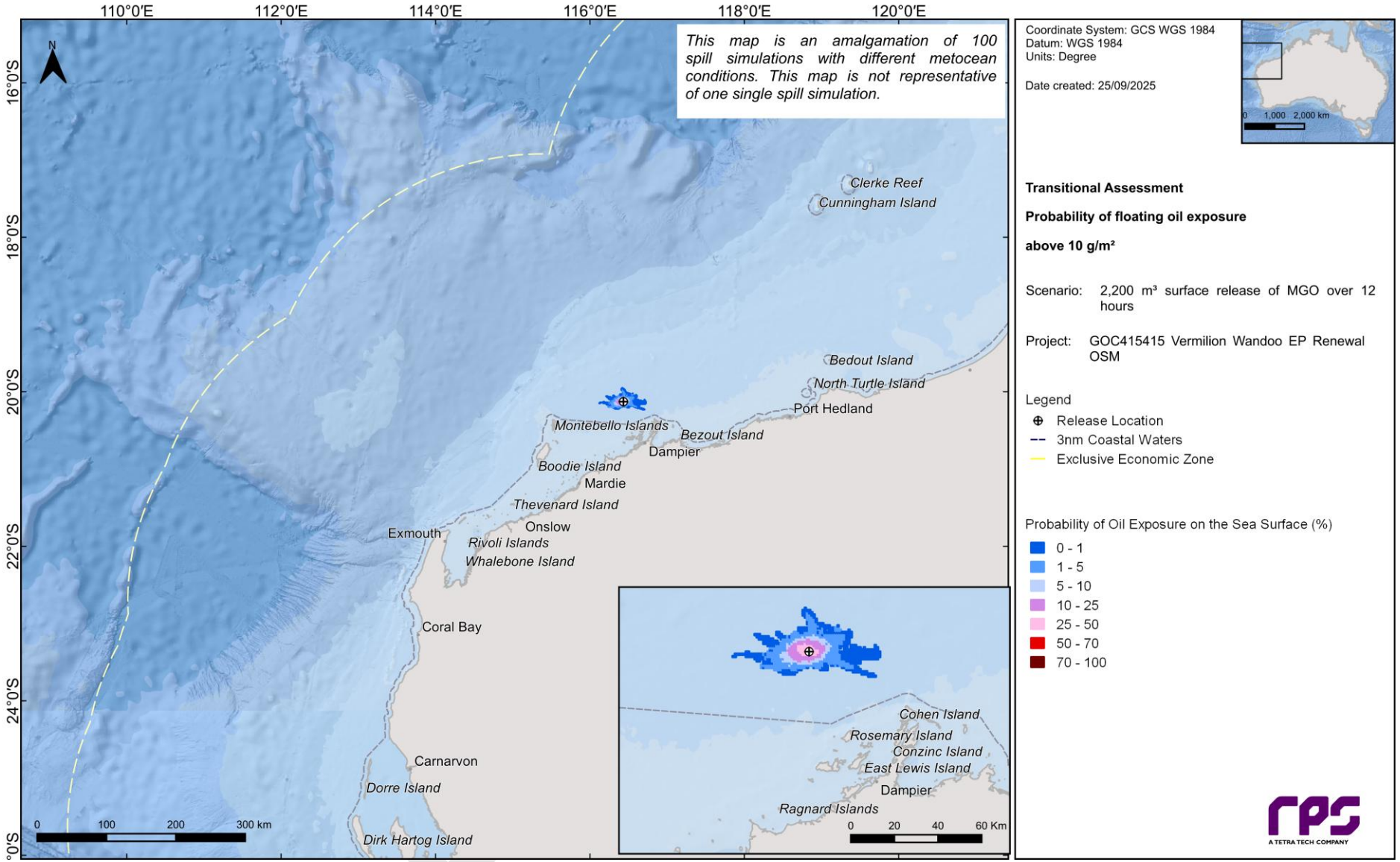


Figure 13.20 Probability of floating oil exposure at, or above, 10 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

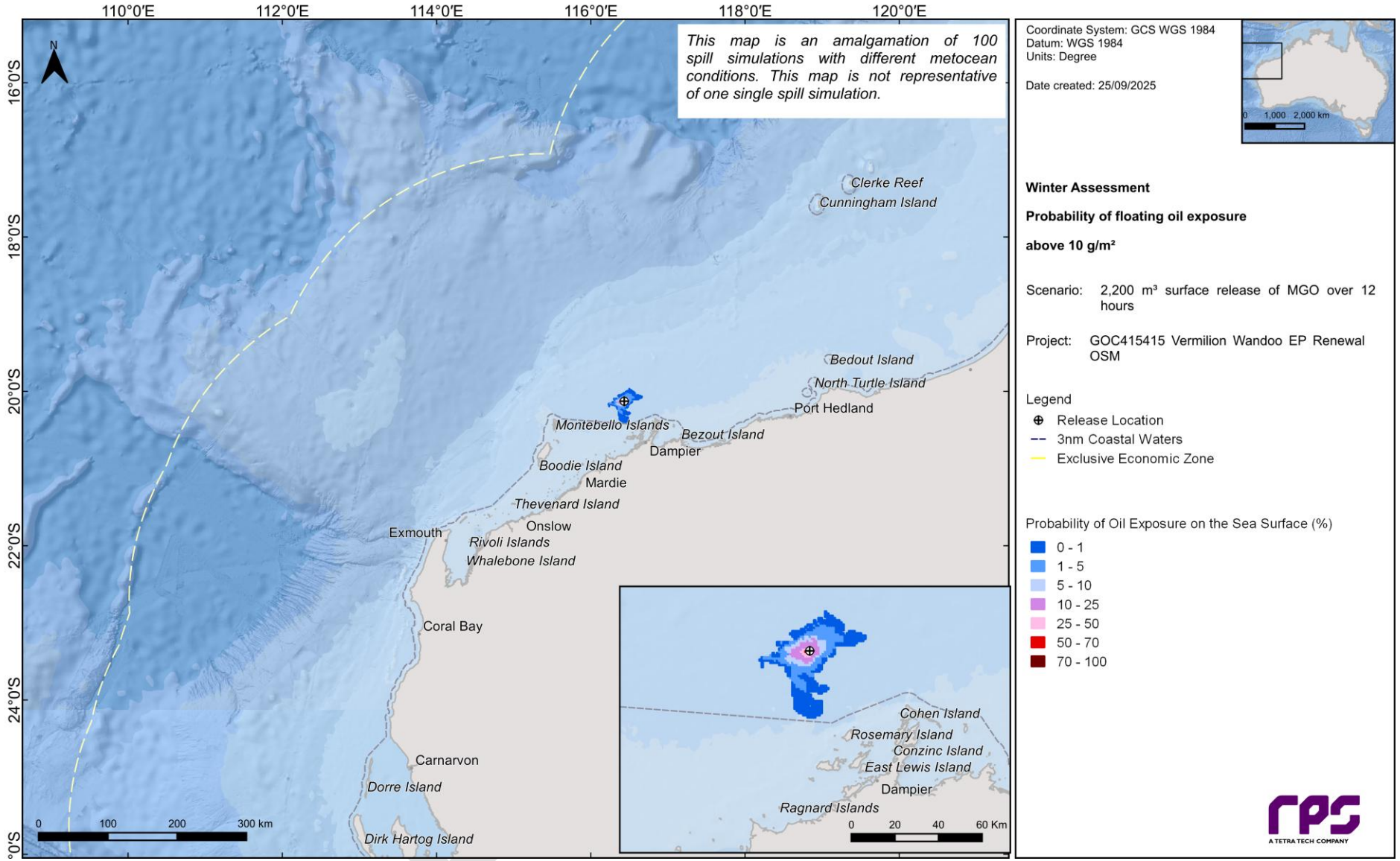


Figure 13.21 Probability of floating oil exposure at, or above, 10 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

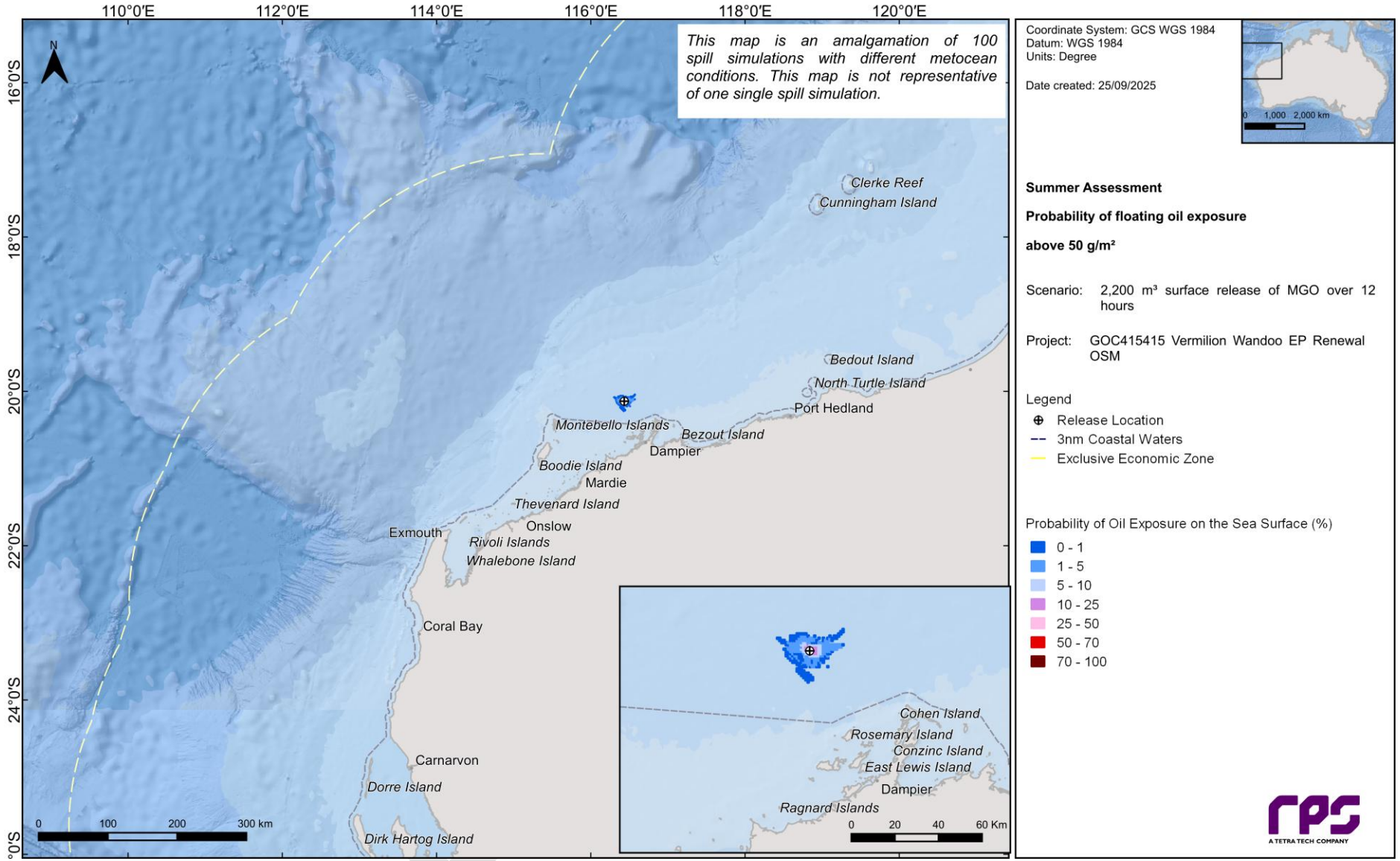


Figure 13.22 Probability of floating oil exposure at, or above, 50 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

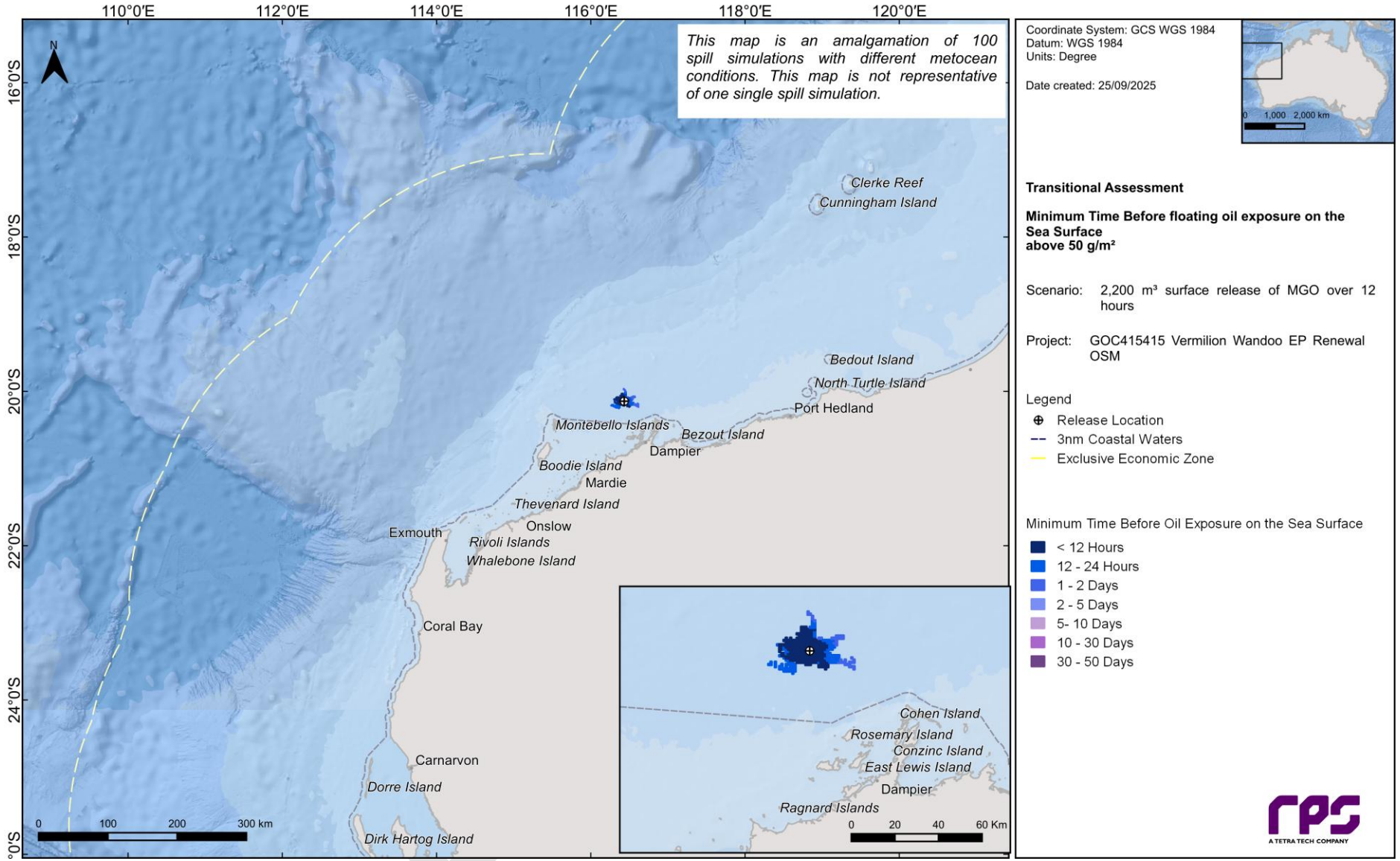


Figure 13.23 Probability of floating oil exposure at, or above, 50 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

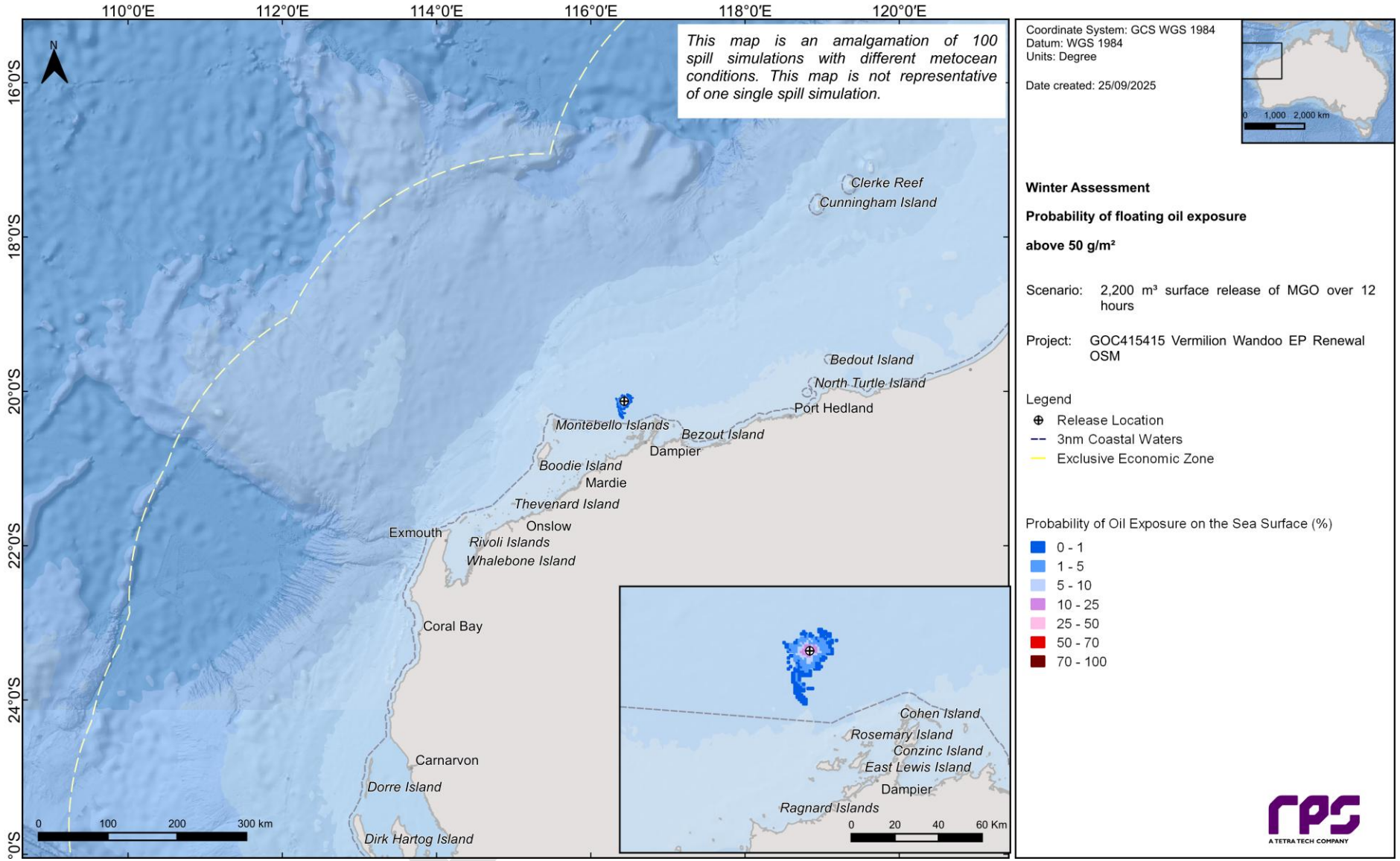


Figure 13.24 Probability of floating oil exposure at, or above, 50 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

13.1.4 Shoreline accumulation

Table 13-3 summarises the predicted oil accumulation on shorelines across different seasons and thresholds. The highest probability of oil accumulation on any shoreline at, or above, the 10 g/m^2 threshold was recorded during winter, reaching 34%. The shortest time for oil to reach any shoreline at this threshold was 3 days 22 hours, also during winter. The maximum volume of oil ashore from a single spill was 15.0 m^3 occurring during winter.

Table 13-4 to Table 13-6 presents the predicted oil accumulation for WAMOPRA shoreline cells for each season.

The highest overall probability of oil accumulation at or above the 10 g/m² threshold was forecast for WA11.West (318) – Barrow Island and Montebello Islands (A), with a 21% likelihood during winter conditions. During transitional conditions, the highest probability dropped to 5% for the same shoreline cell. In summer, the highest probability was 3% for WA11.East (105) – West Intercourse Island to Dolphin Island North point (C).

WA11.West (318) – Barrow Island and Montebello Islands (A) also recorded the fastest time for oil to accumulate at or above the 10 g/m² threshold on a shoreline cell at 3 days and 22 hours in winter and 5 days and 8 hours during transitional conditions. Under summer conditions, the fastest accumulation time was 10 days and 15 hours at WA11.East (105) – West Intercourse Island to Dolphin Island North point (C).

Furthermore, the maximum volume of oil ashore was forecast for WA11.West (318) – Barrow Island and Montebello Islands (A) with 15 m³ during winter and 5 m³ during transitional conditions. In summer, the highest oil ashore volume was 2 m³, recorded at WA11.East (316) – West Intercourse Island to Dolphin Island North point (F).

The seasonal maximum potential shoreline oil accumulation are presented in Figure 13.25 to Figure 13.27 and probabilities for each of the thresholds and seasons are presented in Figure 13.28 to Figure 13.32.

Table 13-3 Summary of oil accumulation on any shoreline following a surface release of MGO from Wandoo B's Shaft 2. Results were calculated from 100 spill simulations per season.

Shoreline statistics	Summer			Transitional			Winter		
	Shoreline accumulation thresholds			Shoreline accumulation thresholds			Shoreline accumulation thresholds		
	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²
Probability of contact to any shoreline (%)	6	NC	NC	10	1	NC	34	9	NC
Absolute minimum time to shore	10 d, 15 hrs	NC	NC	5 d, 8 hrs	10 d, 7 hrs	NC	3 d, 22 hrs	4 d, 122 hrs	NC
Maximum accumulated volume (m^3) from a single spill simulation	1.6	NC	NC	6.3	2.3	NC	15.0	12.9	NC
Average accumulated volume (m^3) across all spill simulations	<0.1	NC	NC	0.1	<0.1	NC	1.2	0.7	NC
Maximum length of shoreline (km) from a single spill simulation	7.0	NC	NC	17	2	NC	18.0	5.0	NC
Average length of shoreline (km) across all spill simulations	0.2	NC	NC	0.5	<0.1	NC	2.0	0.3	NC

NC: No contact predicted for specified threshold.

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Table 13-4 Summary of shoreline oil accumulation on WAMOPRA shoreline cells following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

WAMOPRA shoreline cells	Maximum probability (%) of oil accumulation at			Minimum time before oil accumulation at			Maximum shoreline oil accumulation (g/m²) in a given grid cell		Maximum volume (m^3) of accumulated oil ashore at ≥ 10 g/m²		Maximum volume (m^3) of accumulated oil ashore at ≥ 100 g/m²		Maximum volume (m^3) of accumulated oil ashore at ≥ 1,000 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 10 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 100 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 1,000 g/m²	
	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all simulations	for the worst simulation	averaged over all simulations	for the worst simulation	averaged over all simulations	for the worst simulation	averaged over all simulations	for the worst simulation	averaged over all simulations	for the worst simulation	averaged over all simulations	for the worst simulation	averaged over all simulations	for the worst simulation
WA11.East (105) - West Intercourse Island - Dolphin Island N point (C)	3	NC	NC	10 d, 15 hrs	NC	NC	0.8	34	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA11.East (316) - West Intercourse Island - Dolphin Island N point (F)	2	NC	NC	13 d, 9 hrs	NC	NC	0.7	43	<1	2	NC	NC	NC	NC	<1	4	NC	NC	NC	NC
WA11.East (317) - West Intercourse Island - Dolphin Island N point (G)	1	NC	NC	12 d, 7 hrs	NC	NC	0.4	25	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA11.West (318) - Barrow Island and Montebello Islands (A)	1	NC	NC	21 d, 17 hrs	NC	NC	0.3	17	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA11.West (326) - Baresand Point - Entrance Point E	1	NC	NC	30 d, 4 hrs	NC	NC	0.2	12	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC

NC: No contact to receptor predicted for specified threshold.

Table 13-5 Summary of shoreline oil accumulation on WAMOPRA shoreline cells following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

WAMOPRA shoreline cells	Maximum probability (%) of oil accumulation at			Minimum time before oil accumulation at			Maximum shoreline oil accumulation (g/m²) in a given grid cell		Maximum volume (m^3) of accumulated oil ashore at ≥ 10 g/m²		Maximum volume (m^3) of accumulated oil ashore at ≥ 100 g/m²		Maximum volume (m^3) of accumulated oil ashore at ≥ 1,000 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 10 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 100 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 1,000 g/m²	
	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all simulations	for the worst simulation	averaged over all simulations	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all simulations	for the worst simulation	averaged over all simulations	≥ 10 g/m²	≥ 100 g/m²
WA10 (124) - Low Point - Vlamingh Head (B)	1	NC	NC	21 d, 1 hrs	NC	NC	0.2	15	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA11.East (105) - West Intercourse Island - Dolphin Island N point (C)	1	NC	NC	23 d, 8 hrs	NC	NC	0.2	11	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA11.East (109) - James Point - Cape Preston	1	NC	NC	19 d, 10 hrs	NC	NC	0.2	16	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA11.West (318) - Barrow Island and Montebello Islands (A)	5	1	NC	5 d, 8 hrs	10 d, 7 hrs	NC	2.3	112	<1	5	<1	2	NC	NC	<1	10	<1	1	NC	NC
WA11.West (319) - Barrow Island and Montebello Islands (B)	1	1	NC	6 d, 13 hrs	10 d, 10 hrs	NC	1.1	105	<1	3	<1	2	NC	NC	<1	7	<1	1	NC	NC
WA11.West (329) - Locker Point - Baresand Point	4	NC	NC	15 d, 2 hrs	NC	NC	1.4	48	<1	2	NC	NC	NC	NC	<1	6	NC	NC	NC	NC

NC: No contact to receptor predicted for specified threshold.

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Table 13-6 Summary of shoreline oil accumulation on WAMOPRA shoreline cells following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

WAMOPRA shoreline cells	Maximum probability (%) of oil accumulation at			Minimum time before oil accumulation at			Maximum shoreline oil accumulation (g/m²) in a given grid cell		Maximum volume (m^3) of accumulated oil ashore at ≥ 10 g/m²		Maximum volume (m^3) of accumulated oil ashore at ≥ 100 g/m²		Maximum volume (m^3) of accumulated oil ashore at ≥ 1,000 g/m²			Maximum length (km) of oil accumulation on shorelines at ≥ 10 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 100 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 1,000 g/m²	
	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all simulations	for the worst simulation	averaged over all simulations	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all simulations	for the worst simulation	averaged over all simulations	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 100 g/m²
WA10 (124) - Low Point - Vlamingh Head (B)	1	NC	NC	15 d, 22 hrs	NC	NC	0.3	11	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC	NC	NC
WA11.West (318) - Barrow Island and Montebello Islands (A)	21	8	NC	3 d, 22 hrs	4 d, 5 hrs	NC	30	564	<1	15	<1	13	NC	NC	2	14	<1	5	NC	NC	NC	NC
WA11.West (319) - Barrow Island and Montebello Islands (B)	4	NC	NC	5 d, 23 hrs	NC	NC	1.8	37	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC	NC	NC
WA11.West (321) - Barrow Island and Montebello Islands (D)	1	NC	NC	8 d, 18 hrs	NC	NC	0.4	20	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC	NC	NC
WA11.West (326) - Baresand Point - Entrance Point E	4	NC	NC	10 d, 13 hrs	NC	NC	2.4	74	<1	5	NC	NC	NC	NC	<1	12	NC	NC	NC	NC	NC	NC
WA11.West (329) - Locker Point - Baresand Point	13	NC	NC	10 d, 8 hrs	NC	NC	4.6	81	<1	4	NC	NC	NC	NC	<1	13	NC	NC	NC	NC	NC	NC

NC: No contact to receptor predicted for specified threshold.

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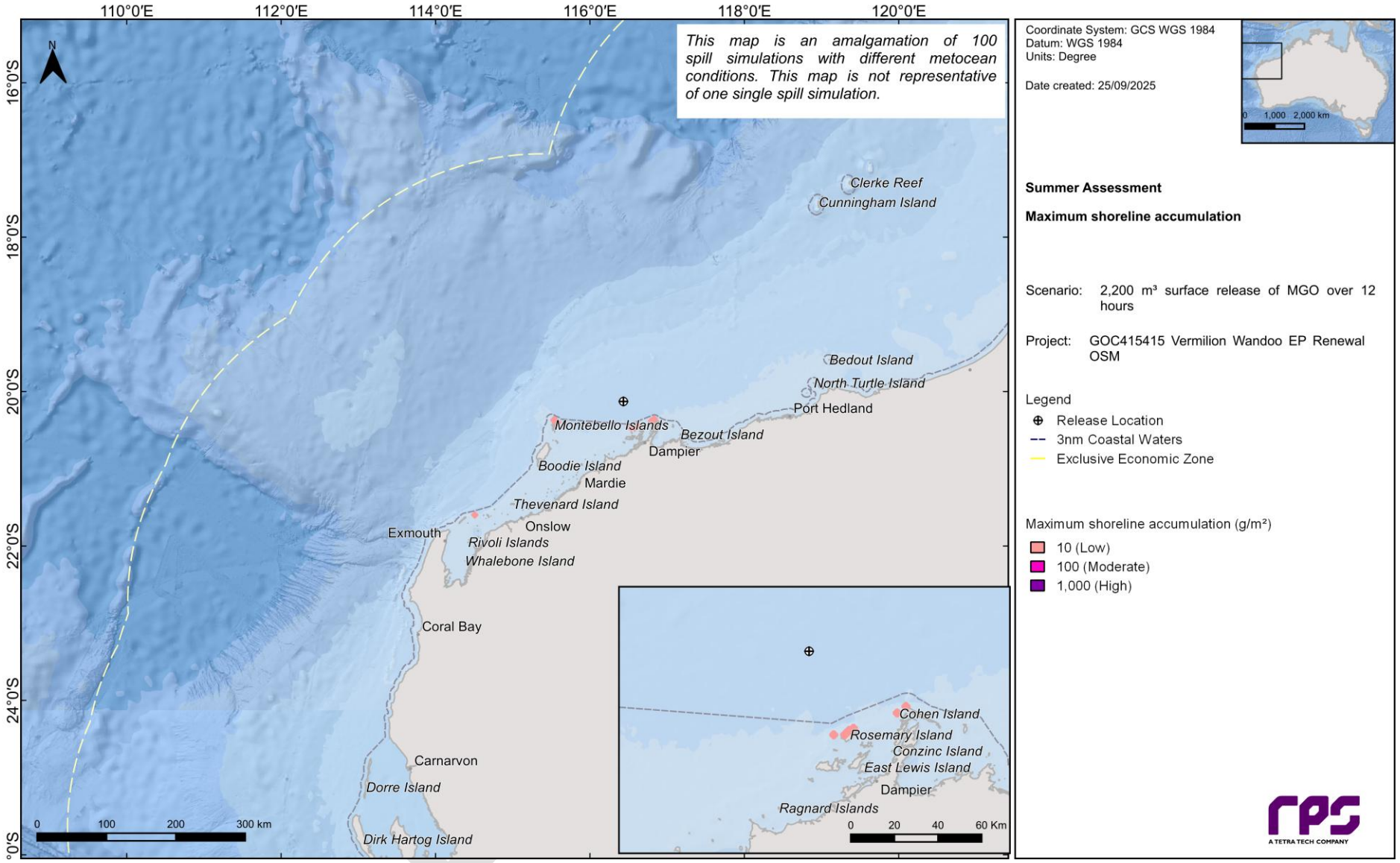


Figure 13.25 Maximum potential shoreline oil accumulation following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

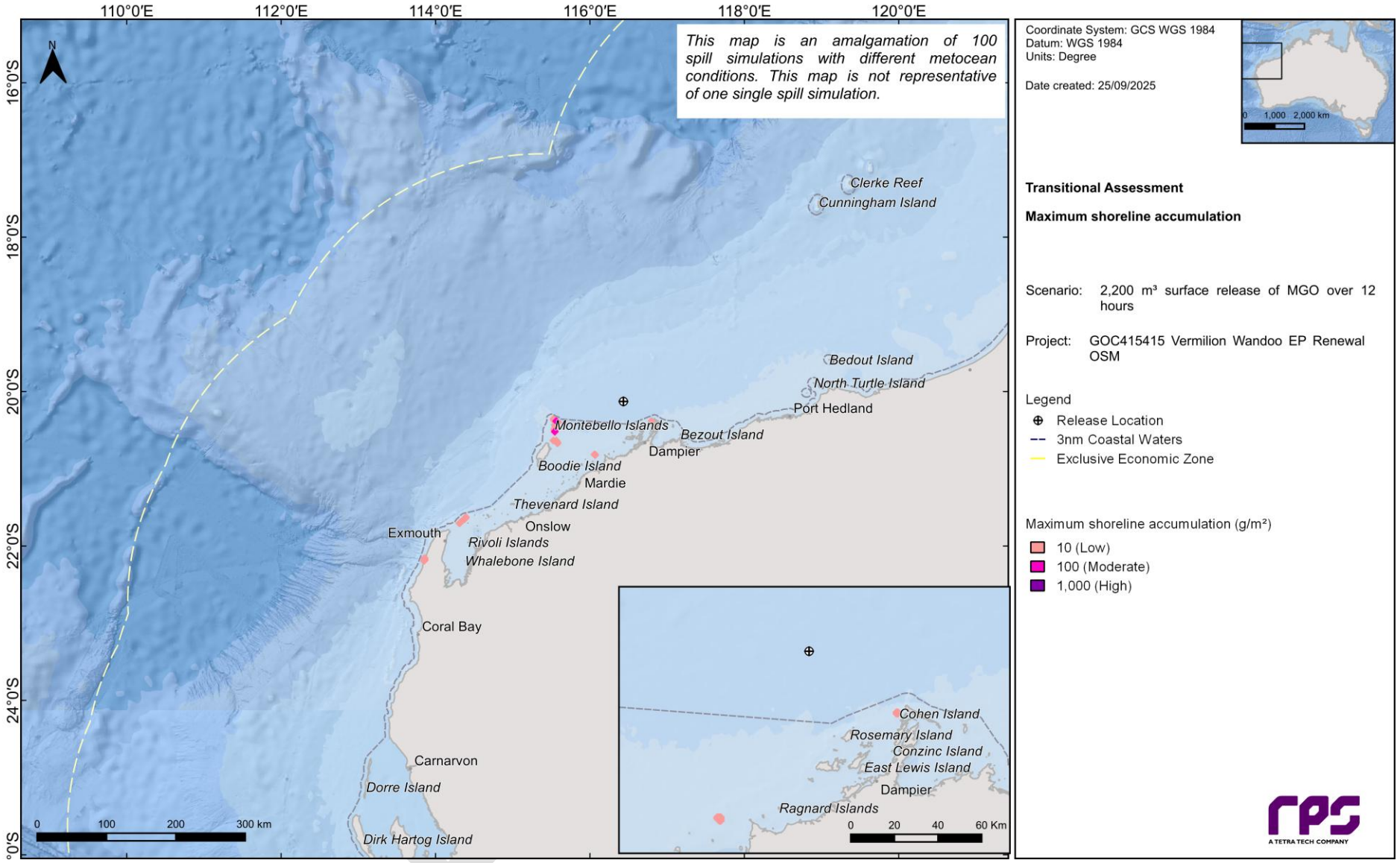


Figure 13.26 Maximum potential shoreline oil accumulation following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

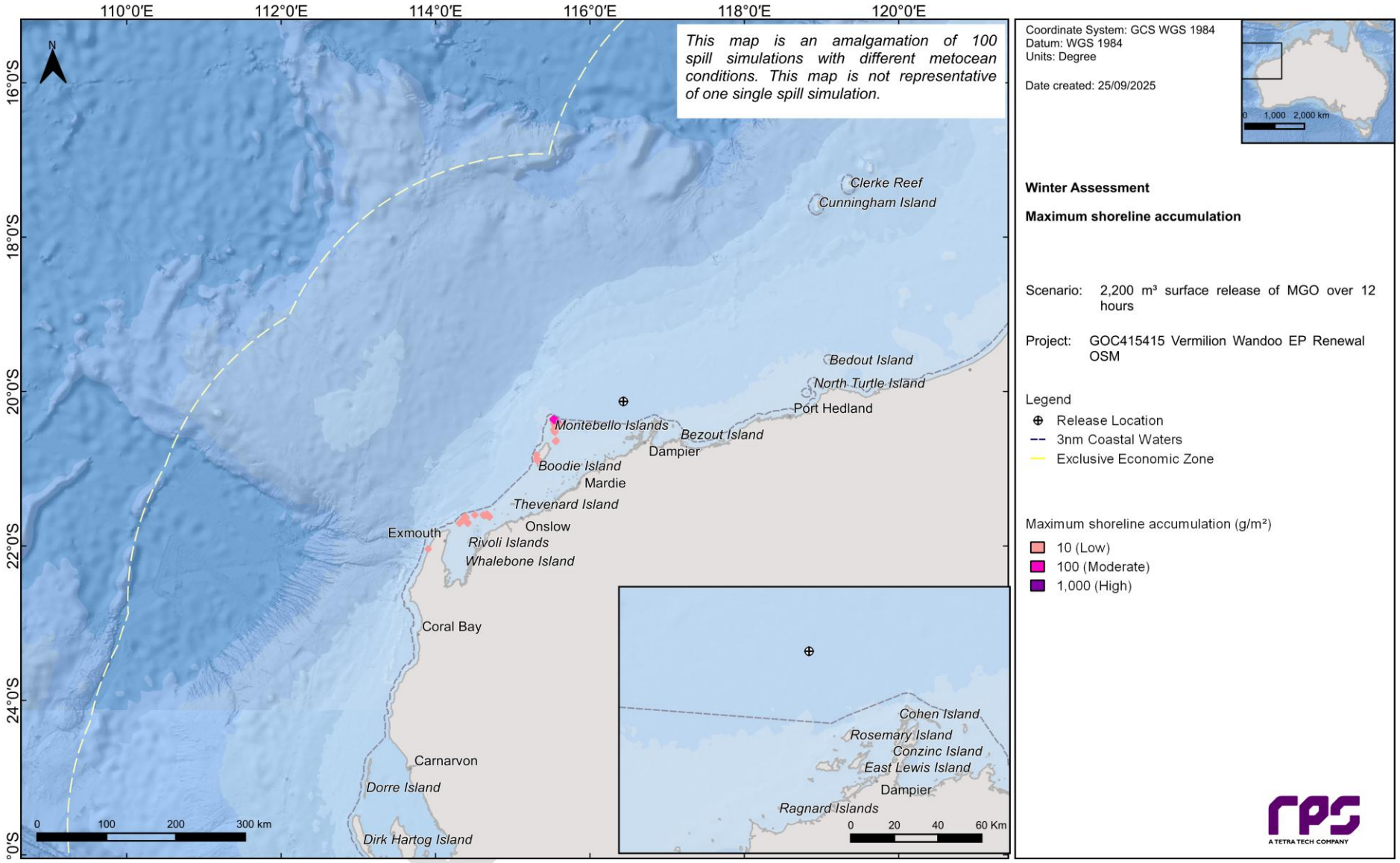


Figure 13.27 Maximum potential shoreline oil accumulation following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

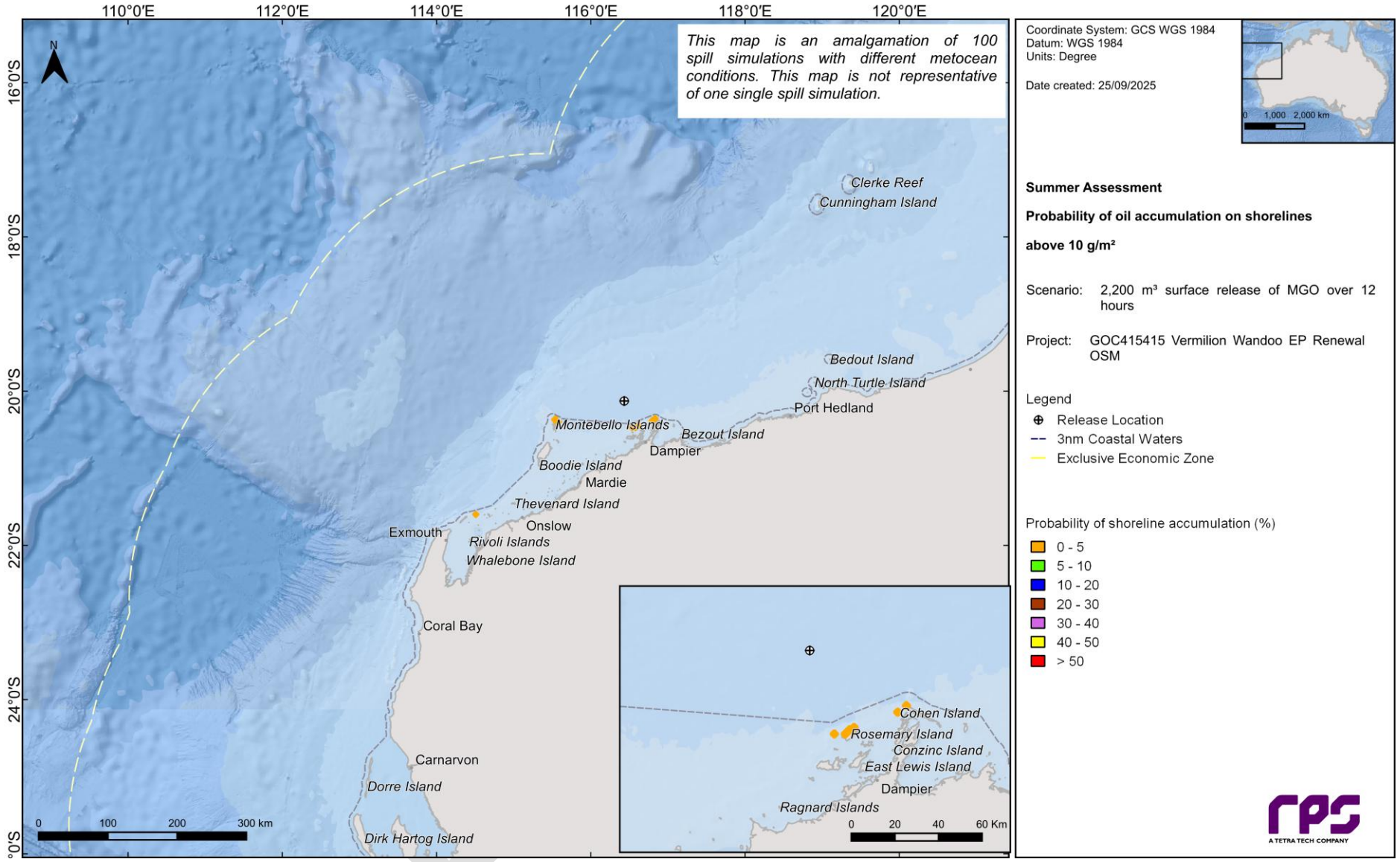


Figure 13.28 Predicted probability of shoreline oil accumulation at, or above, 10 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

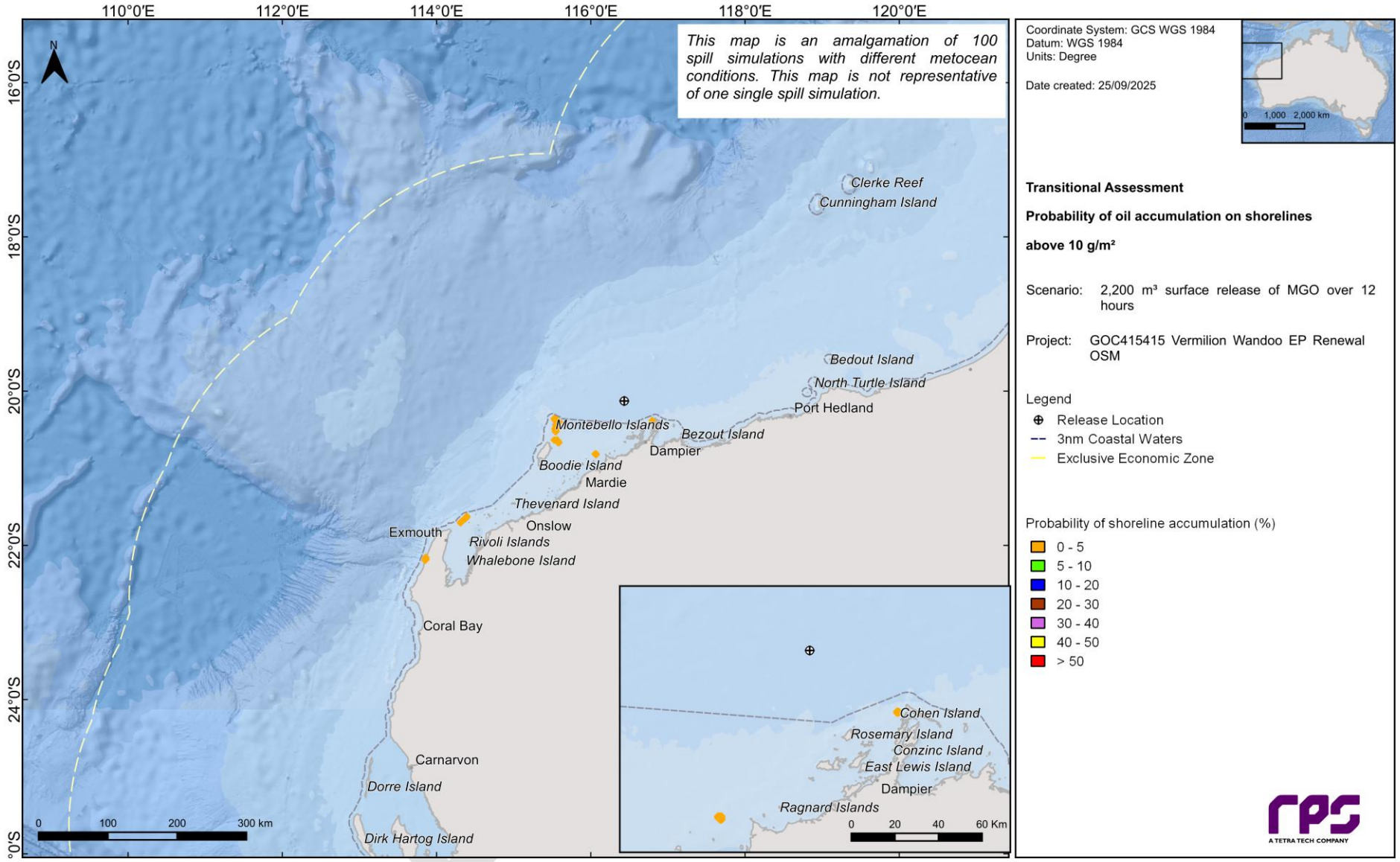


Figure 13.29 Predicted probability of shoreline oil accumulation at, or above, 10 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

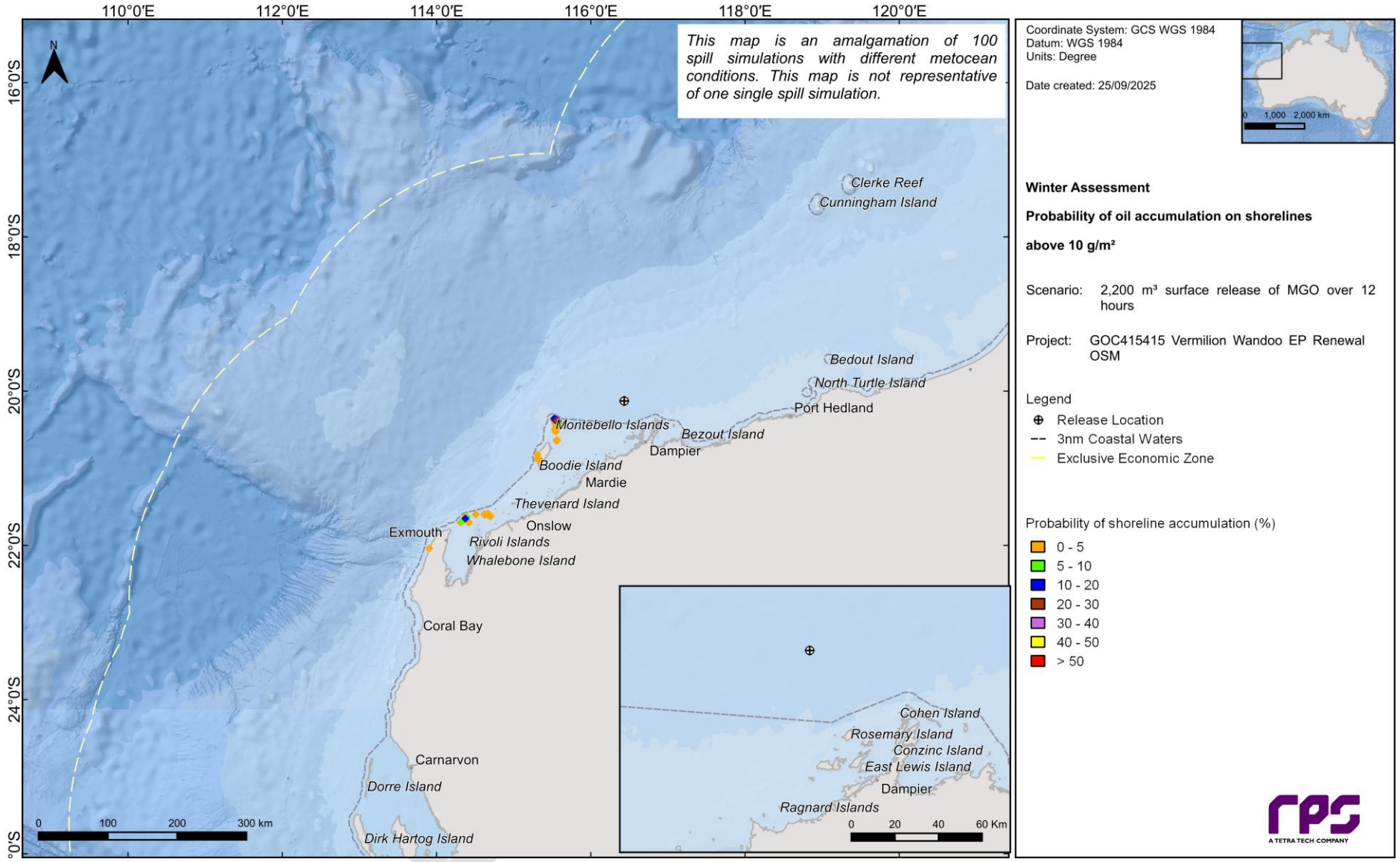


Figure 13.30 Predicted probability of shoreline oil accumulation at, or above, 10 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

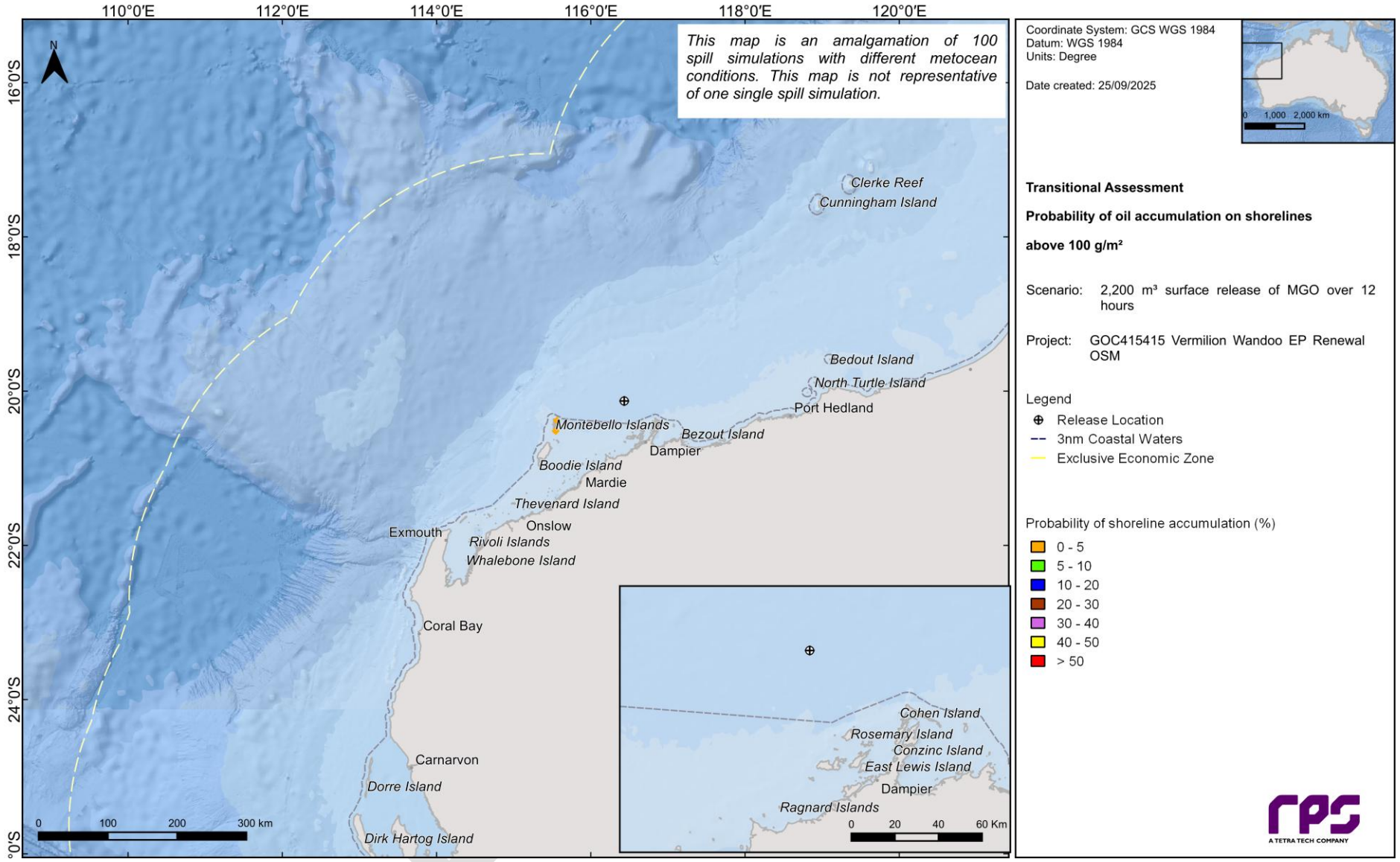


Figure 13.31 Predicted probability of shoreline oil accumulation at, or above, 100 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

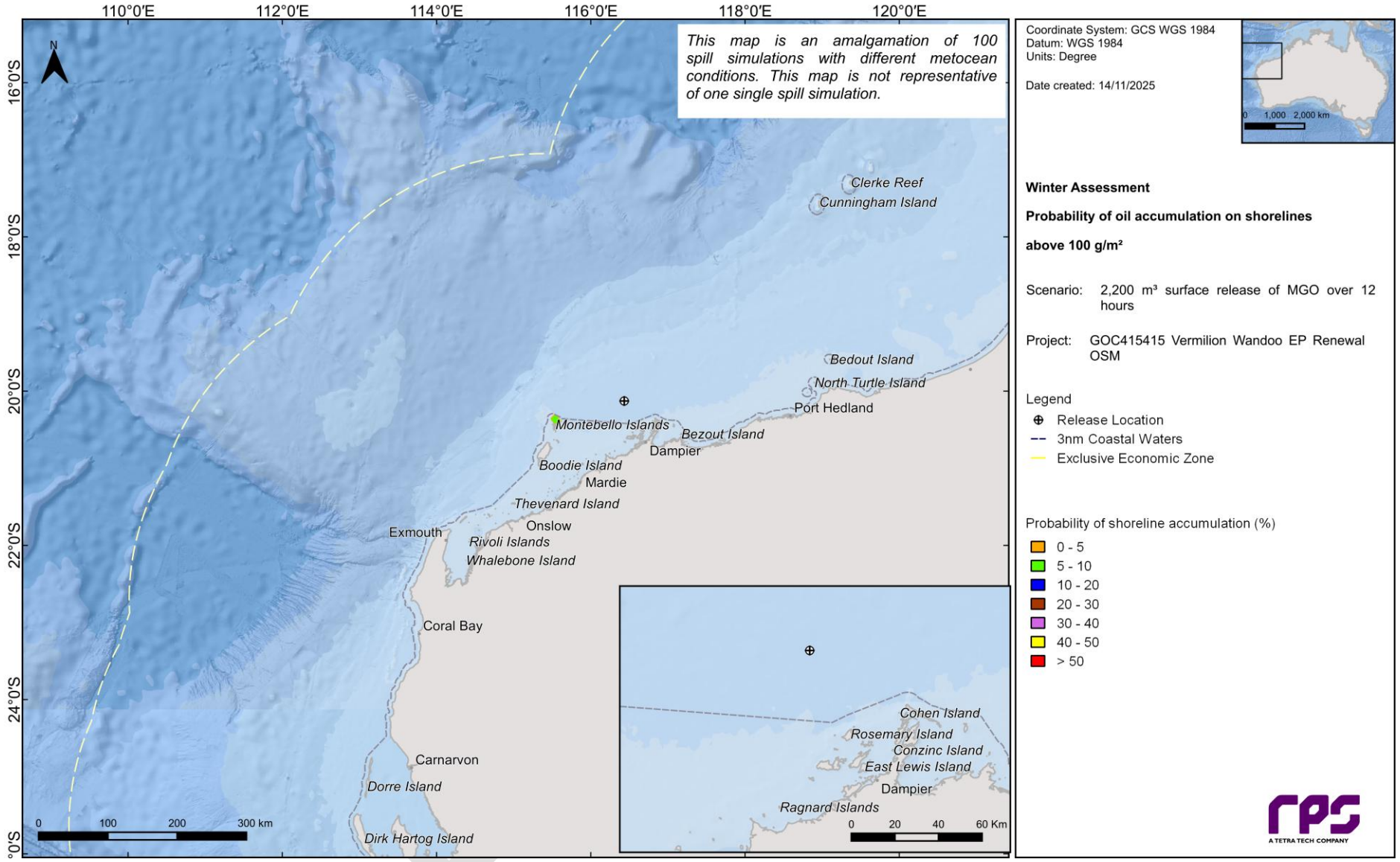


Figure 13.32 Predicted probability of shoreline oil accumulation at, or above, 100 g/m² following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

13.1.5 In-water exposure

13.1.5.1 Dissolved Hydrocarbons

Table 13-7 summarises the maximum distances from the release location to the dissolved hydrocarbon exposure thresholds for each season. Concentrations exceeding 10 ppb may potentially extend up to 307 km from the release location. As the threshold increases above 50 ppb and 400 ppb, the maximum distance decreases to 180 km and 30 km, respectively.

Table 13-8 summarises the predicted dissolved hydrocarbon exposure to receptors (either at, or above, receptors in the water column).

The Montebello AMP recorded the highest probabilities of exposure at, or above, 10 ppb during summer (5%), transitional (11%) and winter (15%) conditions. The same receptor recorded the quickest time to exposure at, or above, 10 ppb at 1 day during summer. The Montebello AMP also recorded the highest concentrations at 329 ppb during summer conditions.

Figure 13.33 to Figure 13.35 illustrate the dissolved hydrocarbon exposure zones for the three seasons, whilst Figure 13.36 to Figure 13.53 show the minimum times before exposure and probabilities of exposure for each threshold and season.

Seasonal cross-sectional transects (north-south and east-west) of the maximum dissolved hydrocarbons in the vicinity of the release site are presented in Figure 13.54 to Figure 13.59.

Table 13-7 Maximum distances from the release location to dissolved hydrocarbon exposure thresholds following a surface release of MGO from Wandoo B's Shaft 2. Results were calculated from 100 spill simulations per season.

Season	Distance and direction travelled	Dissolved hydrocarbon exposure thresholds		
		10 ppb	50 ppb	400 ppb
Summer	Maximum distance (km) from release location	151	83	29
	Direction	Northeast	Southwest	West
Transitional	Maximum distance (km) from release location	288	157	22
	Direction	Southwest	Southwest	West
Winter	Maximum distance (km) from release location	307	180	30
	Direction	Southwest	Southwest	West

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Table 13-8 Receptors predicted to be exposed by dissolved hydrocarbons following a surface release of MGO from Wandoo B's Shaft 2. Results were calculated from100 spill simulations per season.

Category	Name	Summer								Transitional								Winter							
		Probability (%) of dissolved concentration			Minimum time before dissolved hydrocarbon exposure at			Maximum dissolved hydrocarbon concentration (ppb)		Probability (%) of dissolved concentration			Minimum time before dissolved hydrocarbon exposure at			Maximum dissolved hydrocarbon concentration (ppb)		Probability (%) of dissolved concentration			Minimum time before dissolved hydrocarbon exposure at			Maximum dissolved hydrocarbon concentration (ppb)	
		≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	averaged over all simulations	in the worst replicate	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	averaged over all simulations	in the worst replicate	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	averaged over all simulations	in the worst replicate
AMP	Dampier	1	NC	NC	11 d, 13 hrs	NC	NC	<1	12	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Montebello	5	2	NC	1 d, 0 hrs	1 d, 1 hrs	NC	4	329	11	3	NC	1 d, 3 hrs	1 d, 6 hrs	NC	6	301	15	6	NC	1 d, 3 hrs	1 d, 3 hrs	NC	8	326
KEF	Ancient coastline at 125 m depth contour	1	NC	NC	11 d, 0 hrs	NC	NC	<1	17	1	NC	NC	11 d, 6 hrs	NC	NC	<1	14	2	NC	NC	8 d, 9 hrs	NC	NC	<1	32
	Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	14 d, 2 hrs	NC	NC	<1	11	1	NC	NC	10 d, 9 hrs	NC	NC	<1	18
	Commonwealth waters adjacent to Ningaloo Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	<1	8	1	NC	NC	12 d, 16 hrs	NC	NC	<1	13
	Glomar Shoals	2	NC	NC	5 d, 9 hrs	NC	NC	<1	30	3	1	NC	4 d, 6 hrs	4 d, 18 hrs	NC	2	76	3	1	NC	2 d, 20 hrs	2 d, 23 hrs	NC	<1	78
MMA	Muiron Islands	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	10 d, 20 hrs	NC	NC	<1	21
MP	Barrow Island	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	6 d, 5 hrs	NC	NC	<1	18	3	1	NC	5 d, 3 hrs	5 d, 21 hrs	NC	<1	52
	Montebello Islands	2	NC	NC	5 d, 1 hrs	NC	NC	<1	49	2	1	NC	3 d, 11 hrs	3 d, 12 hrs	NC	2	63	9	3	NC	3 d, 8 hrs	3 d, 10 hrs	NC	3	87
	Ningaloo	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	12 d, 16 hrs	NC	NC	<1	13
RSB	Glomar Shoal	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	6 d, 3 hrs	NC	NC	<1	24	NC	NC	NC	NC	NC	NC	NC	NC
	Montebello Shoals	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	4	1	NC	4 d, 5 hrs	4 d, 6 hrs	NC	2	75
	Penguin Bank	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	7 d, 18 hrs	NC	NC	<1	16
	Tryal Rocks	1	NC	NC	11 d, 16 hrs	NC	NC	<1	12	3	2	NC	2 d, 22 hrs	3 d, 12 hrs	NC	3	121	7	1	NC	2 d, 9 hrs	2 d, 15 hrs	NC	3	129
State and Territory Waters	WA	4	3	NC	1 d, 3 hrs	1 d, 13 hrs	NC	4	201	3	1	NC	1 d, 19 hrs	1 d, 21 hrs	NC	2	91	11	3	NC	2 d, 3 hrs	2 d, 9 hrs	NC	4	150

NC: No contact to receptor predicted for specified threshold.

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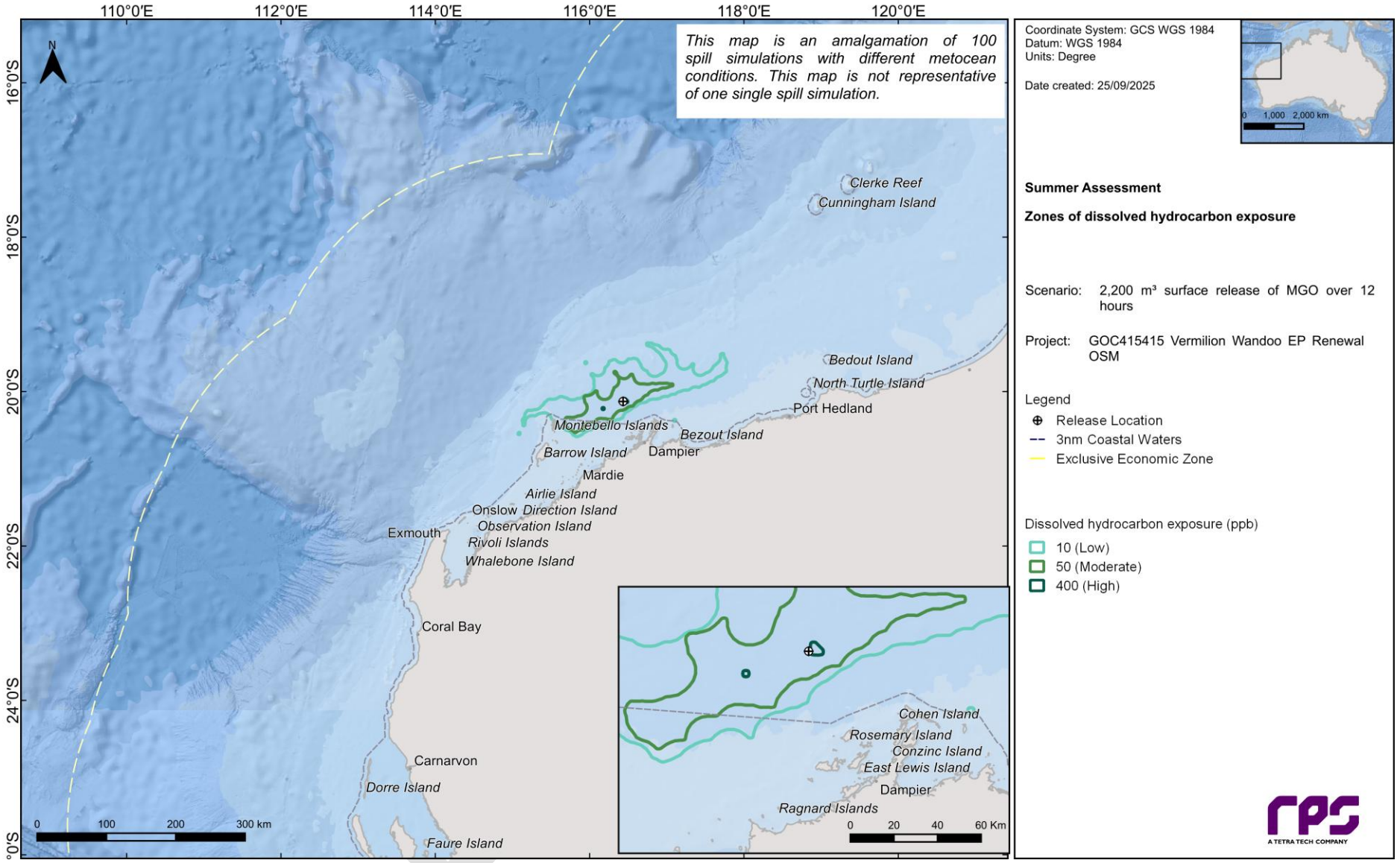


Figure 13.33 Predicted zones of dissolved hydrocarbon exposure following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

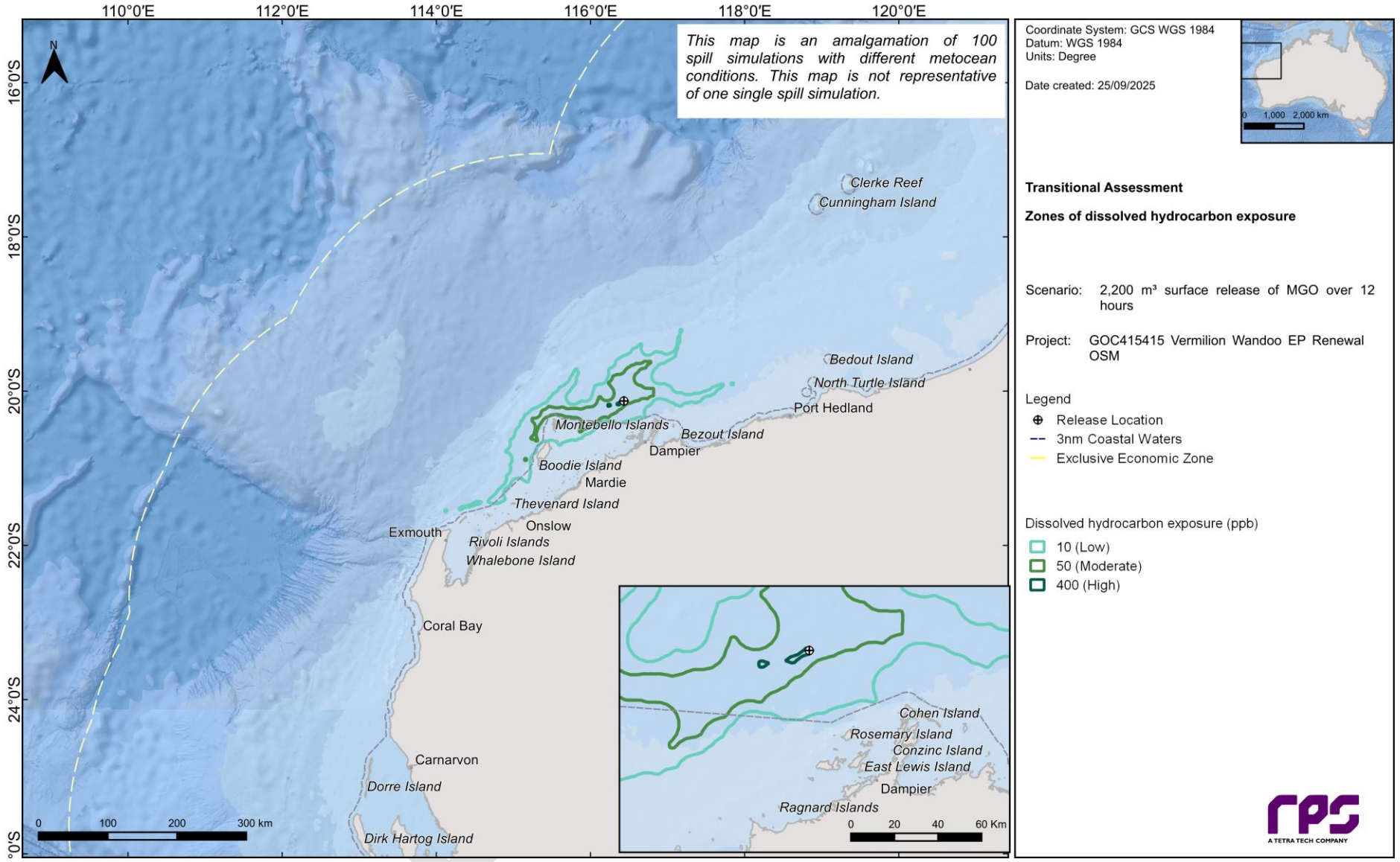


Figure 13.34 Predicted zones of dissolved hydrocarbon exposure following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

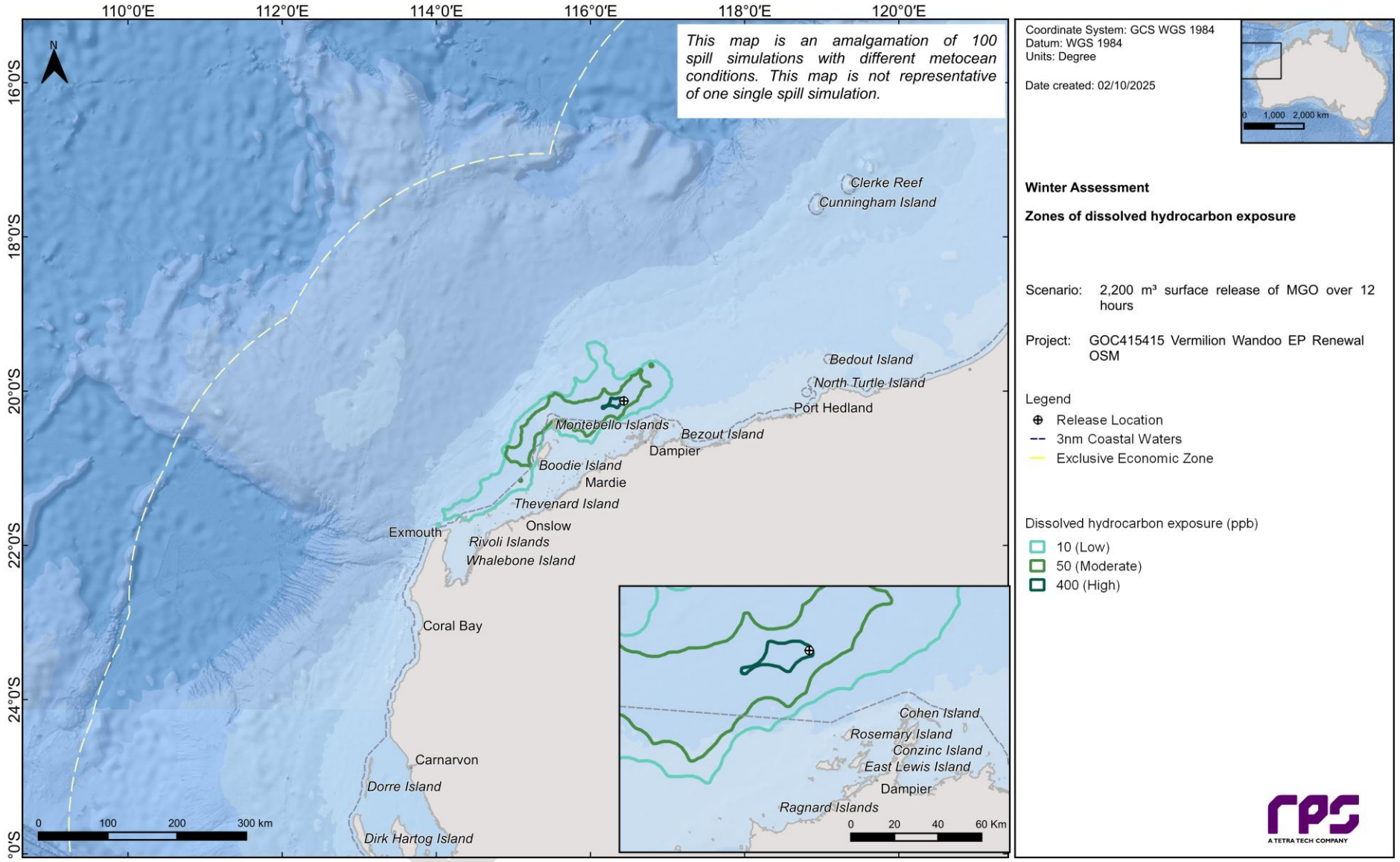


Figure 13.35 Predicted zones of dissolved hydrocarbon exposure following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

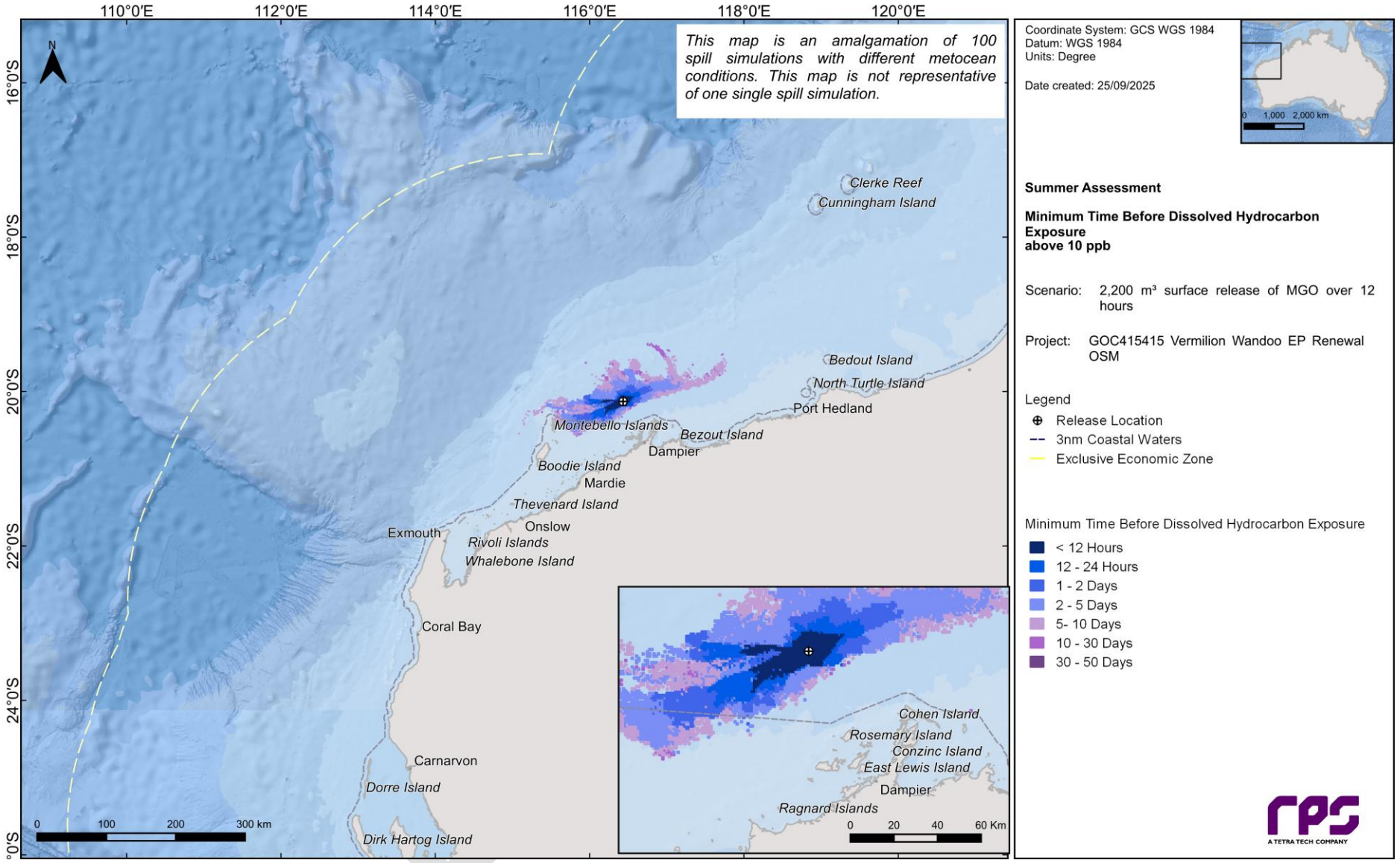


Figure 13.36 Minimum time before dissolved hydrocarbon exposure at, or above, 10 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

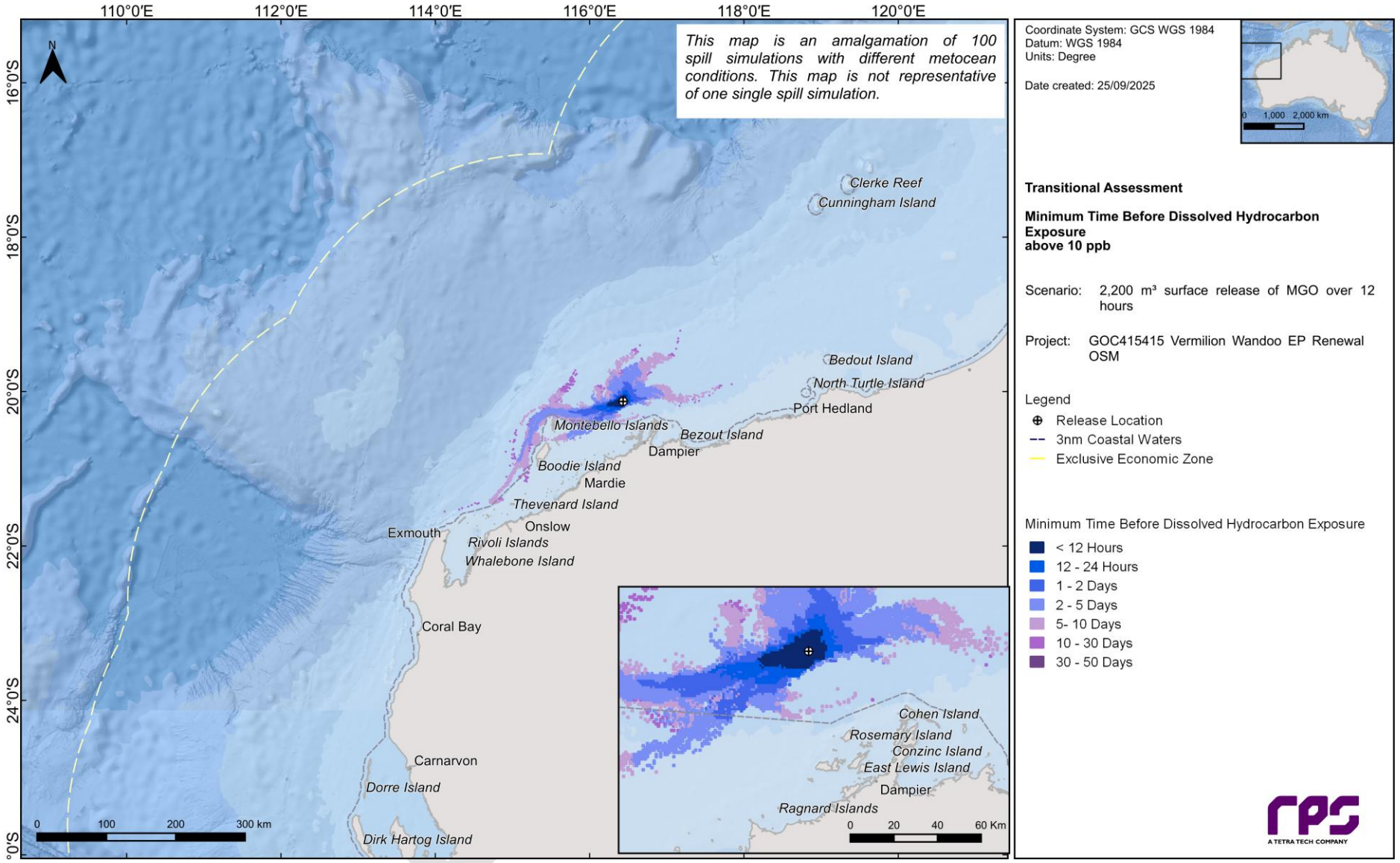


Figure 13.37 Minimum time before dissolved hydrocarbon exposure at, or above, 10 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

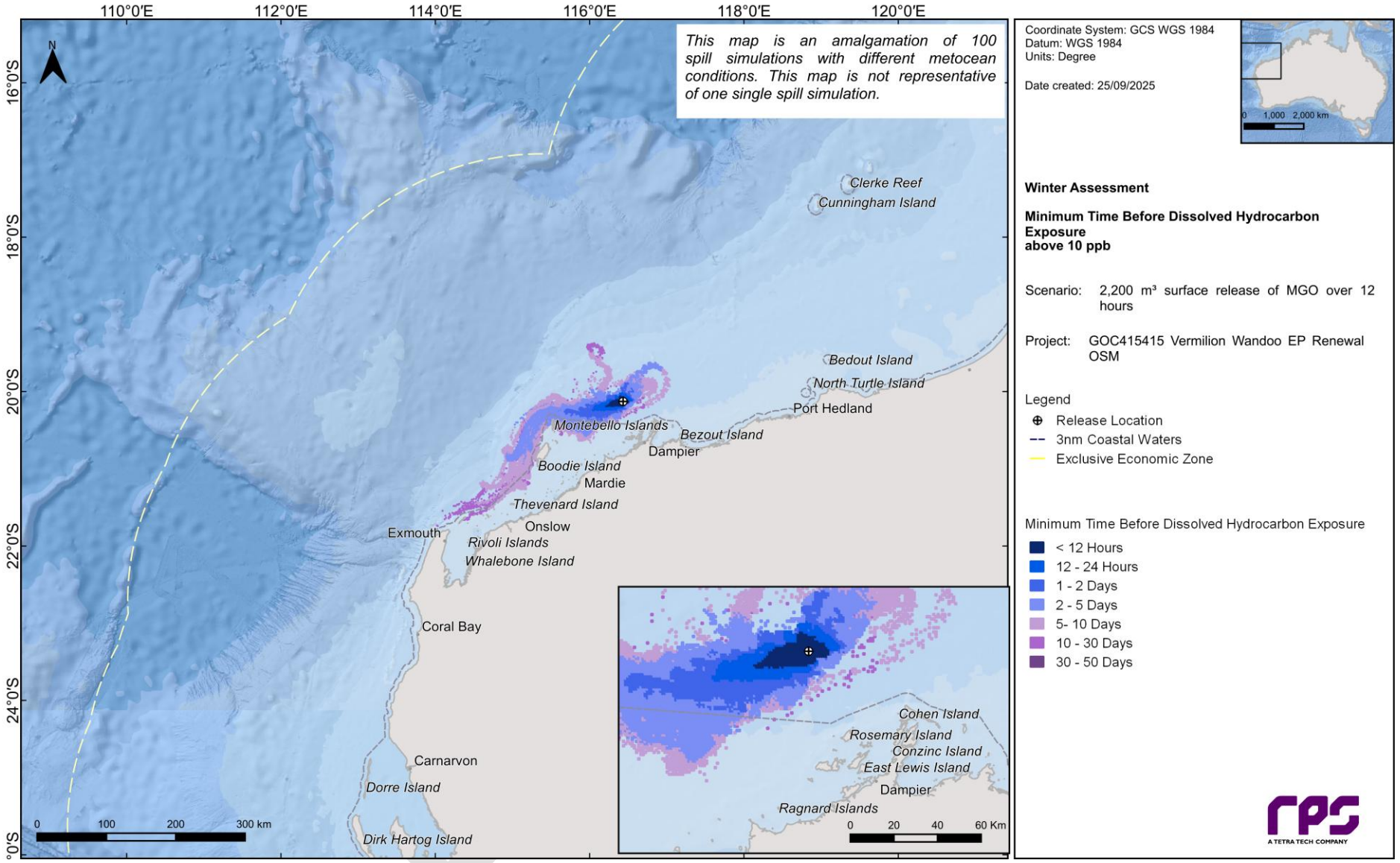


Figure 13.38 Minimum time before dissolved hydrocarbon exposure at, or above, 10 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

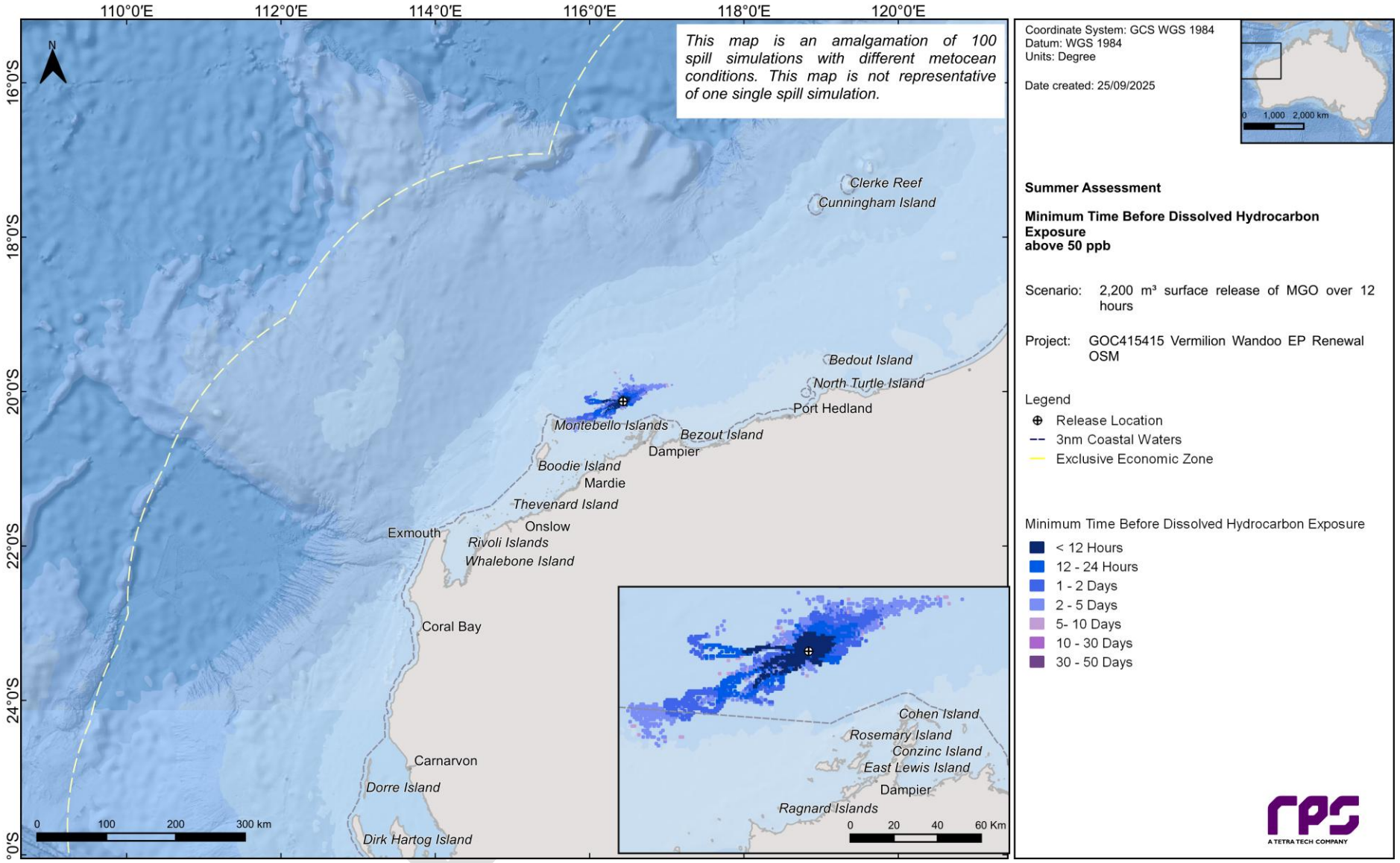


Figure 13.39 Minimum time before dissolved hydrocarbon exposure at, or above, 50 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

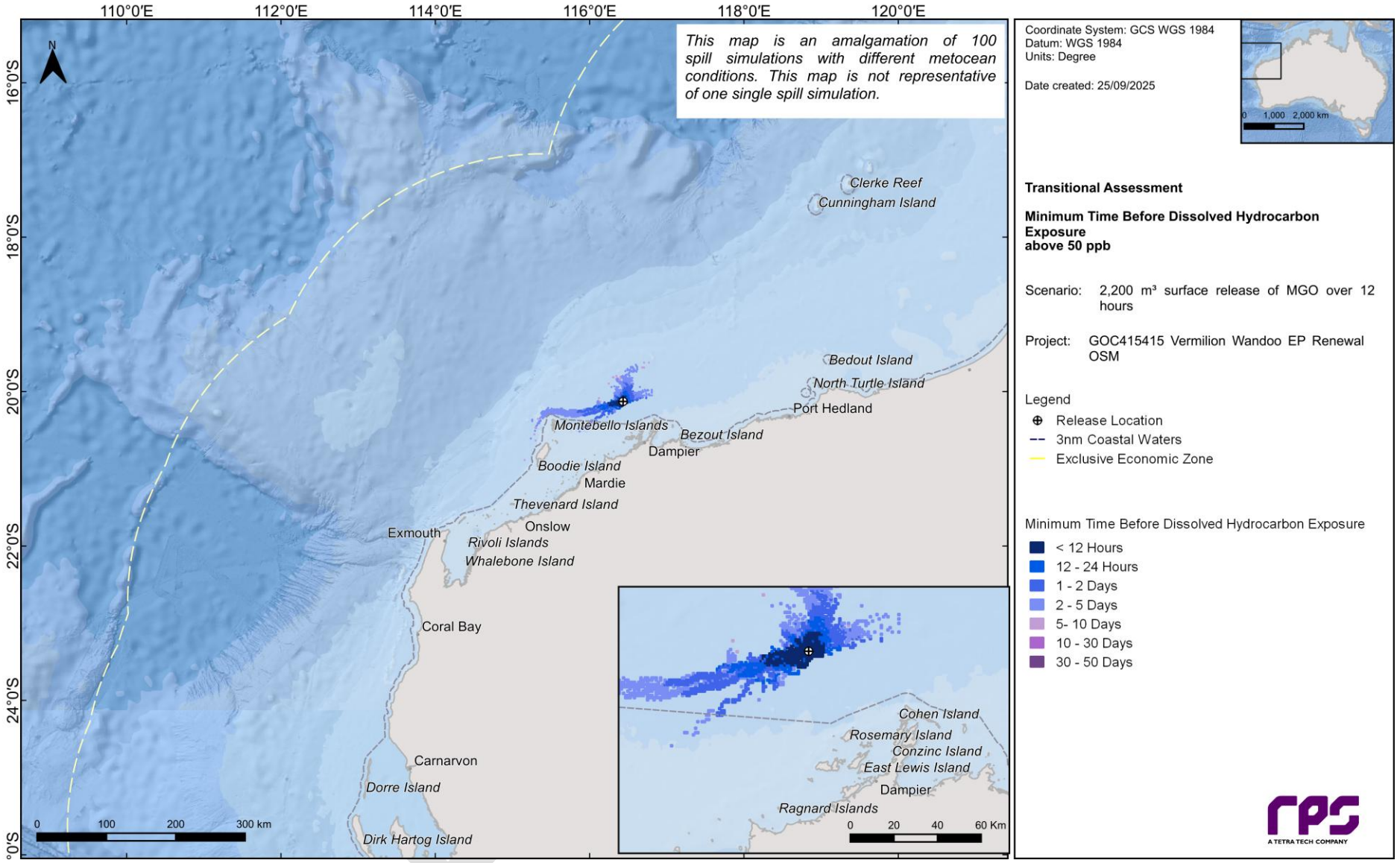


Figure 13.40 Minimum time before dissolved hydrocarbon exposure at, or above, 50 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

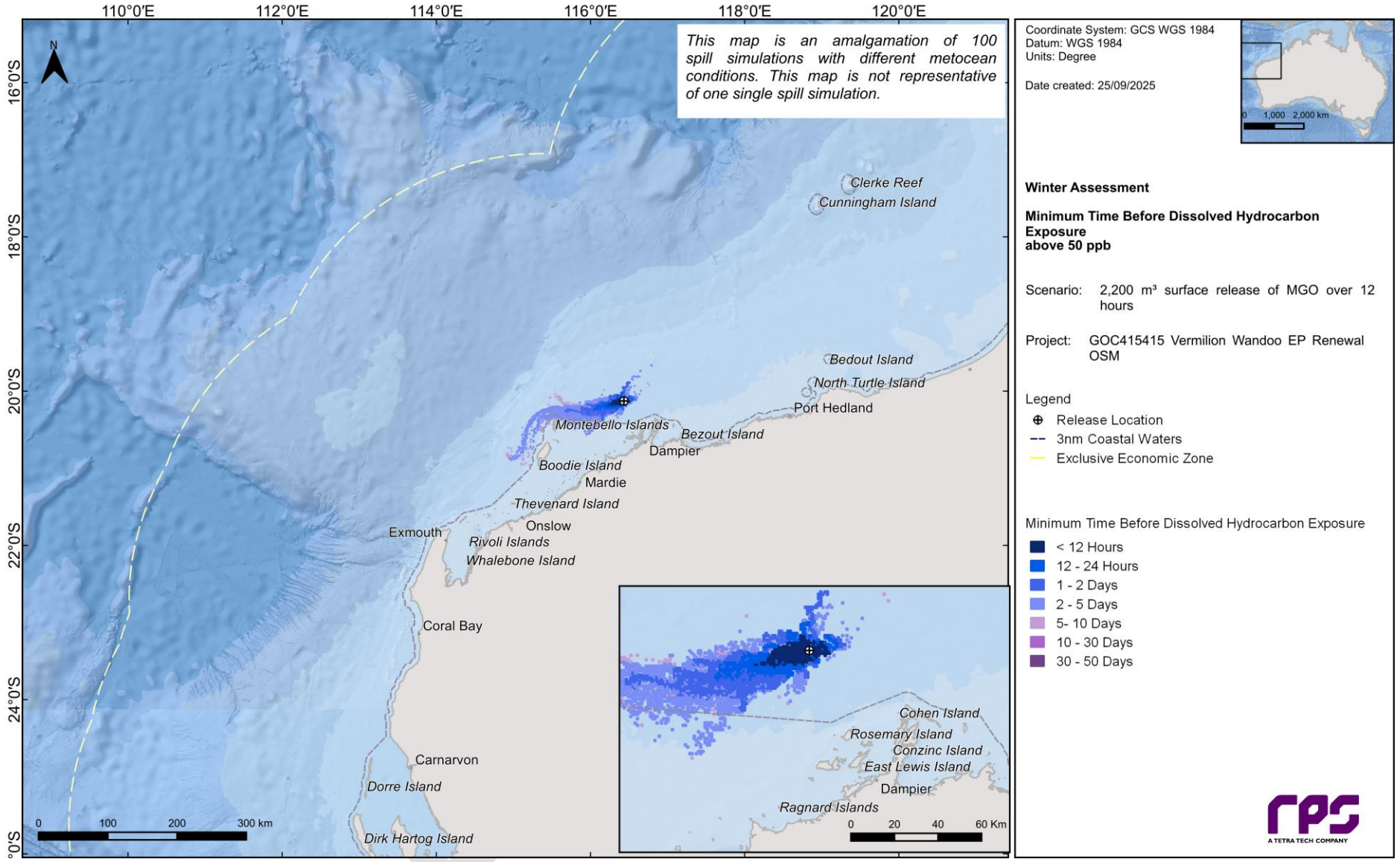


Figure 13.41 Minimum time before dissolved hydrocarbon exposure at, or above, 50 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

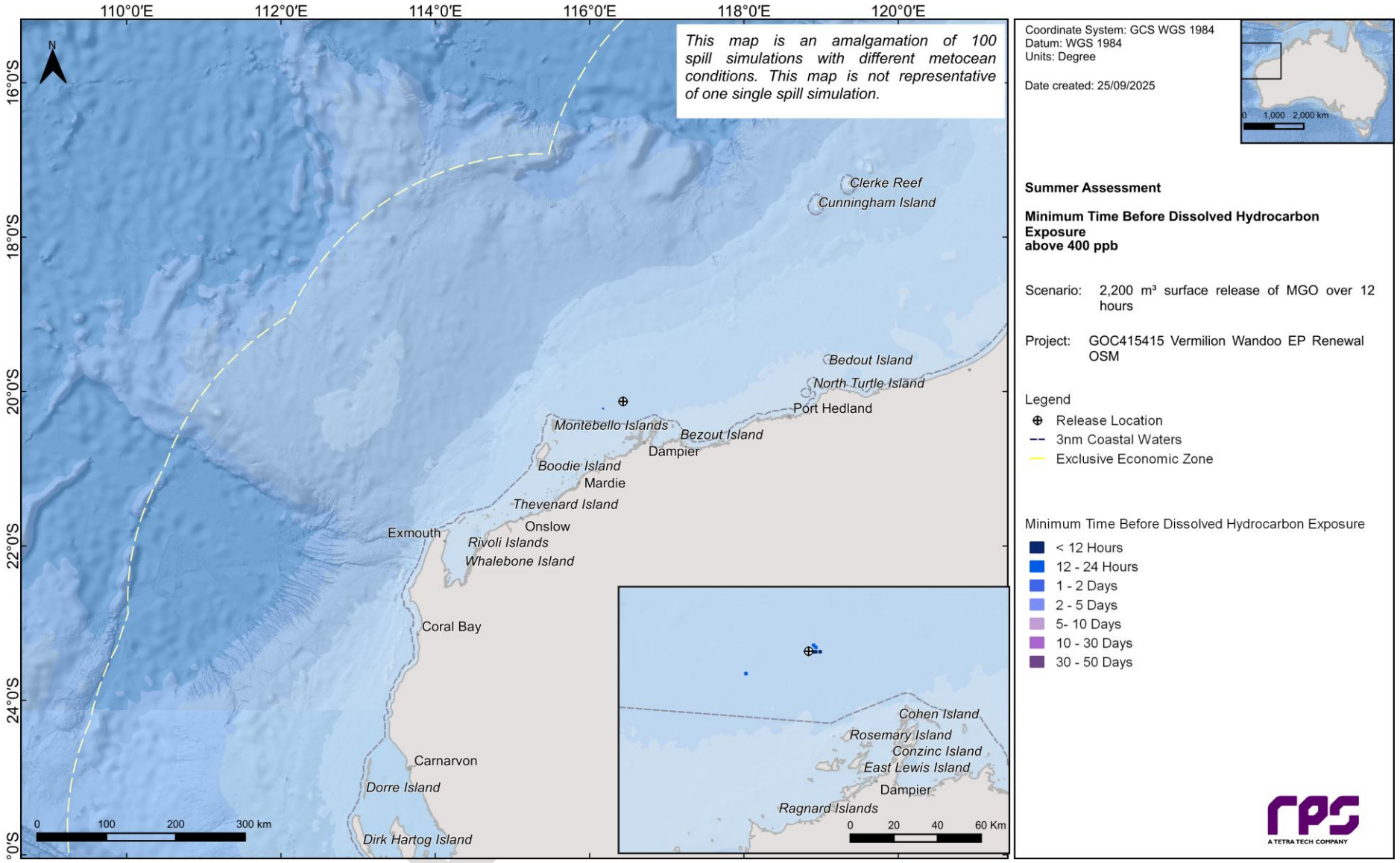


Figure 13.42 Minimum time before dissolved hydrocarbon exposure at, or above, 400 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

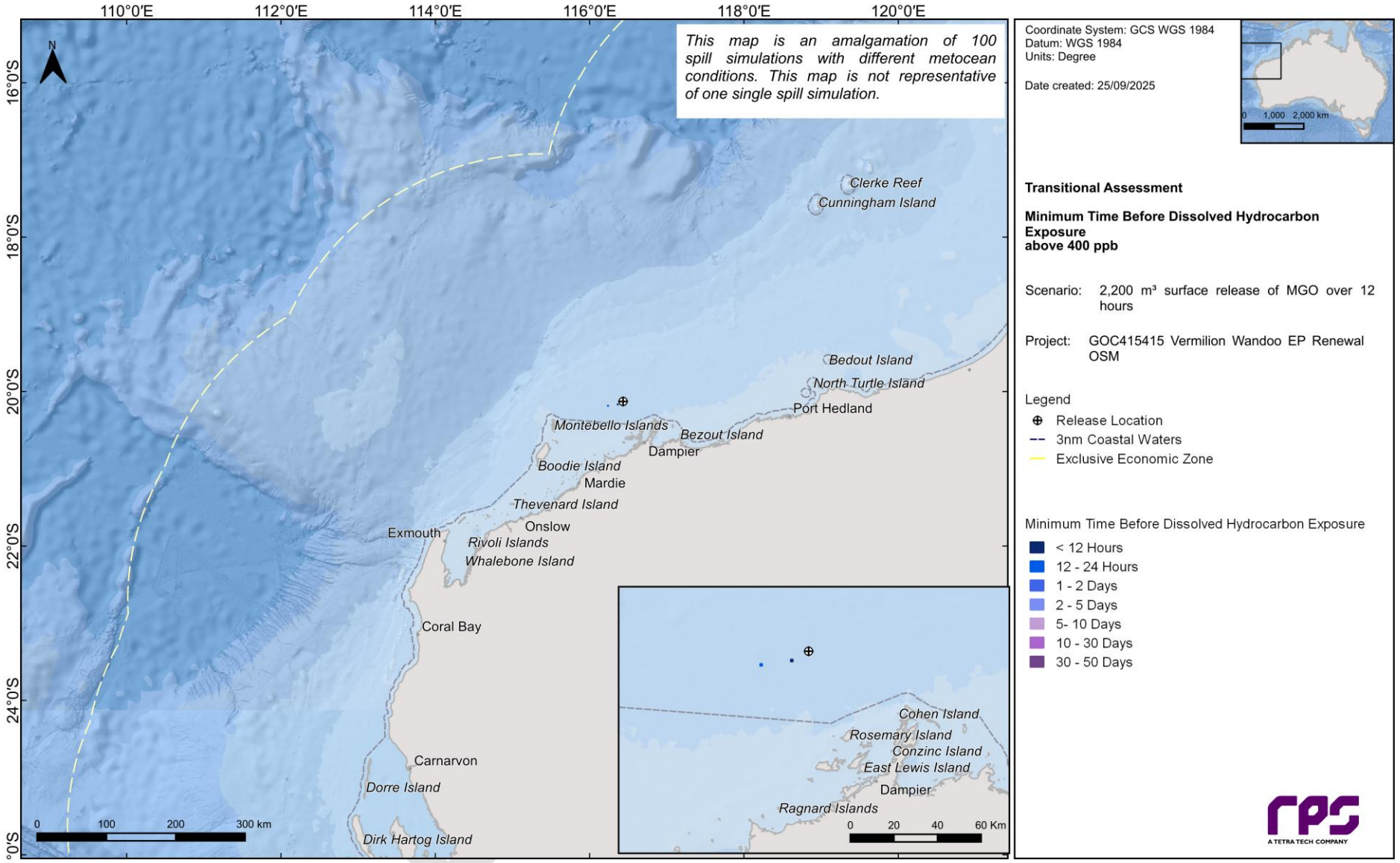


Figure 13.43 Minimum time before dissolved hydrocarbon exposure at, or above, 400 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

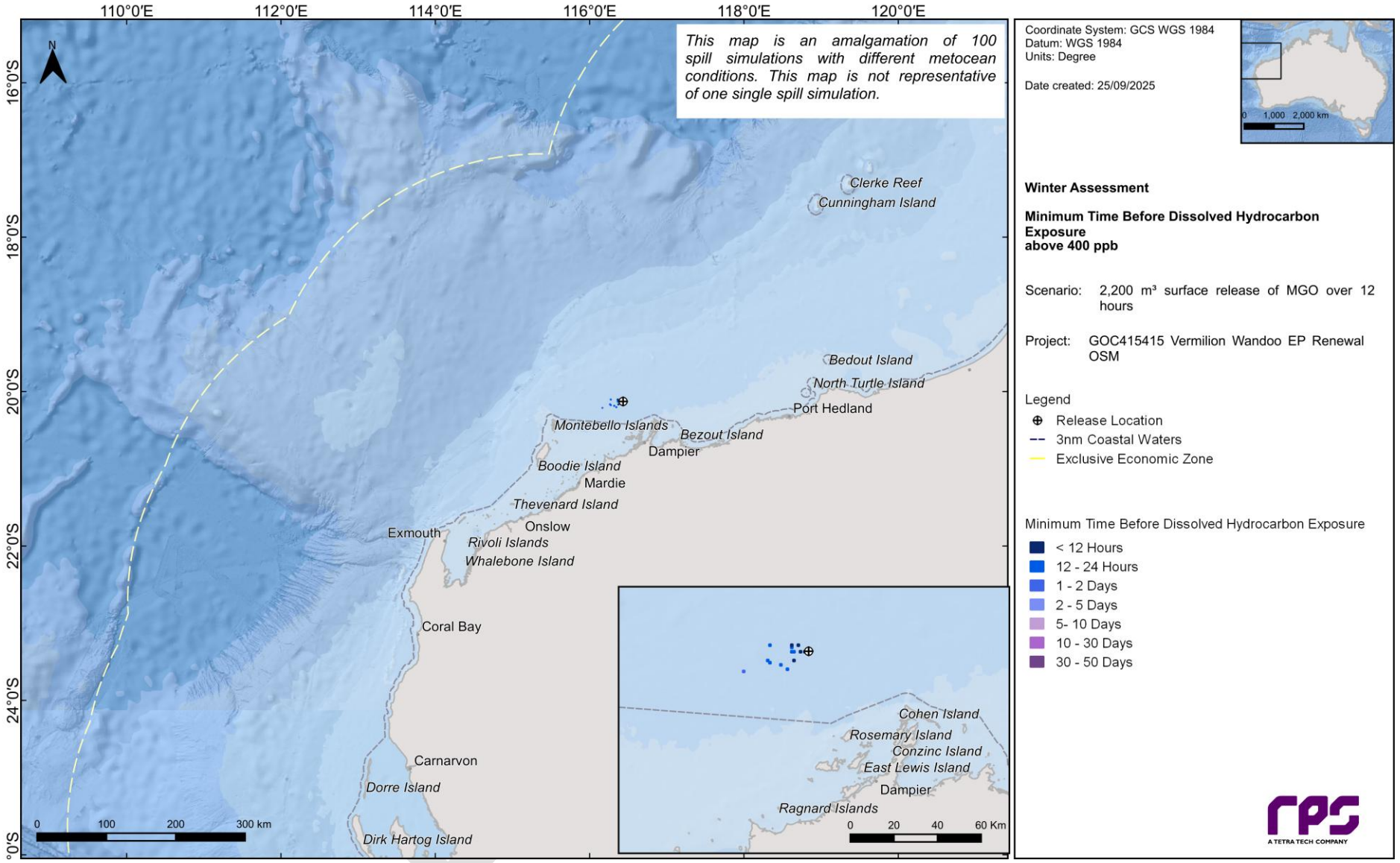


Figure 13.44 Minimum time before dissolved hydrocarbon exposure at, or above, 400 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

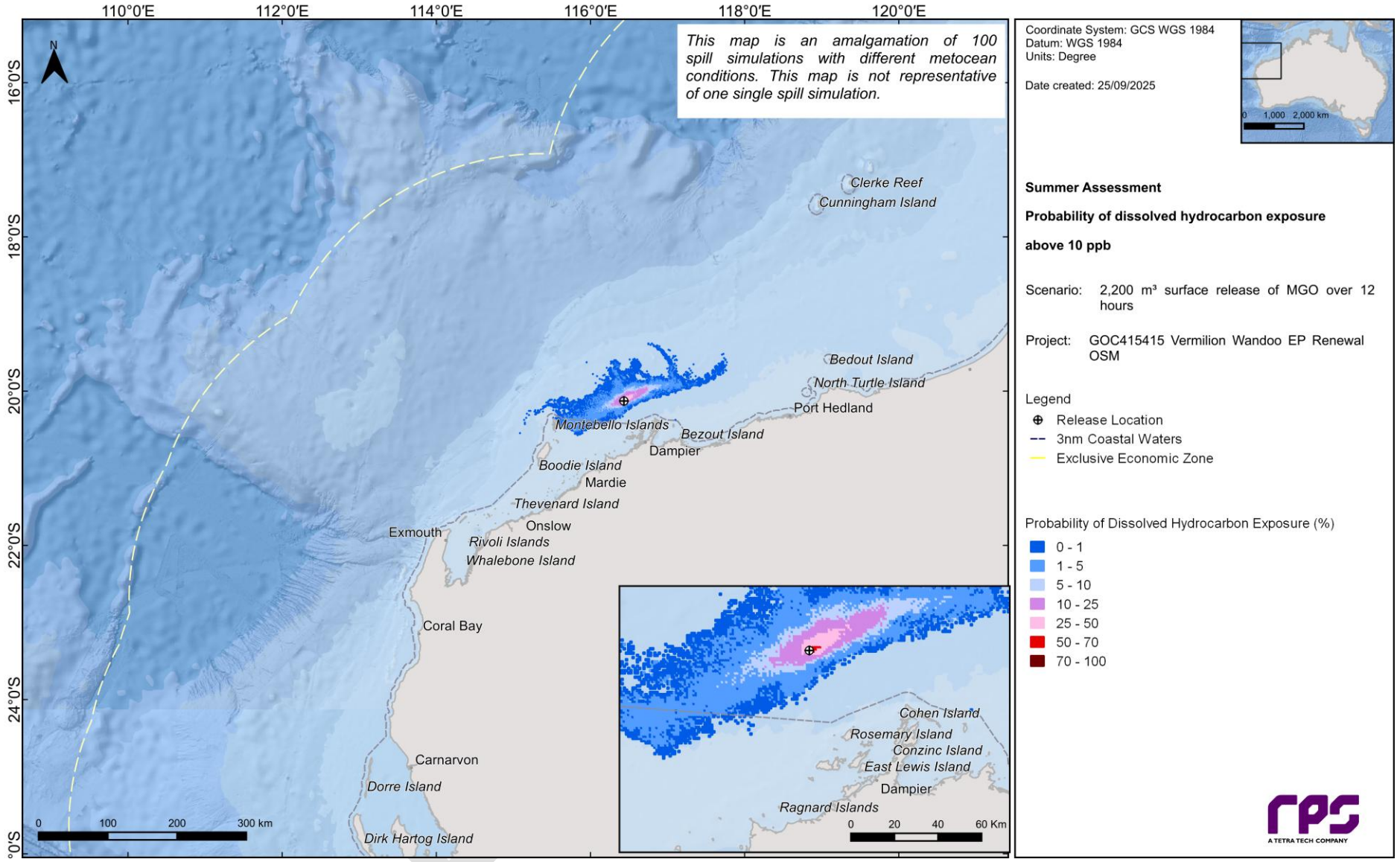


Figure 13.45 Probability of dissolved hydrocarbon exposure at, or above, 10 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

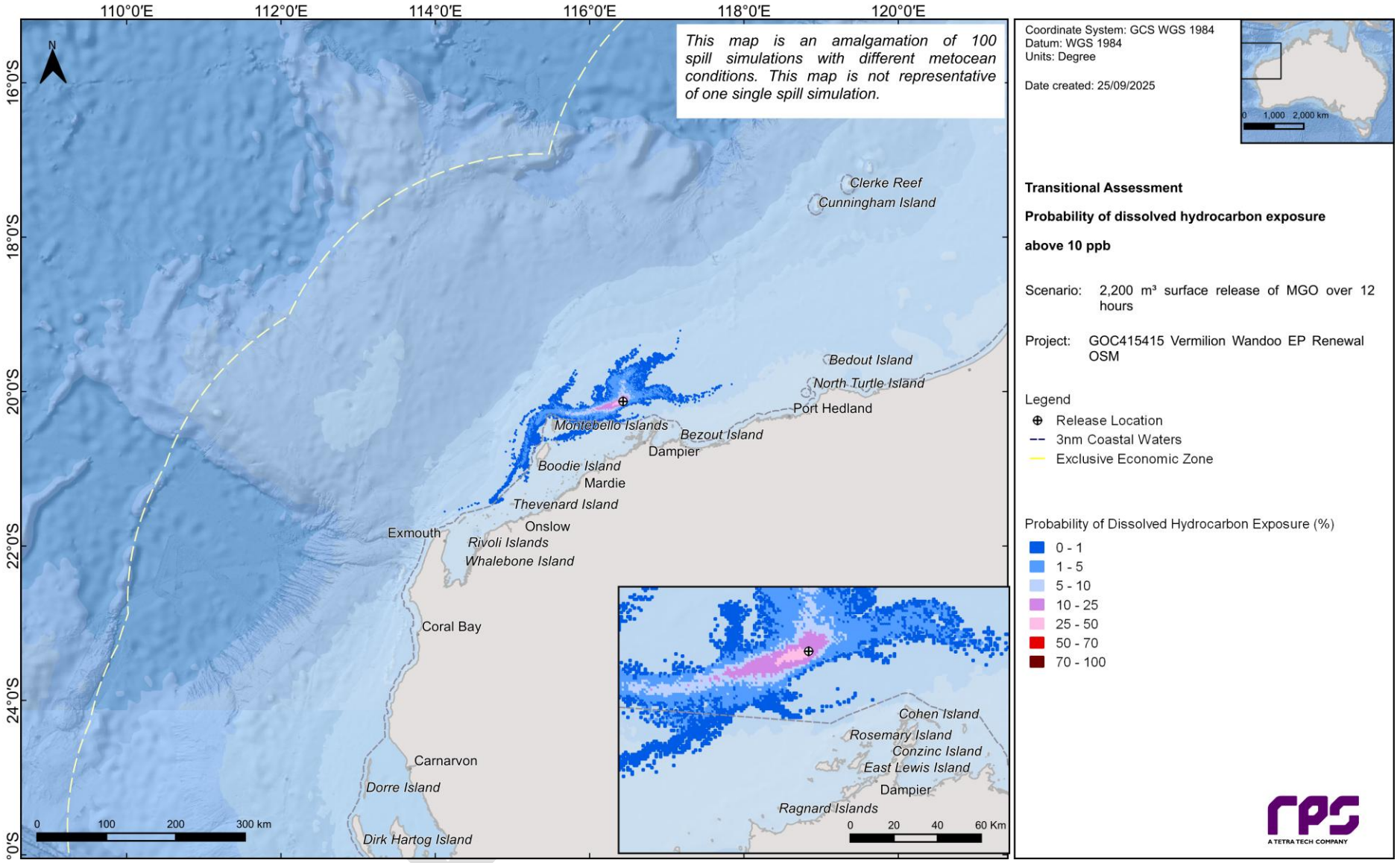


Figure 13.46 Probability of dissolved hydrocarbon exposure at, or above, 10 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

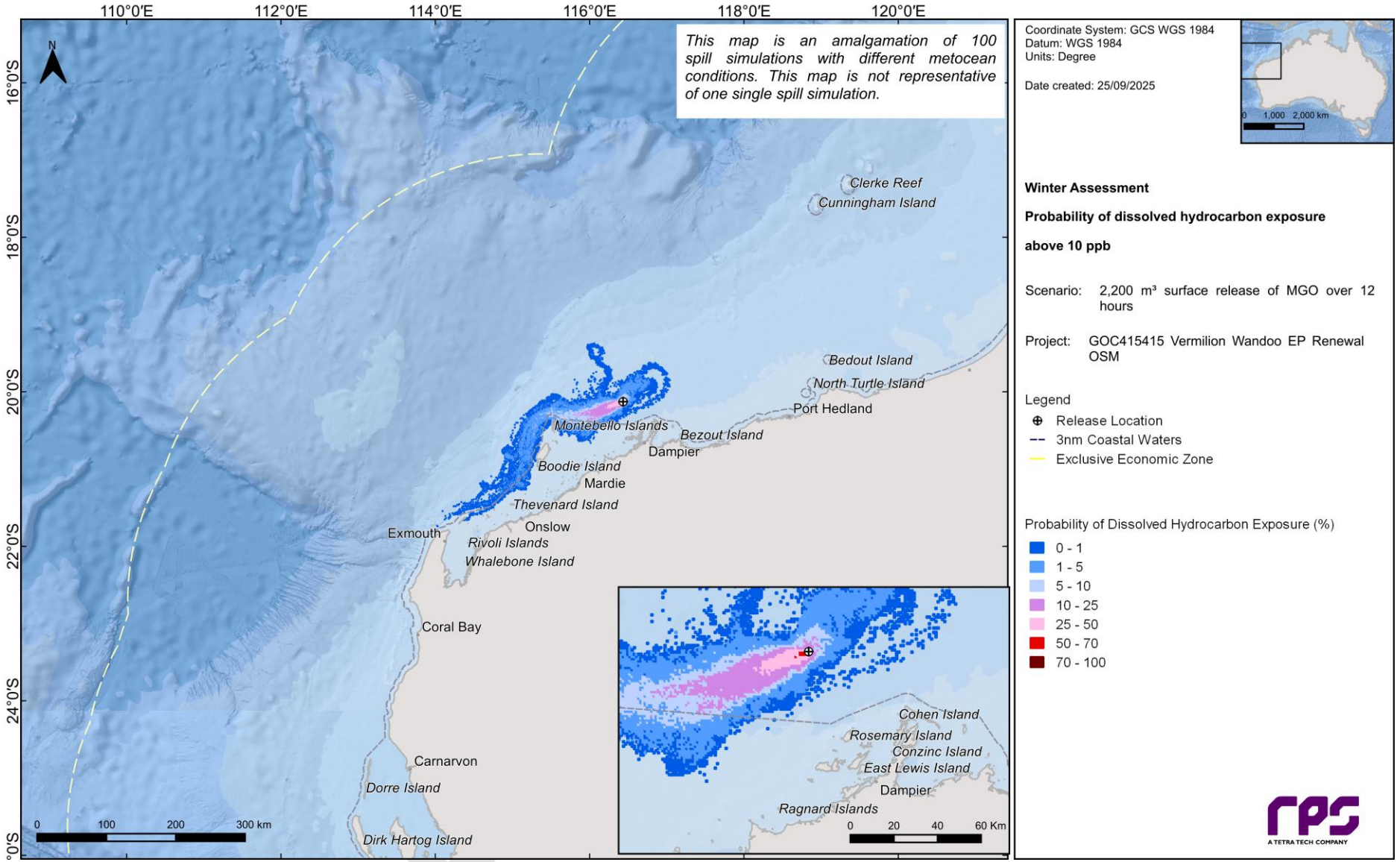


Figure 13.47 Probability of dissolved hydrocarbon exposure at, or above, 10 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

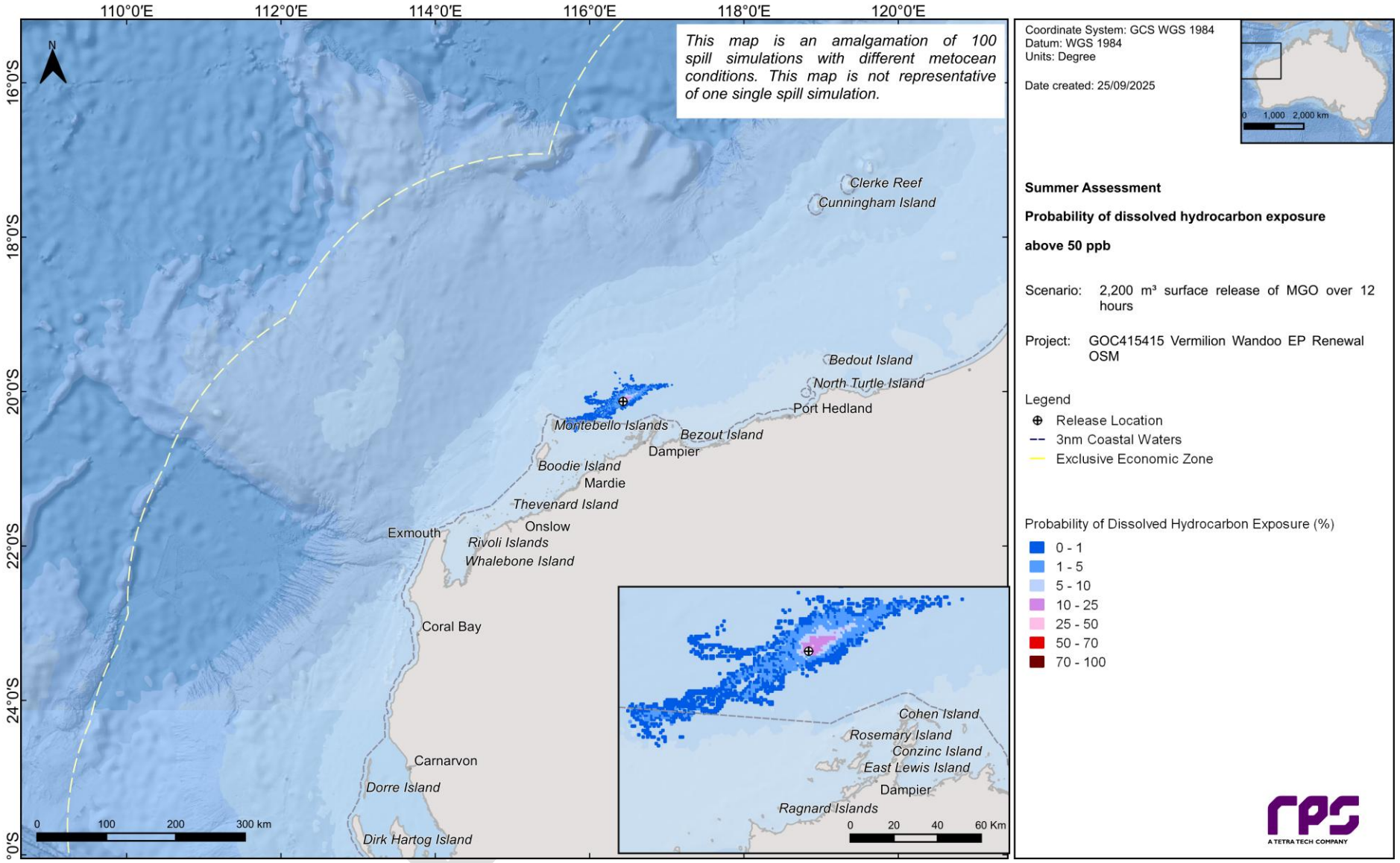


Figure 13.48 Probability of dissolved hydrocarbon exposure at, or above, 50 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

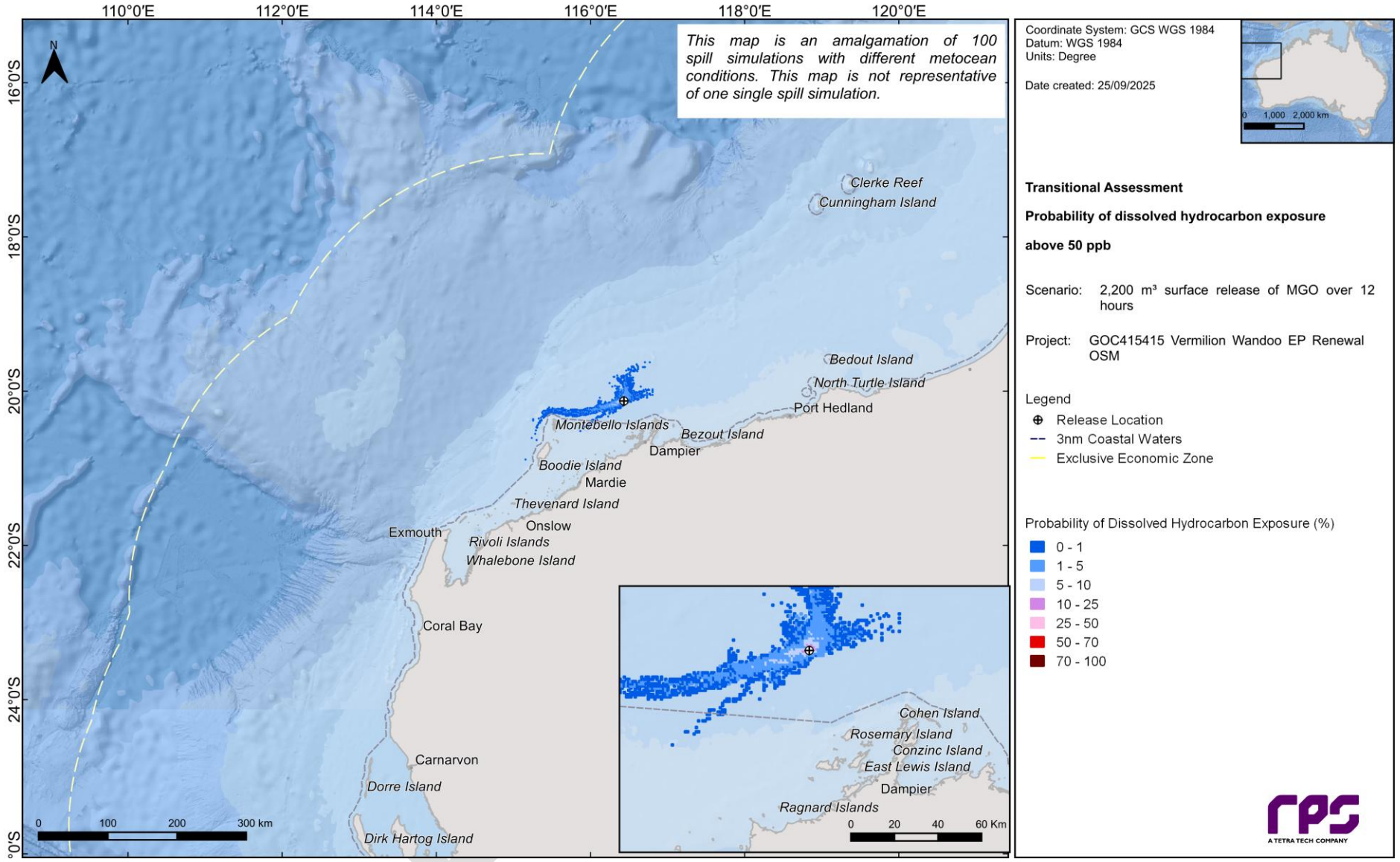


Figure 13.49 Probability of dissolved hydrocarbon exposure at, or above, 50 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

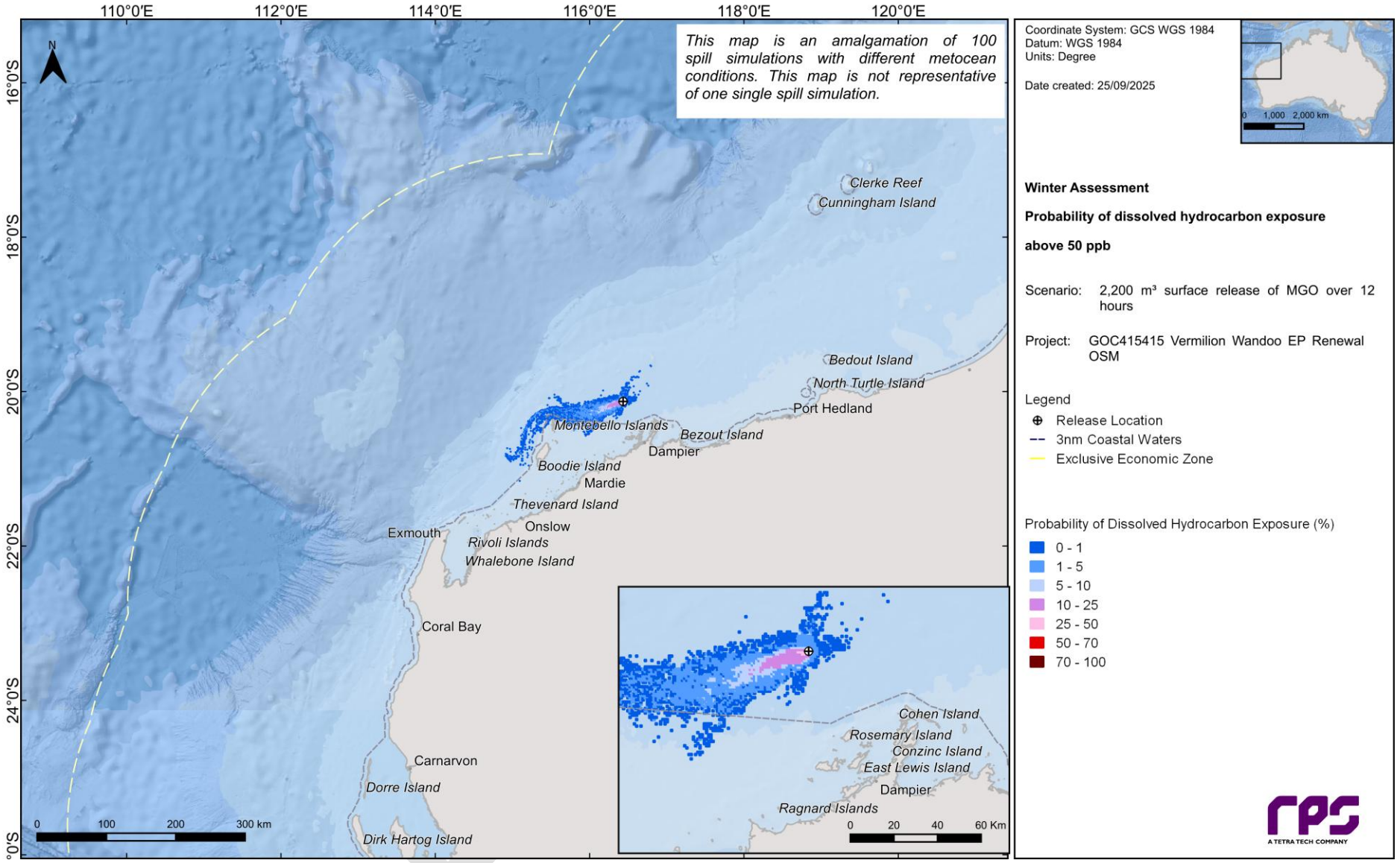


Figure 13.50 Probability of dissolved hydrocarbon exposure at, or above, 50 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

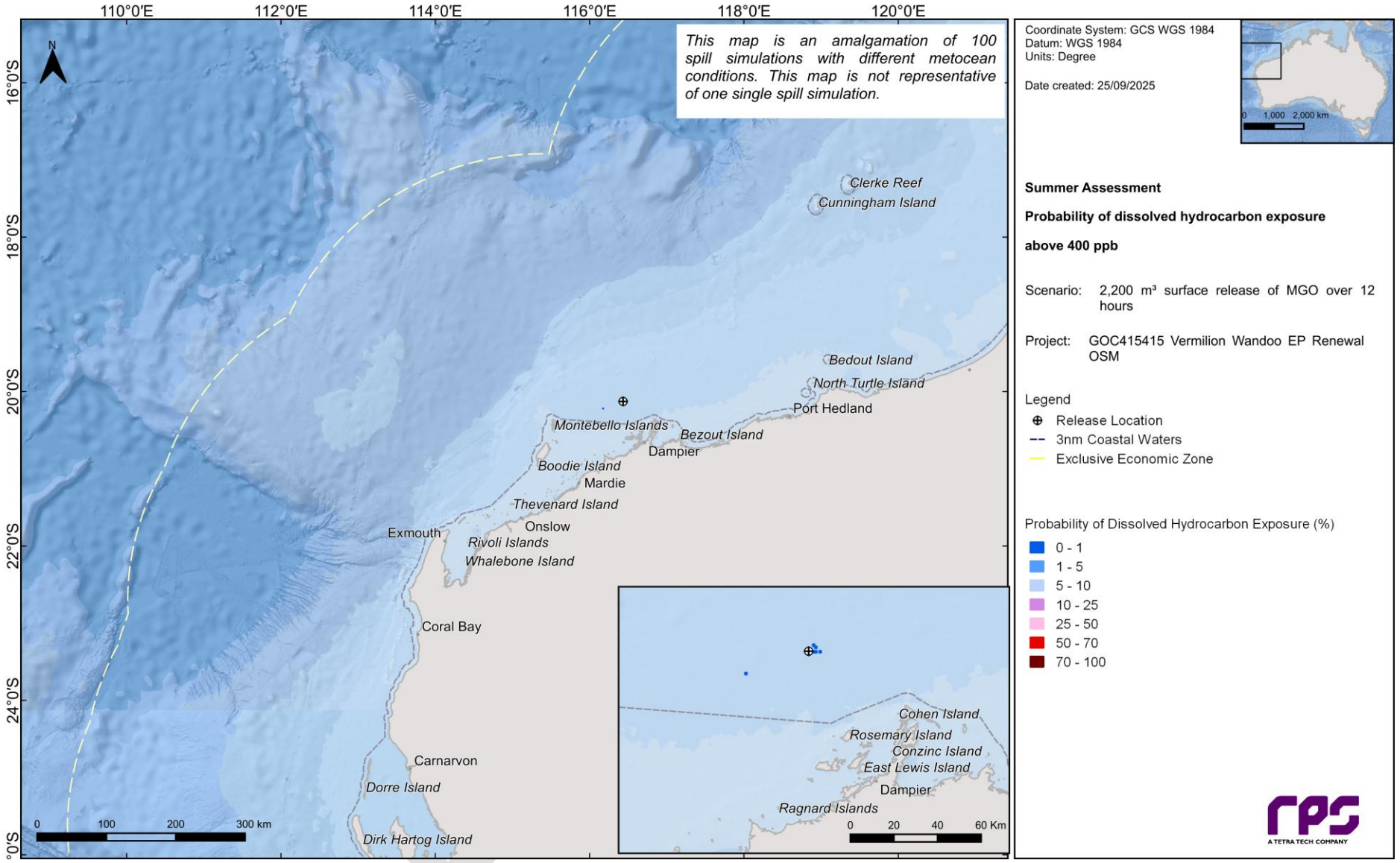


Figure 13.51 Probability of dissolved hydrocarbon exposure at, or above, 400 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

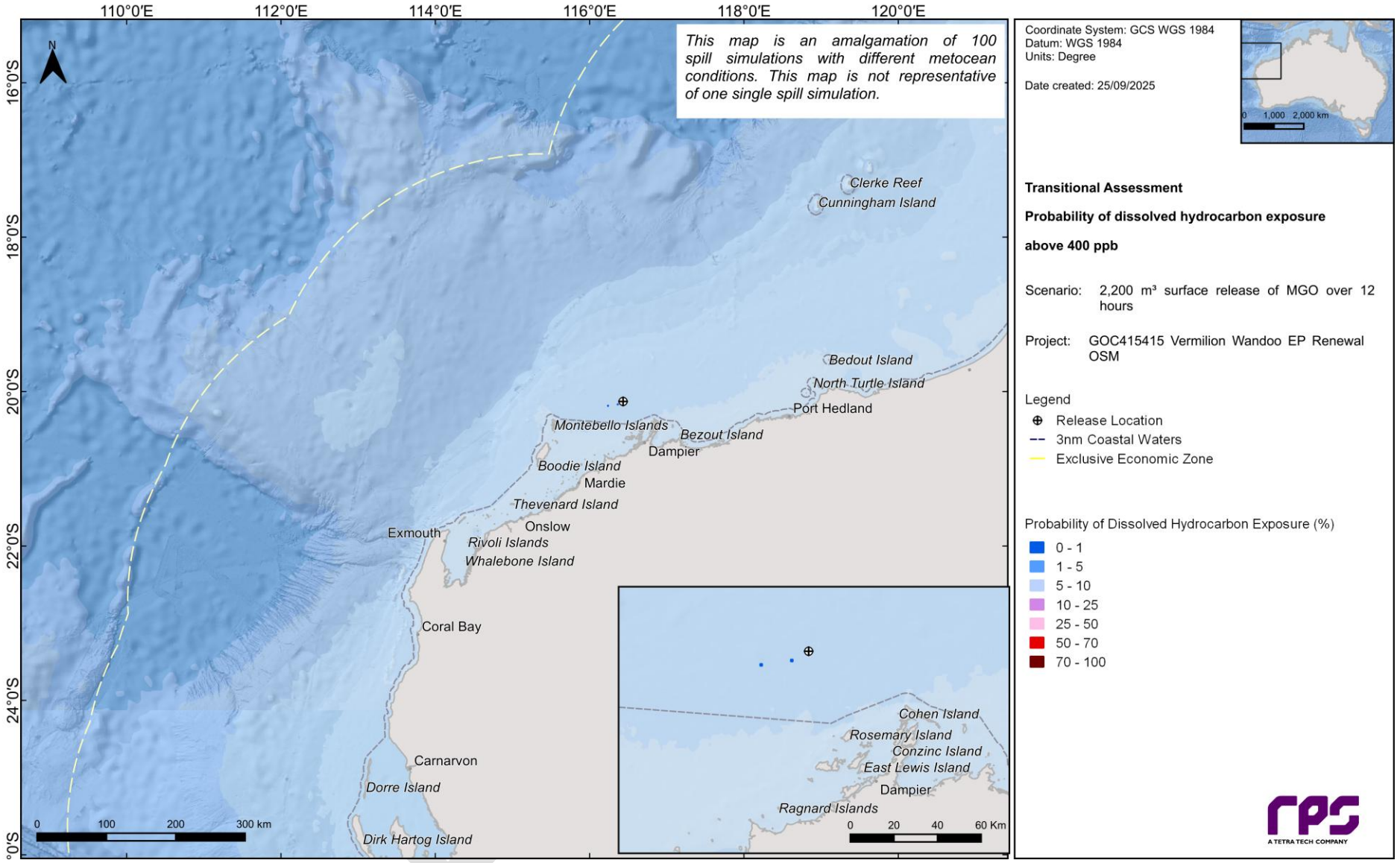


Figure 13.52 Probability of dissolved hydrocarbon exposure at, or above, 400 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

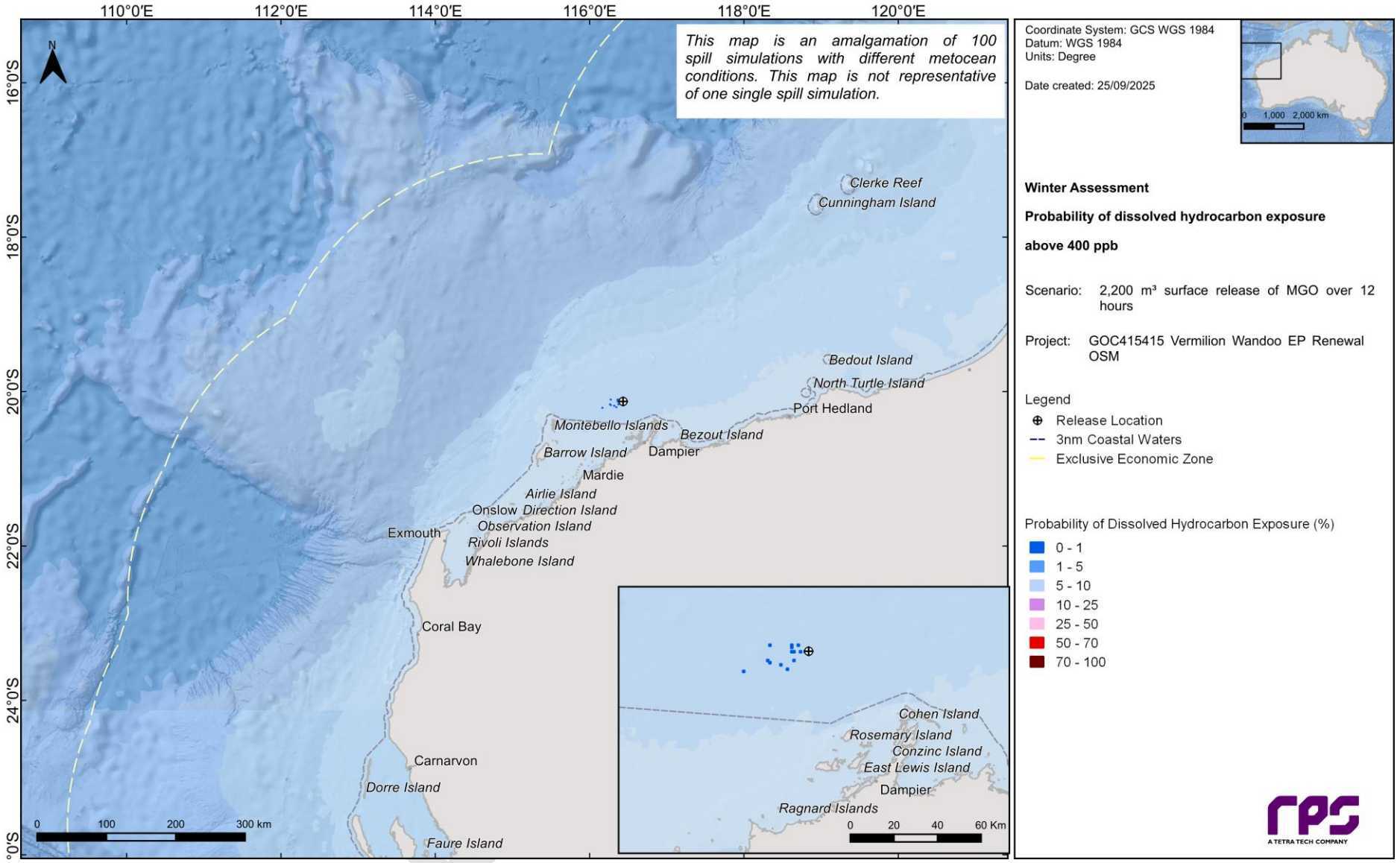


Figure 13.53 Probability of dissolved hydrocarbon exposure at, or above, 400 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

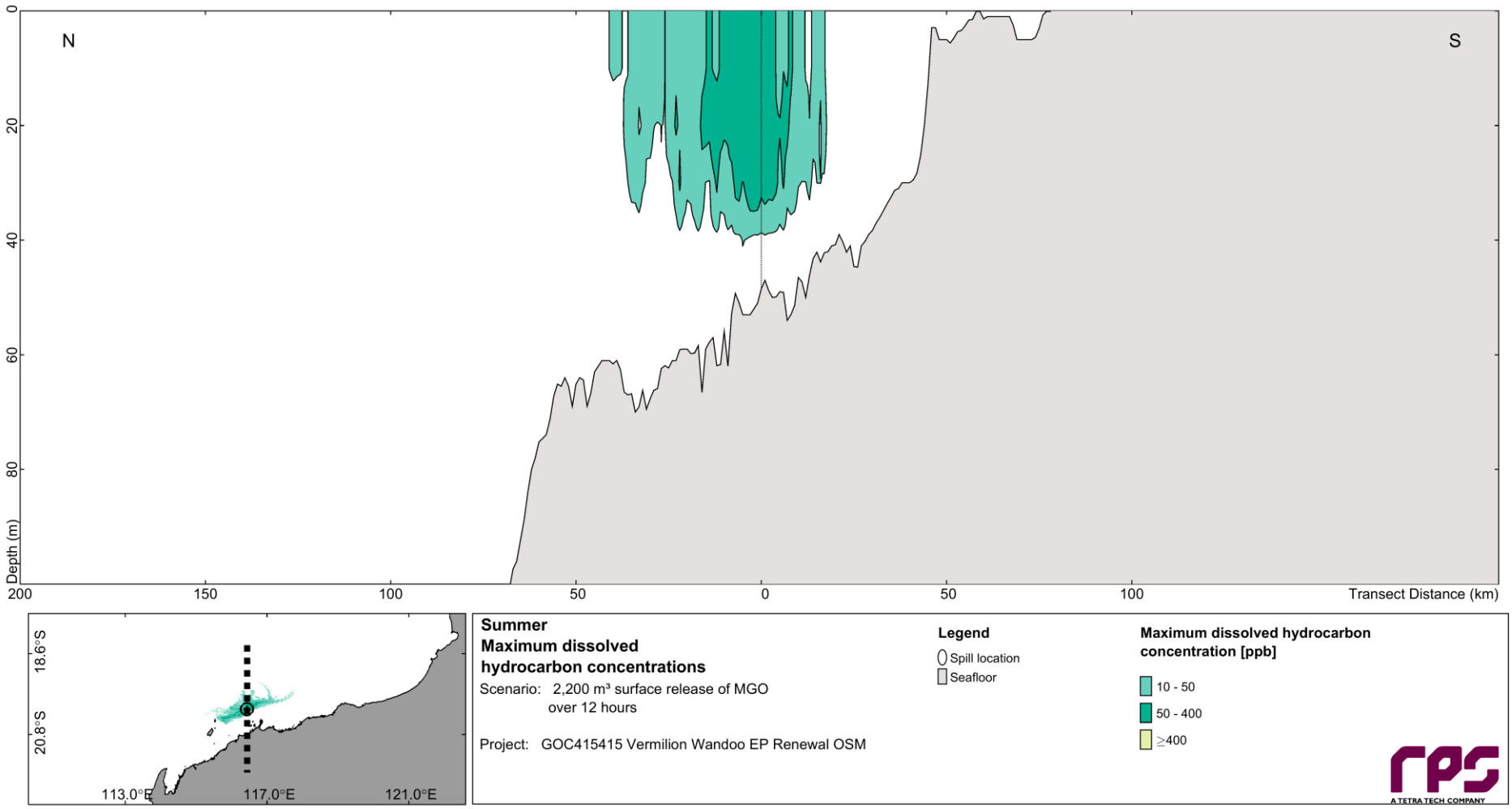


Figure 13.54 North-south cross-section transect of dissolved hydrocarbon concentrations exposure following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

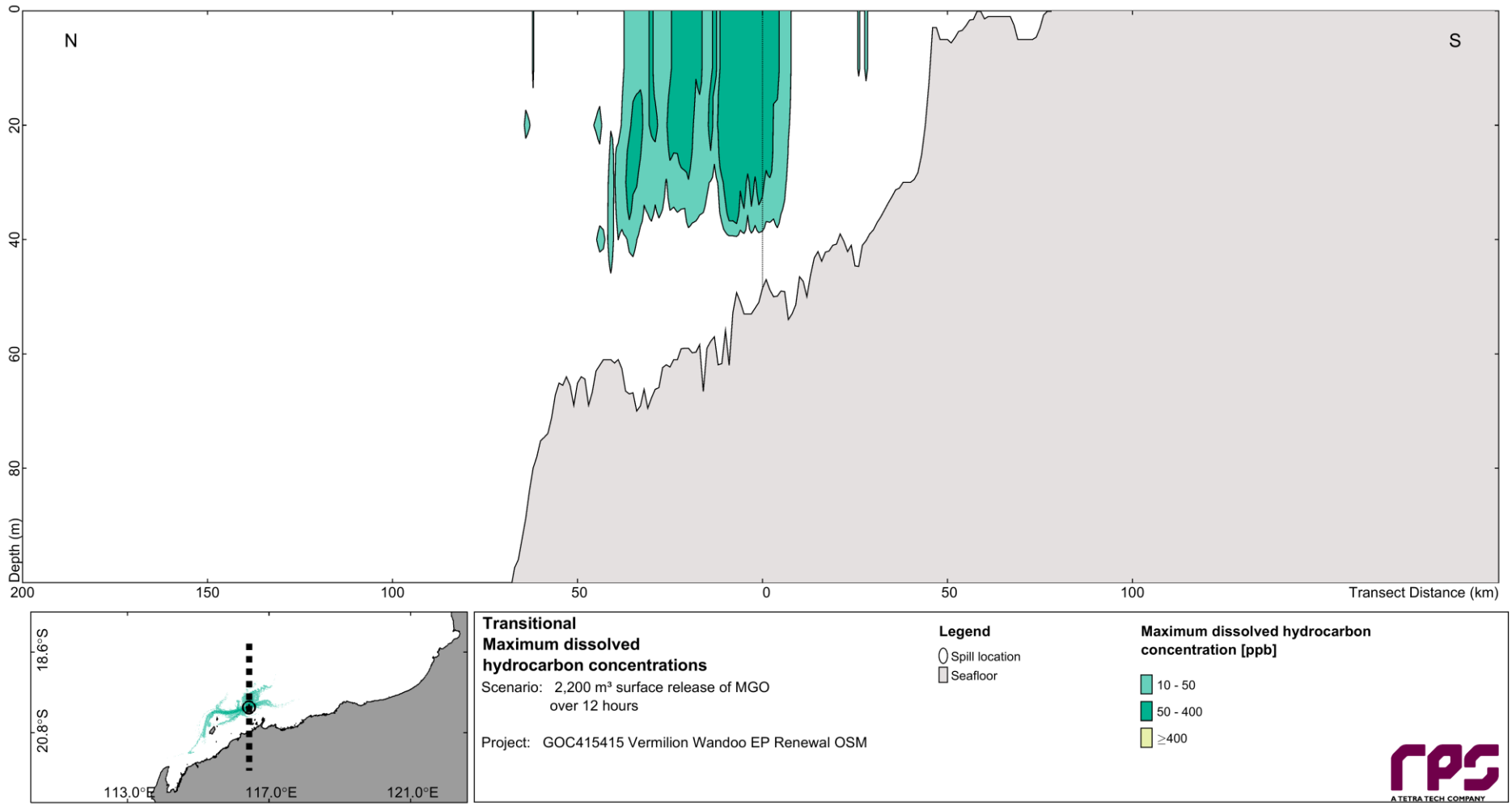


Figure 13.55 North-south cross-section transect of dissolved hydrocarbon concentrations exposure following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

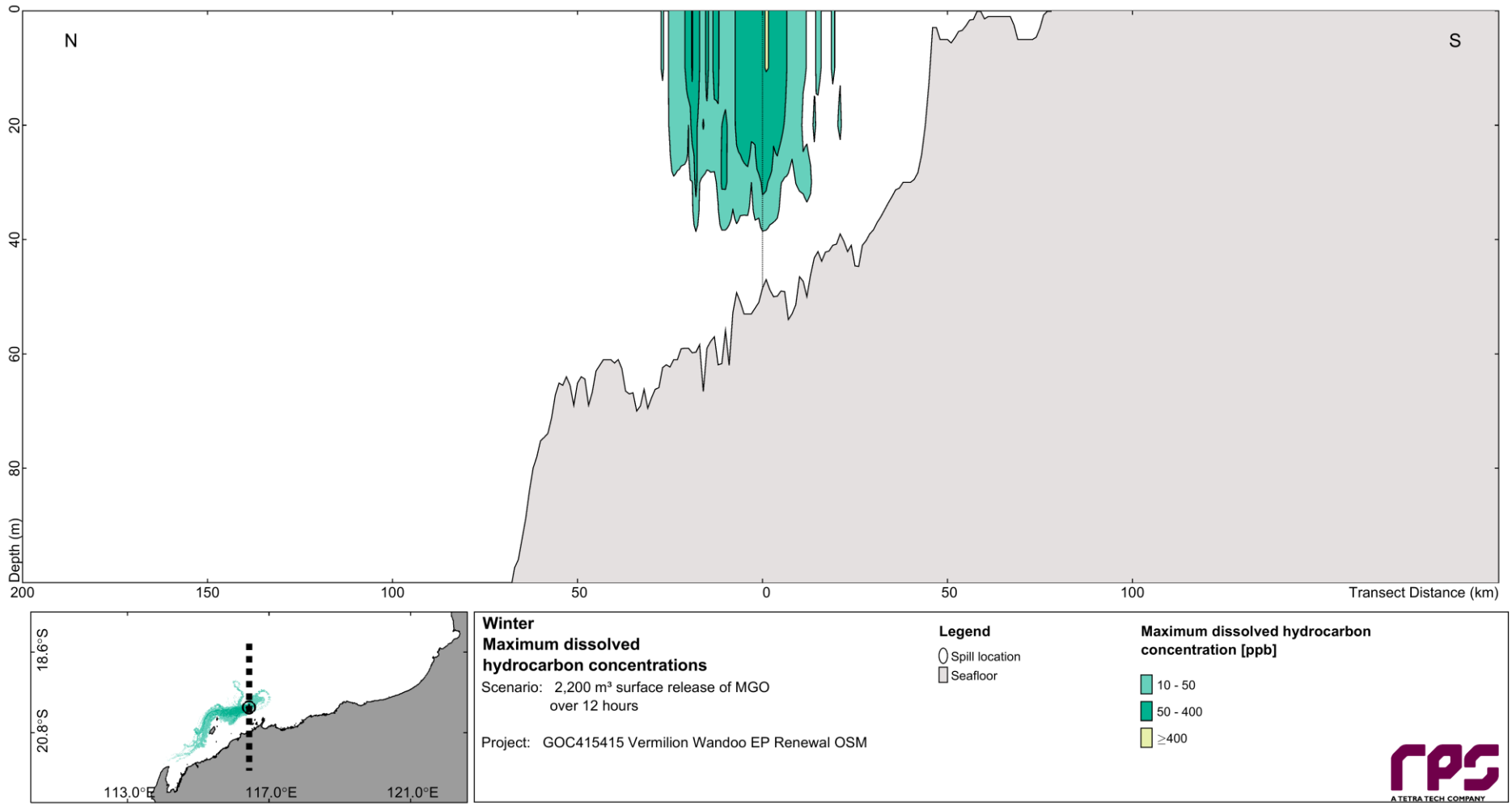


Figure 13.56 North-south cross-section transect of dissolved hydrocarbon concentrations exposure following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

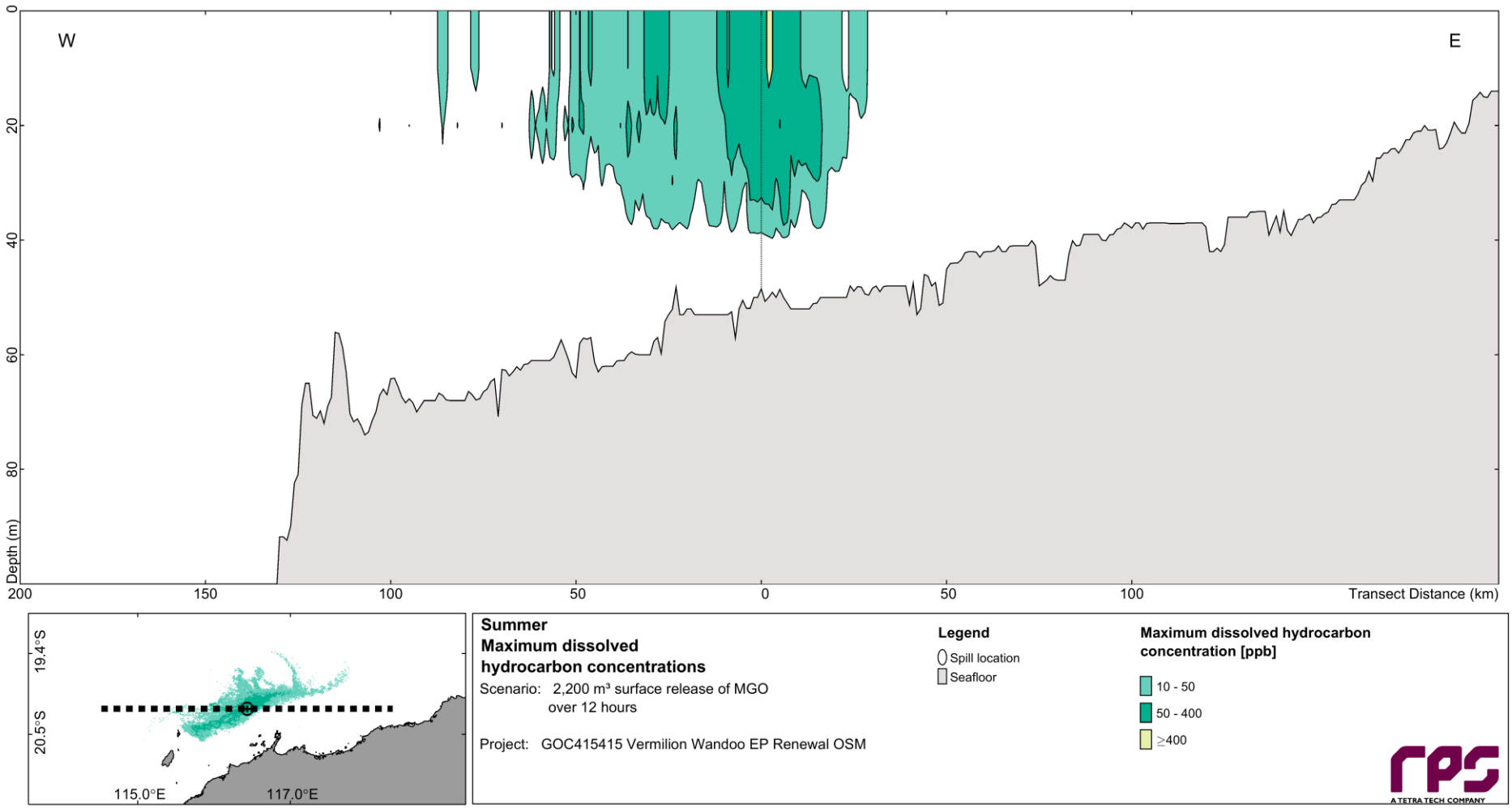


Figure 13.57 East-west cross-section transect of dissolved hydrocarbon concentrations exposure following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

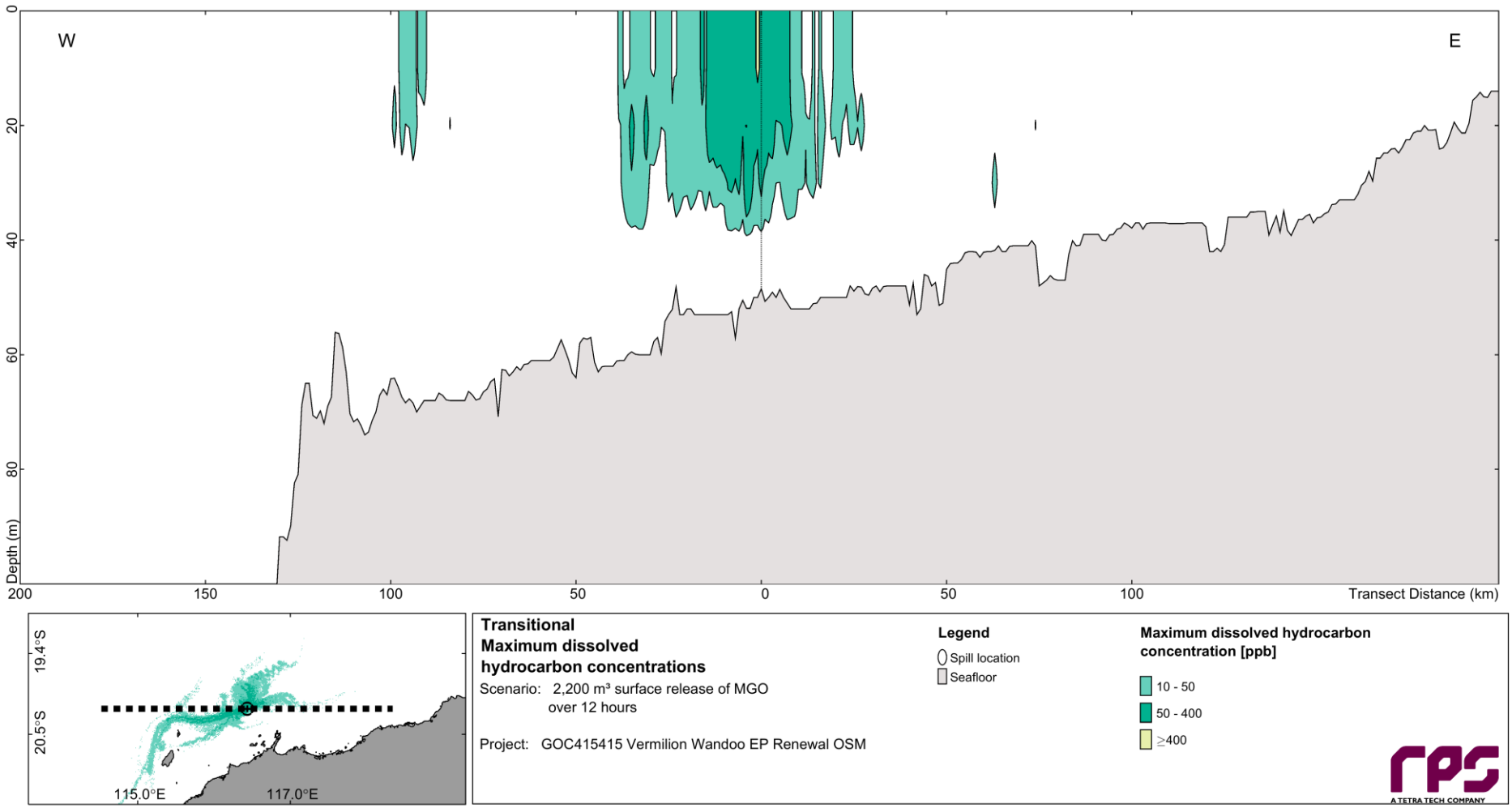


Figure 13.58 East-west cross-section transect of dissolved hydrocarbon concentrations exposure following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

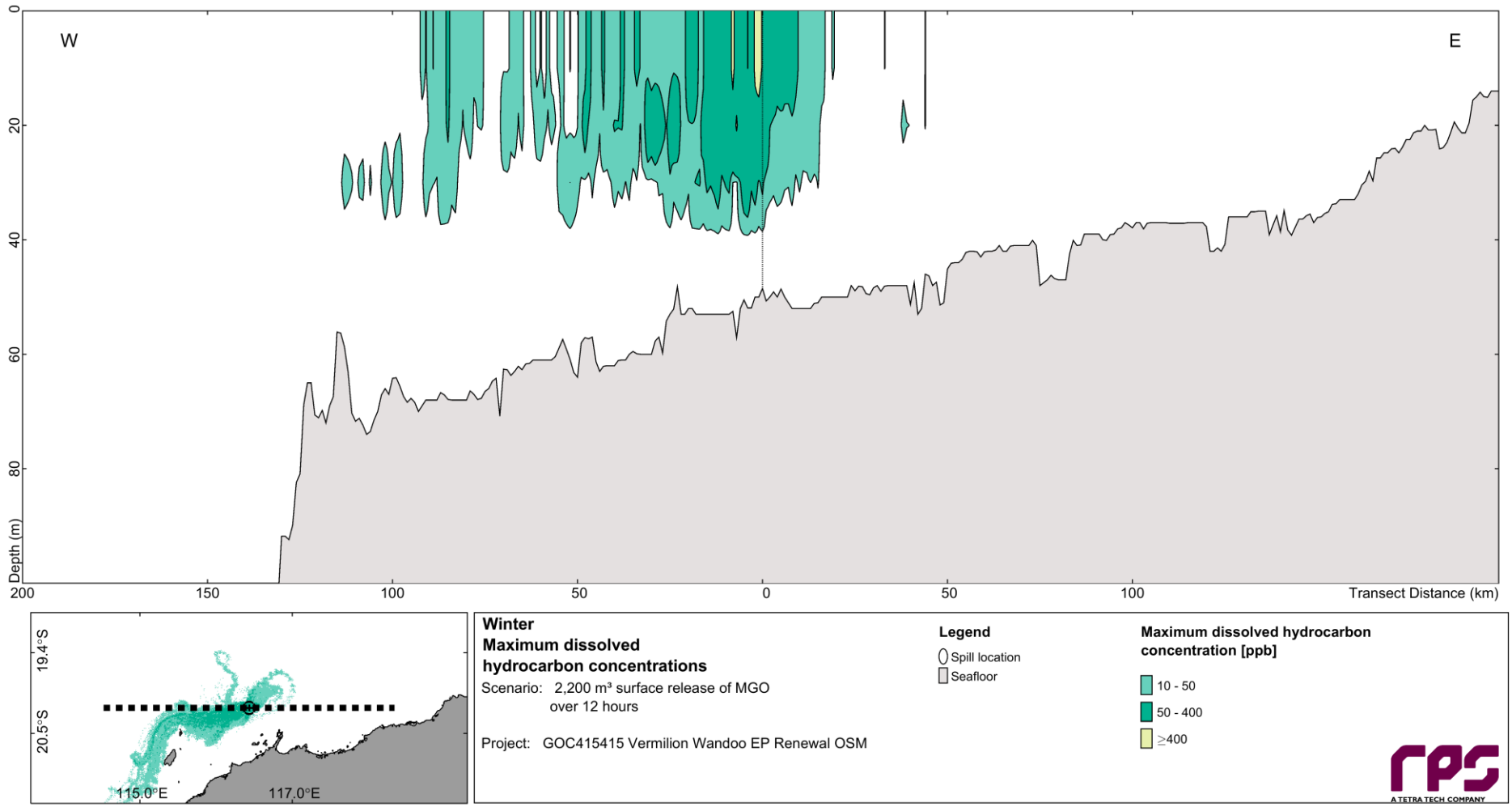


Figure 13.59 East-west cross-section transect of dissolved hydrocarbon concentrations exposure following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

13.1.5.2 Entrained Hydrocarbons

Table 13-9 summarises the maximum distances from the release location to entrained hydrocarbon thresholds for each season. Concentrations exceeding 10 ppb may potentially extend up to 729 km from the release location. As the threshold increases above 100 ppb and 1,000 ppb, the maximum distance decreases to 452 km and 175 km, respectively.

Table 13-10 summarises the receptors exposed to entrained hydrocarbons per season (either at, or above, receptors in the water column).

The Montebello AMP recorded the highest probability of exposure to concentrations at, or above, 10 ppb, across all seasons, 35% in summer, 64% during the transitional conditions and 72% in winter. Additionally, the same receptor recorded the overall quickest time to exposure at 20 hours during summer. Additionally, Montebello AMP recorded the highest concentration of 2,856 ppb during winter.

Figure 13.60 to Figure 13.62 illustrate the zones of exposure to entrained hydrocarbons for each season, whilst Figure 13.63 to Figure 13.80 display the minimum exposure times and the probability of exposure for each threshold and season.

Seasonal cross-sectional transects (north-south and east-west) of the maximum entrained hydrocarbons in the vicinity of the release site, are presented in Figure 13.81 to Figure 13.86.

Table 13-9 Maximum distances from the release location to entrained hydrocarbon exposure thresholds following a surface release of MGO from Wandoo B's Shaft 2. Results were calculated from 100 spill simulations per season.

Season	Distance and direction travelled	Entrained hydrocarbon exposure thresholds		
		10 ppb	100 ppb	1000 ppb
Summer	Maximum distance (km) from release location	489	274	68
	Direction	Southwest	Southwest	Southwest
Transitional	Maximum distance (km) from release location	729	421	92
	Direction	Southwest	Southwest	West
Winter	Maximum distance (km) from release location	674	452	175
	Direction	Southwest	Southwest	Southwest

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Table 13-10 Receptors predicted to be exposed by entrained hydrocarbons following a surface release of MGO from Wandoo B's Shaft 2. Results were calculated from100 spill simulations per season.

Category	Name	Summer								Transitional								Winter							
		Probability (%) of entrained concentration			Minimum time before entrained hydrocarbon exposure at			Maximum entrained hydrocarbon concentration (ppb)		Probability (%) of entrained concentration			Minimum time before entrained hydrocarbon exposure at			Maximum entrained hydrocarbon concentration (ppb)		Probability (%) of dissolved concentration			Minimum time before entrained hydrocarbon exposure at			Maximum entrained hydrocarbon concentration (ppb)	
		≥ 10 ppb	≥ 100 ppb	≥ 1,000 ppb	≥ 10 ppb	≥ 100 ppb	≥ 1,000 ppb	averaged over all simulations	in the worst replicate	≥ 10 ppb	≥ 100 ppb	≥ 1,000 ppb	≥ 10 ppb	≥ 100 ppb	≥ 1,000 ppb	averaged over all simulations	in the worst replicate	≥ 10 ppb	≥ 100 ppb	≥ 1,000 ppb	≥ 10 ppb	≥ 100 ppb	≥ 1,000 ppb	averaged over all simulations	in the worst replicate
AMP	Argo-Rowley Terrace	2	NC	NC	37 d, 11 hrs	NC	NC	<1	12	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Carnarvon Canyon	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	26 d, 15 hrs	NC	NC	<1	13	NC	NC	NC	NC	NC	NC	NC	NC
	Dampier	4	1	NC	8 d, 9 hrs	9 d, 8 hrs	NC	3	144	4	1	NC	3 d, 22 hrs	11 d, 5 hrs	NC	3	156	2	NC	NC	12 d, 1 hrs	NC	NC	<1	24
	Gascoyne	4	NC	NC	19 d, 7 hrs	NC	NC	2	69	31	5	NC	13 d, 8 hrs	14 d, 15 hrs	NC	13	167	37	11	NC	9 d, 21 hrs	10 d, 0 hrs	NC	27	316
	Montebello	35	19	2	20 hrs	21 hrs	22 hrs	66	1,613	64	45	11	1 d, 2 hrs	1 d, 2 hrs	1 d, 4 hrs	303	2,754	72	48	13	23 hrs	1 d, 0 hrs	1 d, 1 hrs	336	2,856
KEF	Ancient coastline at 125 m depth contour	23	5	NC	6 d, 0 hrs	6 d, 12 hrs	NC	12	412	36	7	NC	7 d, 8 hrs	8 d, 17 hrs	NC	19	406	49	13	NC	4 d, 16 hrs	4 d, 19 hrs	NC	38	713
	Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	8	NC	NC	12 d, 1 hrs	NC	NC	4	81	30	4	NC	8 d, 22 hrs	12 d, 18 hrs	NC	13	201	45	13	NC	7 d, 6 hrs	7 d, 9 hrs	NC	37	563
	Commonwealth waters adjacent to Ningaloo Reef	5	NC	NC	14 d, 6 hrs	NC	NC	2	78	31	4	NC	11 d, 7 hrs	14 d, 21 hrs	NC	12	261	43	11	NC	9 d, 7 hrs	9 d, 17 hrs	NC	31	391
	Continental Slope Demersal Fish Communities	12	NC	NC	10 d, 14 hrs	NC	NC	4	98	31	5	NC	9 d, 15 hrs	9 d, 23 hrs	NC	14	303	39	10	NC	6 d, 3 hrs	6 d, 18 hrs	NC	25	347
	Exmouth Plateau	1	NC	NC	19 d, 18 hrs	NC	NC	<1	28	4	NC	NC	22 d, 7 hrs	NC	NC	<1	49	8	1	NC	15 d, 3 hrs	15 d, 15 hrs	NC	4	151
	Glomar Shoals	29	10	NC	3 d, 0 hrs	3 d, 10 hrs	NC	34	643	21	15	NC	3 d, 13 hrs	4 d, 1 hrs	NC	56	923	17	6	3	2 d, 10 hrs	2 d, 12 hrs	2 d, 17 hrs	52	1,685
	Mermaid Reef and Commonwealth waters surrounding Rowley Shoals	2	NC	NC	36 d, 10 hrs	NC	NC	<1	12	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
MMA	Muiron Islands	5	1	NC	14 d, 0 hrs	19 d, 19 hrs	NC	3	130	29	3	NC	10 d, 0 hrs	12 d, 12 hrs	NC	14	317	43	11	NC	8 d, 10 hrs	8 d, 14 hrs	NC	30	304
MP	Barrow Island	5	NC	NC	4 d, 23 hrs	NC	NC	2	57	26	4	NC	5 d, 0 hrs	5 d, 4 hrs	NC	14	250	37	10	NC	3 d, 19 hrs	4 d, 3 hrs	NC	37	769
	Montebello Islands	11	4	NC	2 d, 21 hrs	3 d, 6 hrs	NC	9	324	35	19	NC	2 d, 16 hrs	2 d, 22 hrs	NC	51	633	67	28	4	2 d, 12 hrs	2 d, 20 hrs	3 d, 23 hrs	115	1,371
	Ningaloo	5	NC	NC	14 d, 6 hrs	NC	NC	2	78	31	4	NC	11 d, 7 hrs	14 d, 21 hrs	NC	12	261	43	11	NC	9 d, 7 hrs	9 d, 17 hrs	NC	31	391
	Shark Bay	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	32 d, 7 hrs	NC	NC	<1	13	1	NC	NC	39 d, 16 hrs	NC	NC	<1	17
NR	Barrow Island	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	8 d, 13 hrs	NC	NC	<1	31	9	NC	NC	16 d, 2 hrs	NC	NC	4	77
	Great Sandy Island	1	NC	NC	49 d, 11 hrs	NC	NC	<1	13	2	NC	NC	30 d, 19 hrs	NC	NC	<1	29	7	1	NC	11 d, 17 hrs	18 d, 23 hrs	NC	3	102
	Lowendal Islands	3	NC	NC	11 d, 13 hrs	NC	NC	<1	28	5	1	NC	5 d, 12 hrs	5 d, 23 hrs	NC	4	265	18	1	NC	6 d, 19 hrs	9 d, 22 hrs	NC	11	233
	Thevenard Island	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	9 d, 1 hrs	NC	NC	<1	22	5	NC	NC	7 d, 20 hrs	NC	NC	3	44
RSB	Australind Shoal	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	31 d, 11 hrs	NC	NC	<1	17	NC	NC	NC	NC	NC	NC	NC	NC
	Barrow Island Reefs and Shoals	1	NC	NC	49 d, 7 hrs	NC	NC	<1	14	3	NC	NC	30 d, 19 hrs	NC	NC	<1	34	7	1	NC	16 d, 14 hrs	18 d, 14 hrs	NC	4	117

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Baylis Patches	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	15 d, 11 hrs	NC	NC	<1	22
Beryl Reef	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	45 d, 13 hrs	NC	NC	<1	13	1	NC	NC	17 d, 21 hrs	NC	NC	2	16
Brewis Reef	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	8 d, 13 hrs	NC	NC	2	23	6	NC	NC	7 d, 7 hrs	NC	NC	3	39
Camplin Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	30 d, 14 hrs	NC	NC	<1	18
Cod Bank	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	12 d, 5 hrs	NC	NC	<1	29	NC	NC	NC	NC	NC	NC	NC	NC
Combe Reef	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	24 d, 5 hrs	NC	NC	3	50	11	NC	NC	9 d, 22 hrs	NC	NC	5	91
Cooper Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	30 d, 13 hrs	NC	NC	<1	19
Courtenay Shoal	1	NC	NC	17 d, 4 hrs	NC	NC	<1	12	1	NC	NC	19 d, 19 hrs	NC	NC	<1	51	NC	NC	NC	NC	NC	NC	NC	NC
Dailey Shoal	4	NC	NC	16 d, 14 hrs	NC	NC	2	41	16	2	NC	12 d, 3 hrs	27 d, 1 hrs	NC	8	103	30	2	NC	8 d, 18 hrs	11 d, 10 hrs	NC	14	157
Exmouth Reef	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	45 d, 13 hrs	NC	NC	<1	14	4	NC	NC	11 d, 0 hrs	NC	NC	2	32
Fairway Reef	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	22 d, 19 hrs	NC	NC	2	22	7	NC	NC	10 d, 10 hrs	NC	NC	4	75
Flinders Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	19 d, 0 hrs	NC	NC	<1	26
Fortescue Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	11 d, 12 hrs	NC	NC	<1	30
Glennie Patches	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	31 d, 11 hrs	NC	NC	<1	11	NC	NC	NC	NC	NC	NC	NC	NC
Glomar Shoal	26	6	NC	6 d, 15 hrs	7 d, 3 hrs	NC	21	319	17	4	NC	5 d, 19 hrs	5 d, 20 hrs	NC	15	440	7	1	NC	4 d, 8 hrs	6 d, 15 hrs	NC	4	219
Hammersley Shoal	3	NC	NC	7 d, 21 hrs	NC	NC	2	59	1	NC	NC	17 d, 16 hrs	NC	NC	<1	44	NC	NC	NC	NC	NC	NC	NC	NC
Hayman Rock	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	15 d, 8 hrs	NC	NC	<1	24
Hood Reef	1	NC	NC	28 d, 23 hrs	NC	NC	<1	15	7	NC	NC	11 d, 20 hrs	NC	NC	4	46	17	NC	NC	8 d, 20 hrs	NC	NC	6	74
Locker Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	14 d, 11 hrs	NC	NC	<1	32
Madeleine Shoals	4	1	NC	8 d, 8 hrs	8 d, 22 hrs	NC	3	140	3	1	NC	4 d, 9 hrs	11 d, 5 hrs	NC	3	118	2	NC	NC	12 d, 1 hrs	NC	NC	<1	14
McLennan Bank	1	NC	NC	30 d, 16 hrs	NC	NC	<1	15	2	NC	NC	15 d, 8 hrs	NC	NC	2	91	4	NC	NC	7 d, 11 hrs	NC	NC	2	51
Montebello Shoals	8	NC	NC	5 d, 4 hrs	NC	NC	3	62	20	6	NC	4 d, 6 hrs	6 d, 4 hrs	NC	18	271	42	19	NC	3 d, 9 hrs	3 d, 10 hrs	NC	54	550
Ningaloo Reef	1	NC	NC	18 d, 1 hrs	NC	NC	<1	32	14	1	NC	16 d, 12 hrs	18 d, 15 hrs	NC	6	153	15	1	NC	11 d, 8 hrs	24 d, 12 hrs	NC	6	120
North West Reef	2	NC	NC	17 d, 14 hrs	NC	NC	<1	13	9	NC	NC	17 d, 21 hrs	NC	NC	4	57	15	NC	NC	10 d, 7 hrs	NC	NC	6	87
O'Grady Shoal	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	18 d, 10 hrs	NC	NC	<1	34	1	NC	NC	17 d, 18 hrs	NC	NC	<1	23
Otway Reef	NC	NC	NC	NC	NC	NC	NC	NC	5	1	NC	23 d, 5 hrs	32 d, 11 hrs	NC	4	104	15	NC	NC	8 d, 22 hrs	NC	NC	7	67
Outtrim Patches	5	NC	NC	15 d, 1 hrs	NC	NC	3	71	26	1	NC	10 d, 18 hrs	16 d, 4 hrs	NC	11	210	37	8	NC	8 d, 16 hrs	8 d, 21 hrs	NC	24	252
Penguin Bank	4	NC	NC	16 d, 14 hrs	NC	NC	<1	28	19	1	NC	5 d, 20 hrs	7 d, 10 hrs	NC	9	131	39	5	NC	6 d, 5 hrs	6 d, 12 hrs	NC	23	390
Poivre Reef	2	NC	NC	24 d, 5 hrs	NC	NC	<1	18	10	1	NC	5 d, 23 hrs	17 d, 13 hrs	NC	5	130	20	5	NC	5 d, 18 hrs	7 d, 7 hrs	NC	19	480
Rankin Bank	15	1	NC	11 d, 3 hrs	12 d, 5 hrs	NC	6	101	14	NC	NC	12 d, 12 hrs	NC	NC	5	93	13	2	NC	15 d, 2 hrs	16 d, 20 hrs	NC	8	215
Ripple Shoals	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	12 d, 2 hrs	NC	NC	<1	24	7	NC	NC	13 d, 3 hrs	NC	NC	3	76
Rosily Shoals	1	NC	NC	33 d, 19 hrs	NC	NC	<1	25	18	NC	NC	7 d, 10 hrs	NC	NC	6	73	33	2	NC	6 d, 11 hrs	7 d, 5 hrs	NC	13	206
Santo Rock	NC	NC	NC	NC	NC	NC	NC	NC	3	NC	NC	22 d, 6 hrs	NC	NC	<1	23	3	NC	NC	13 d, 21 hrs	NC	NC	2	52
Spider Reef	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	23 d, 8 hrs	NC	NC	<1	13	3	NC	NC	12 d, 10 hrs	NC	NC	3	32
Sultan Reef	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	34 d, 14 hrs	NC	NC	<1	11	1	NC	NC	11 d, 11 hrs	NC	NC	2	27
Taunton Reef	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	34 d, 7 hrs	NC	NC	<1	13	2	NC	NC	16 d, 23 hrs	NC	NC	2	27

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	Tongue Shoals	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	31 d, 0 hrs	NC	NC	<1	11	NC	NC	NC	NC	NC	NC	NC
	Trap Reef	NC	NC	NC	NC	NC	NC	NC	NC	4	NC	NC	8 d, 3 hrs	NC	NC	2	22	11	NC	NC	6 d, 21 hrs	NC	NC	5	56
	Tryal Rocks	15	4	NC	6 d, 14 hrs	6 d, 23 hrs	NC	11	298	51	18	NC	2 d, 13 hrs	2 d, 17 hrs	NC	57	671	66	24	NC	2 d, 3 hrs	2 d, 4 hrs	NC	85	817
	Web Reef	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	38 d, 18 hrs	NC	NC	<1	13	4	NC	NC	12 d, 22 hrs	NC	NC	3	29
State and Territory Waters	Western Australia	14	6	2	1 d, 0 hrs	1 d, 1 hrs	1 d, 2 hrs	34	1,496	35	19	1	1 d, 17 hrs	1 d, 18 hrs	1 d, 20 hrs	54	1,119	67	30	4	1 d, 18 hrs	1 d, 23 hrs	2 d, 0 hrs	155	1,822

NC: No contact to receptor predicted for specified threshold.

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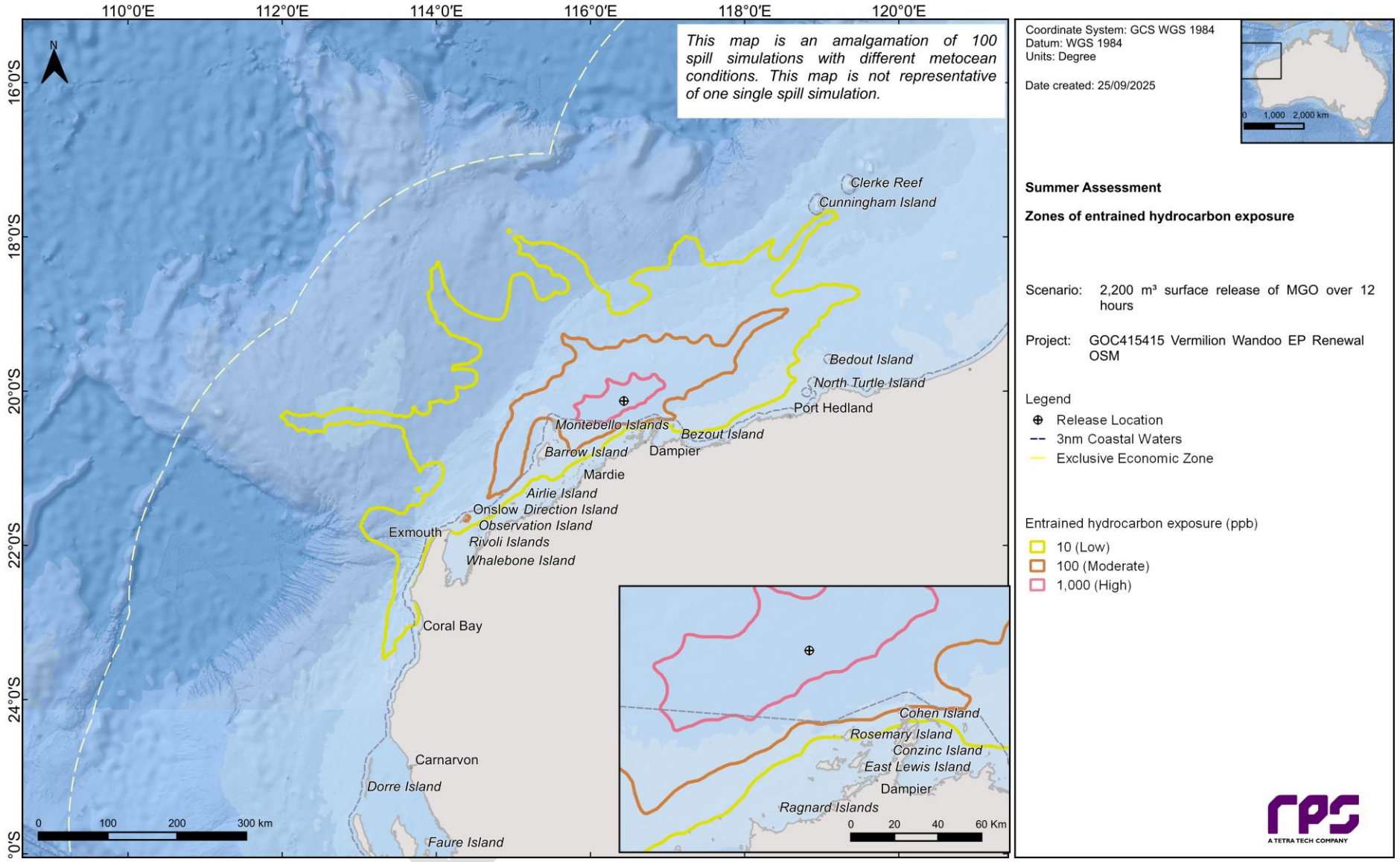


Figure 13.60 Predicted zones of entrained hydrocarbon exposure following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

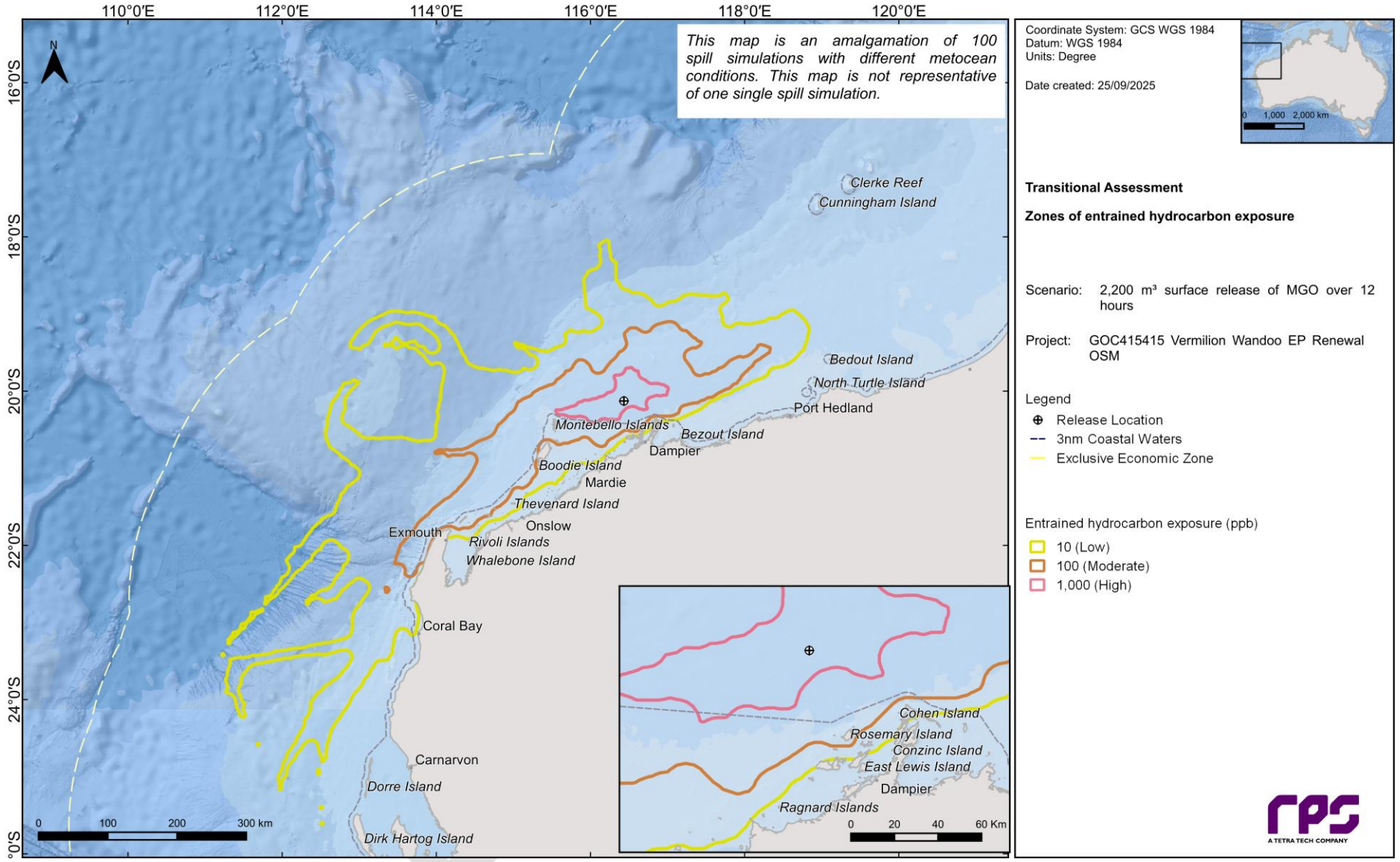


Figure 13.61 Predicted zones of entrained hydrocarbon exposure following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

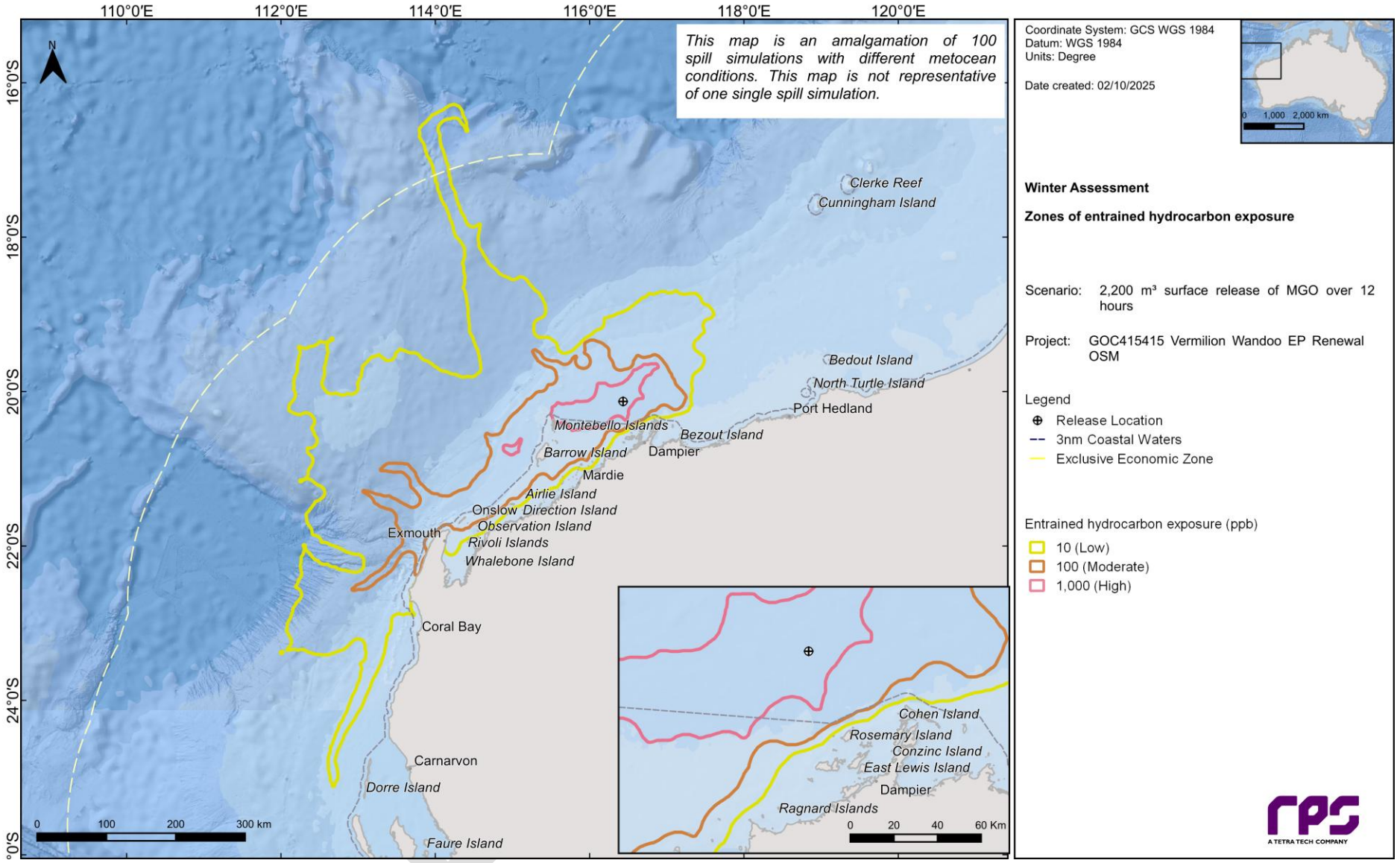


Figure 13.62 Predicted zones of entrained hydrocarbon exposure following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

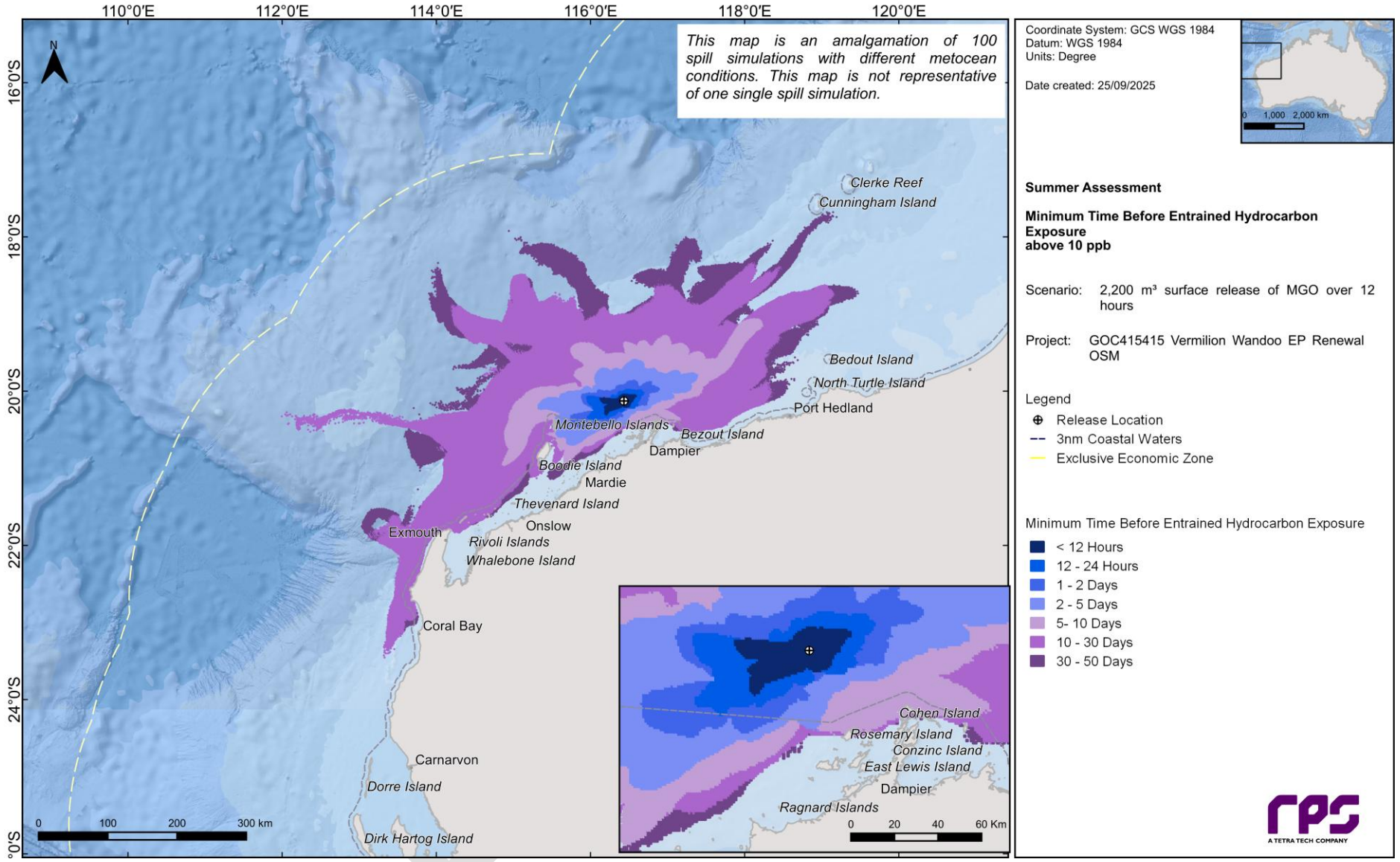


Figure 13.63 Minimum time before entrained hydrocarbon exposure at, or above, 10 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

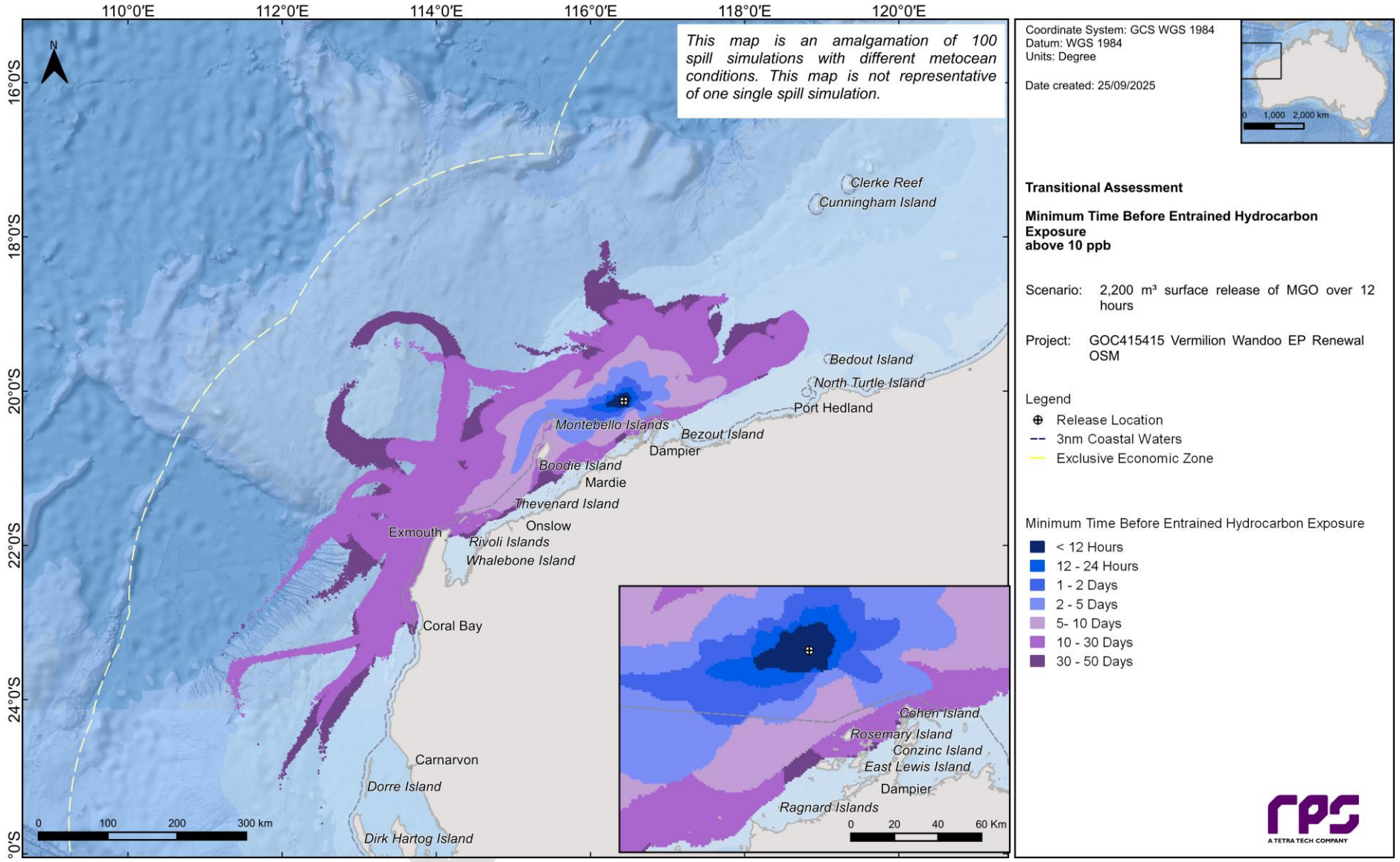


Figure 13.64 Minimum time before entrained hydrocarbon exposure at, or above, 10 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

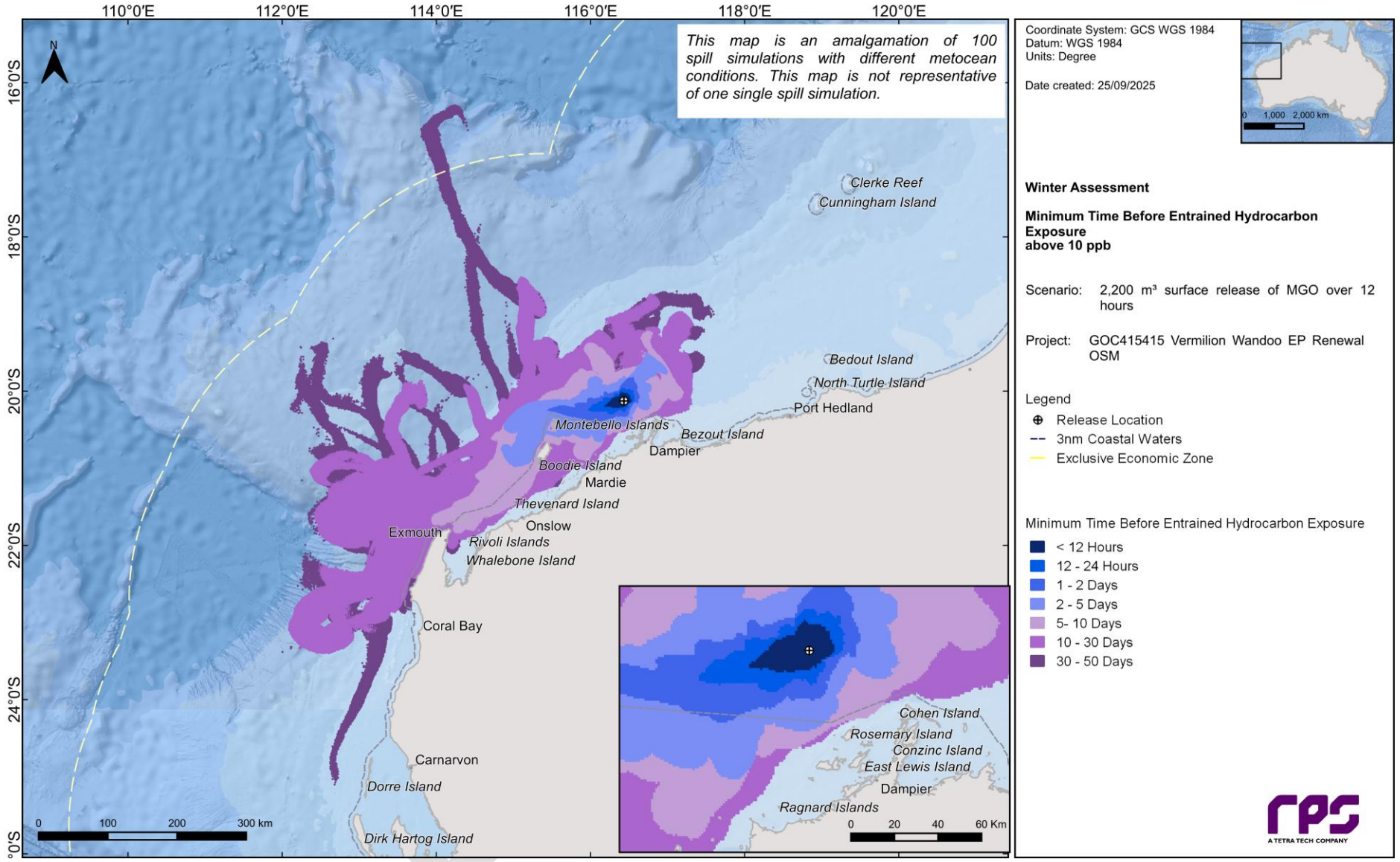


Figure 13.65 Minimum time before entrained hydrocarbon exposure at, or above, 10 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

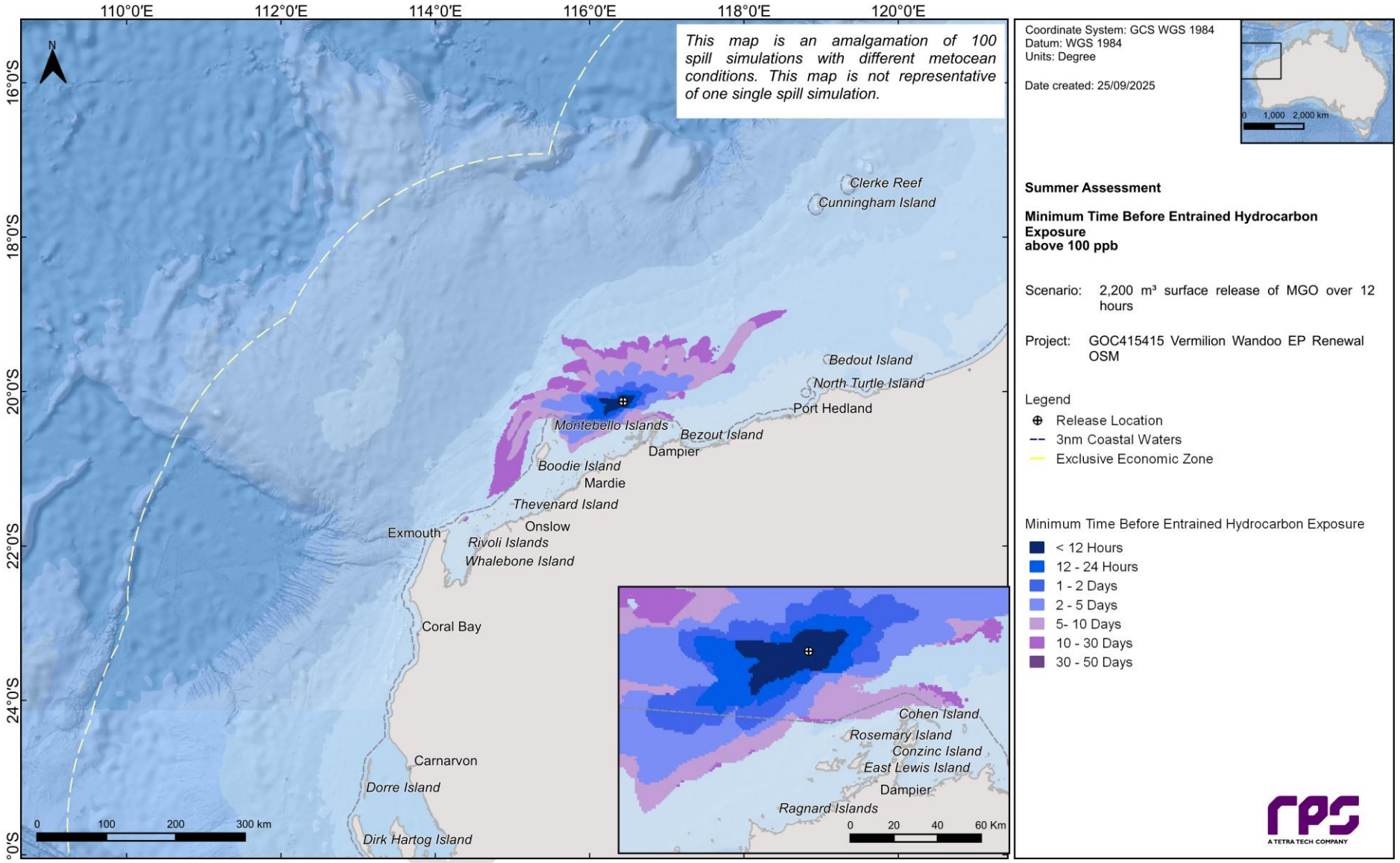


Figure 13.66 Minimum time before entrained hydrocarbon exposure at, or above, 100 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

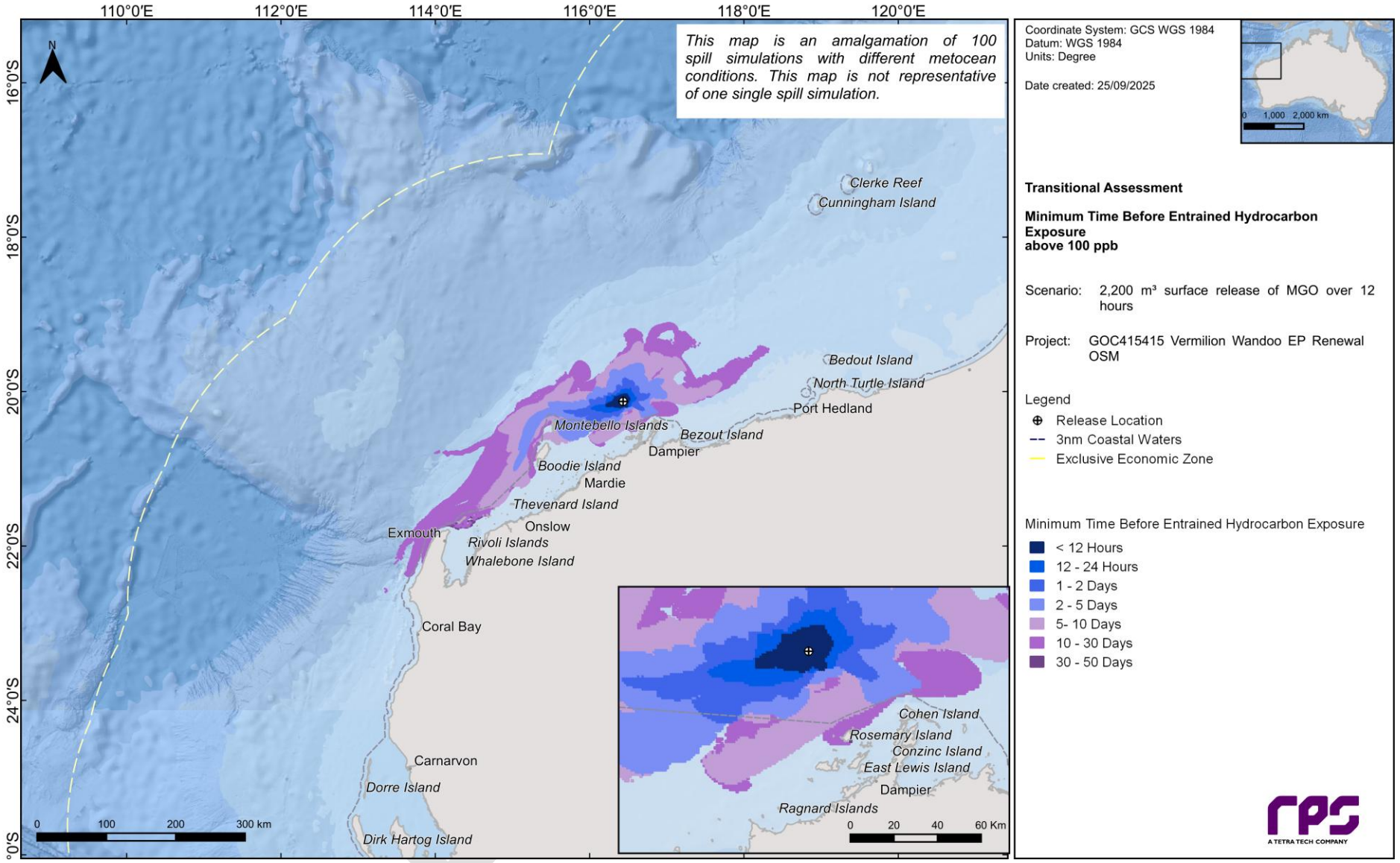


Figure 13.67 Minimum time before entrained hydrocarbon exposure at, or above, 100 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

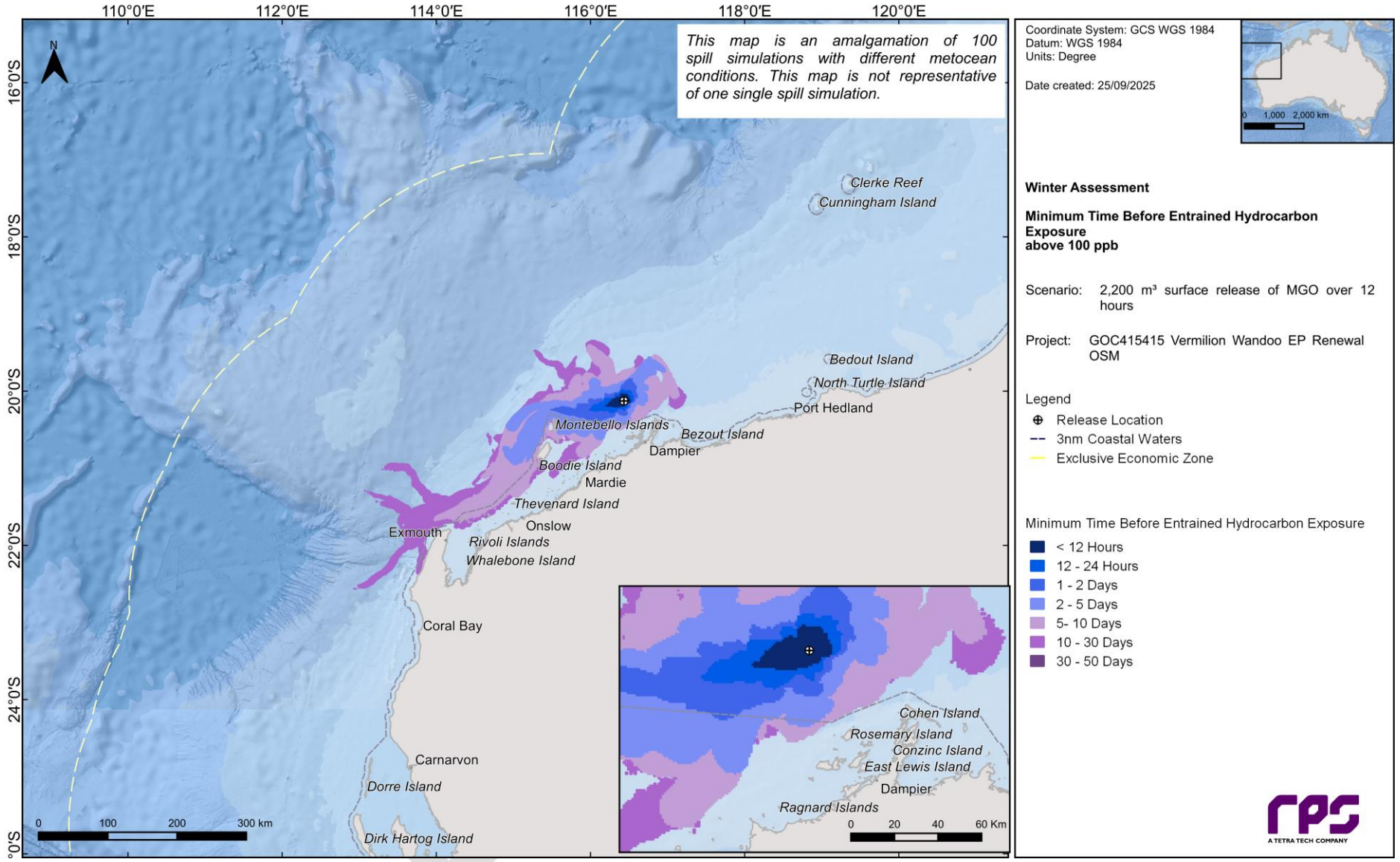


Figure 13.68 Minimum time before entrained hydrocarbon exposure at, or above, 100 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

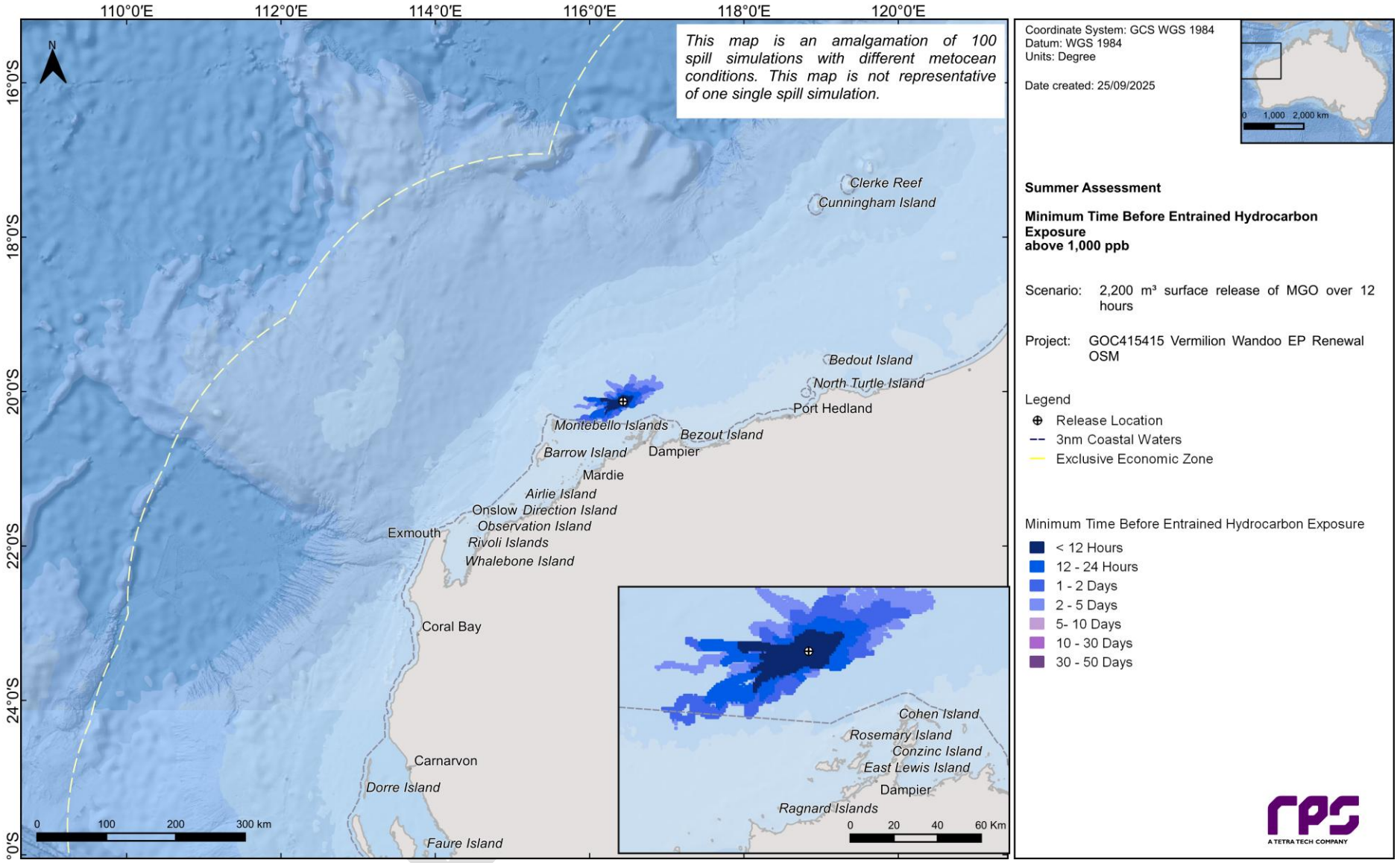


Figure 13.69 Minimum time before entrained hydrocarbon exposure at, or above, 1,000 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

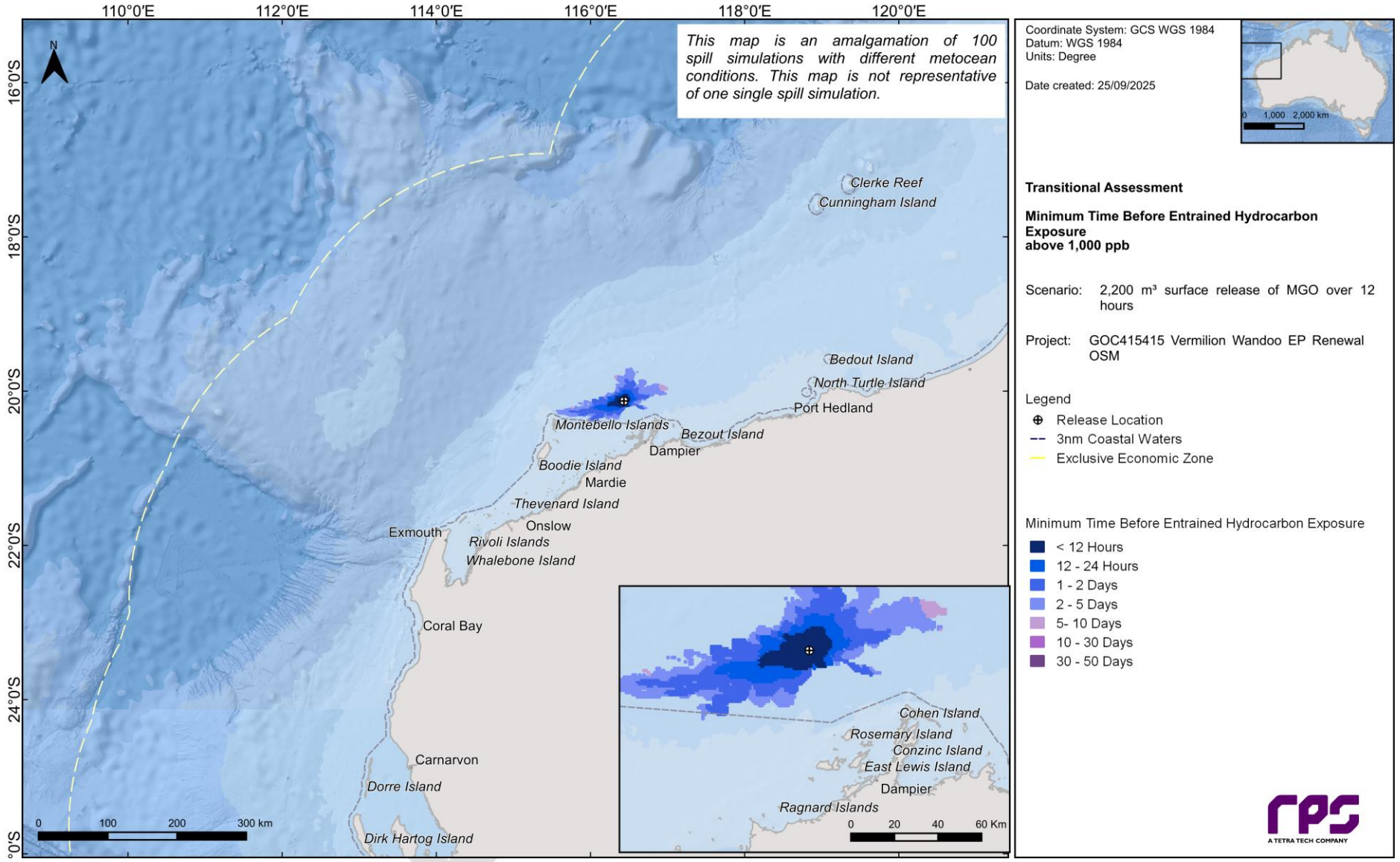


Figure 13.70 Minimum time before entrained hydrocarbon exposure at, or above, 1,000 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

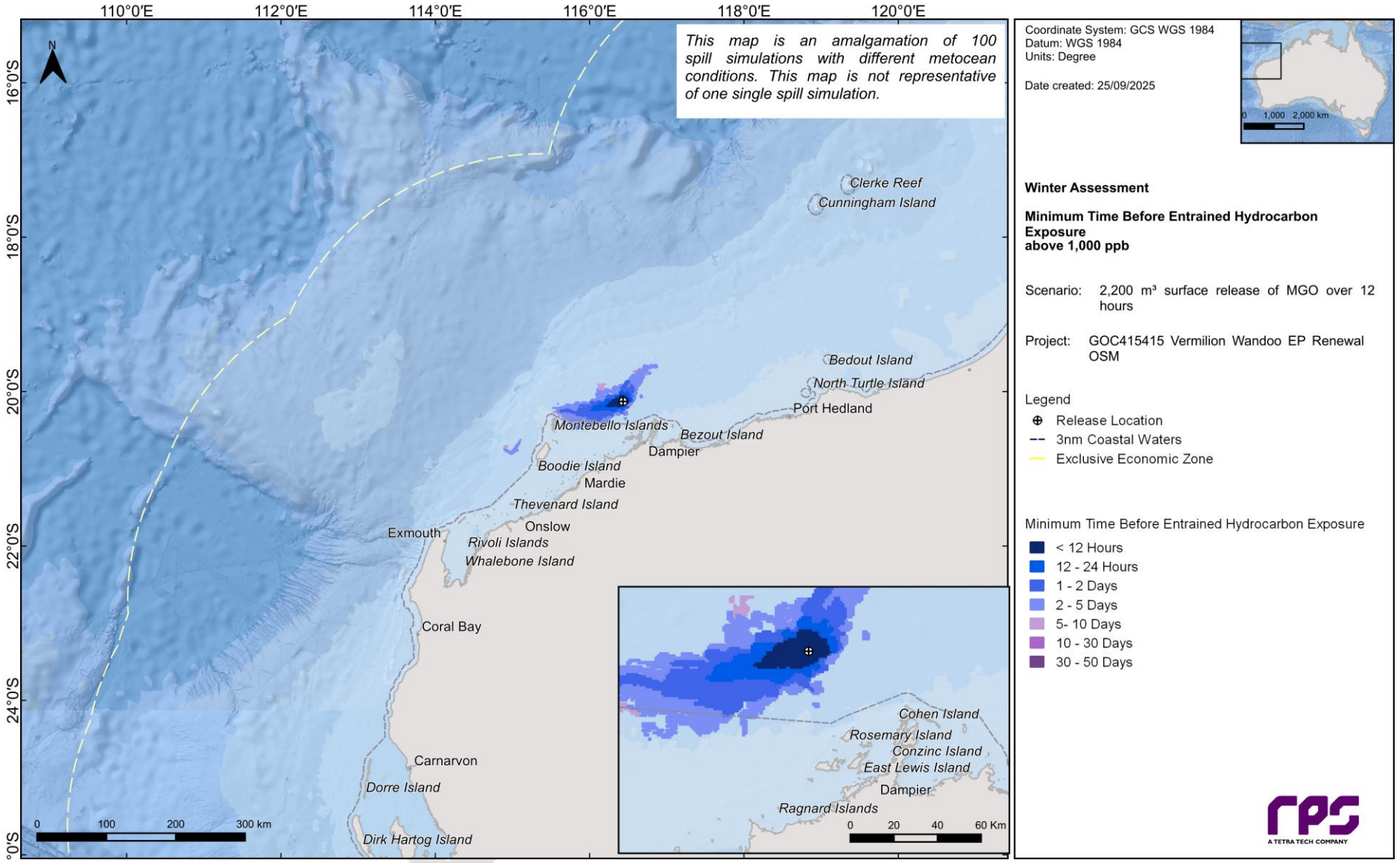


Figure 13.71 Minimum time before entrained hydrocarbon exposure at, or above, 1,000 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

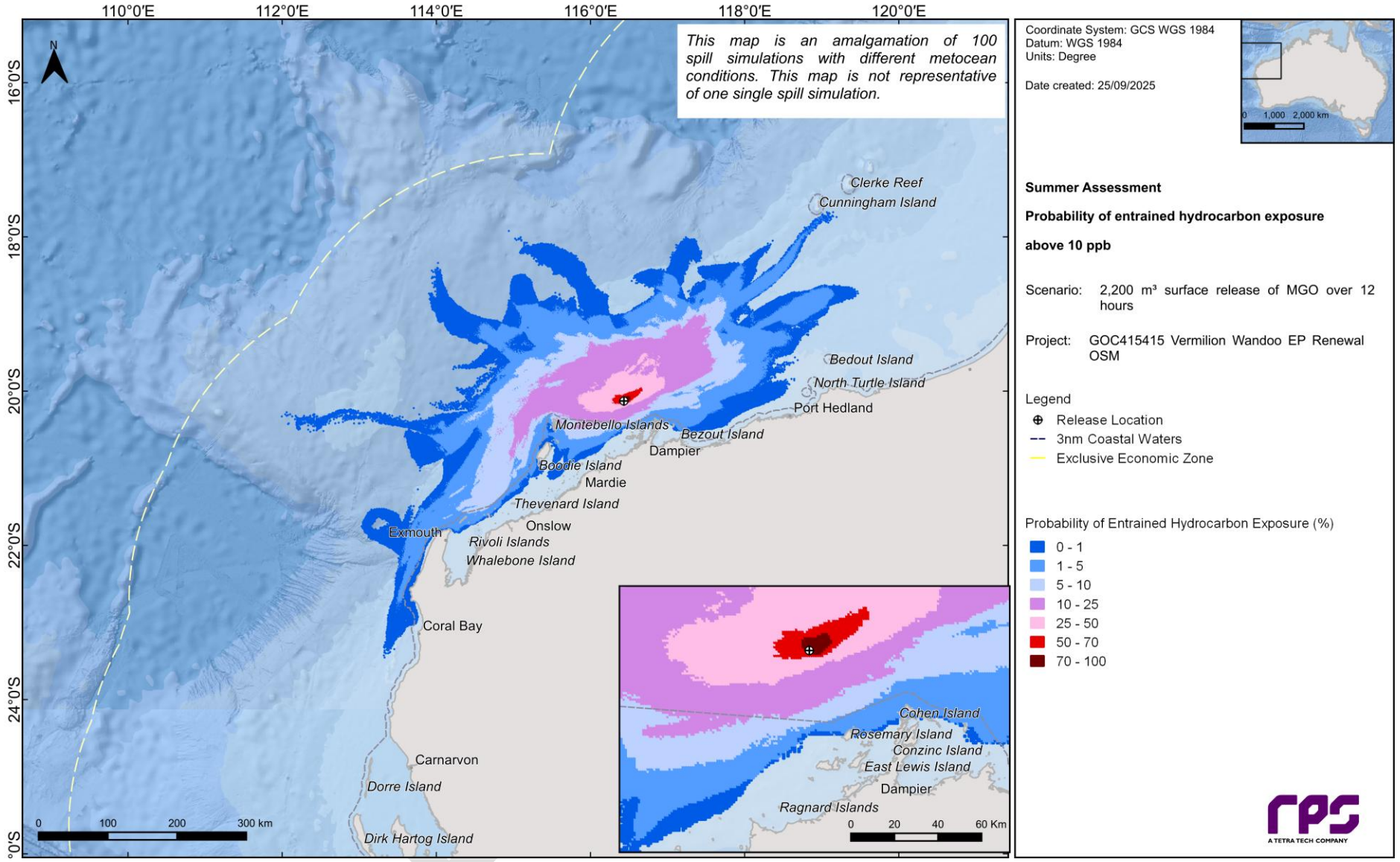


Figure 13.72 Probability of entrained hydrocarbon exposure at, or above, 10 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

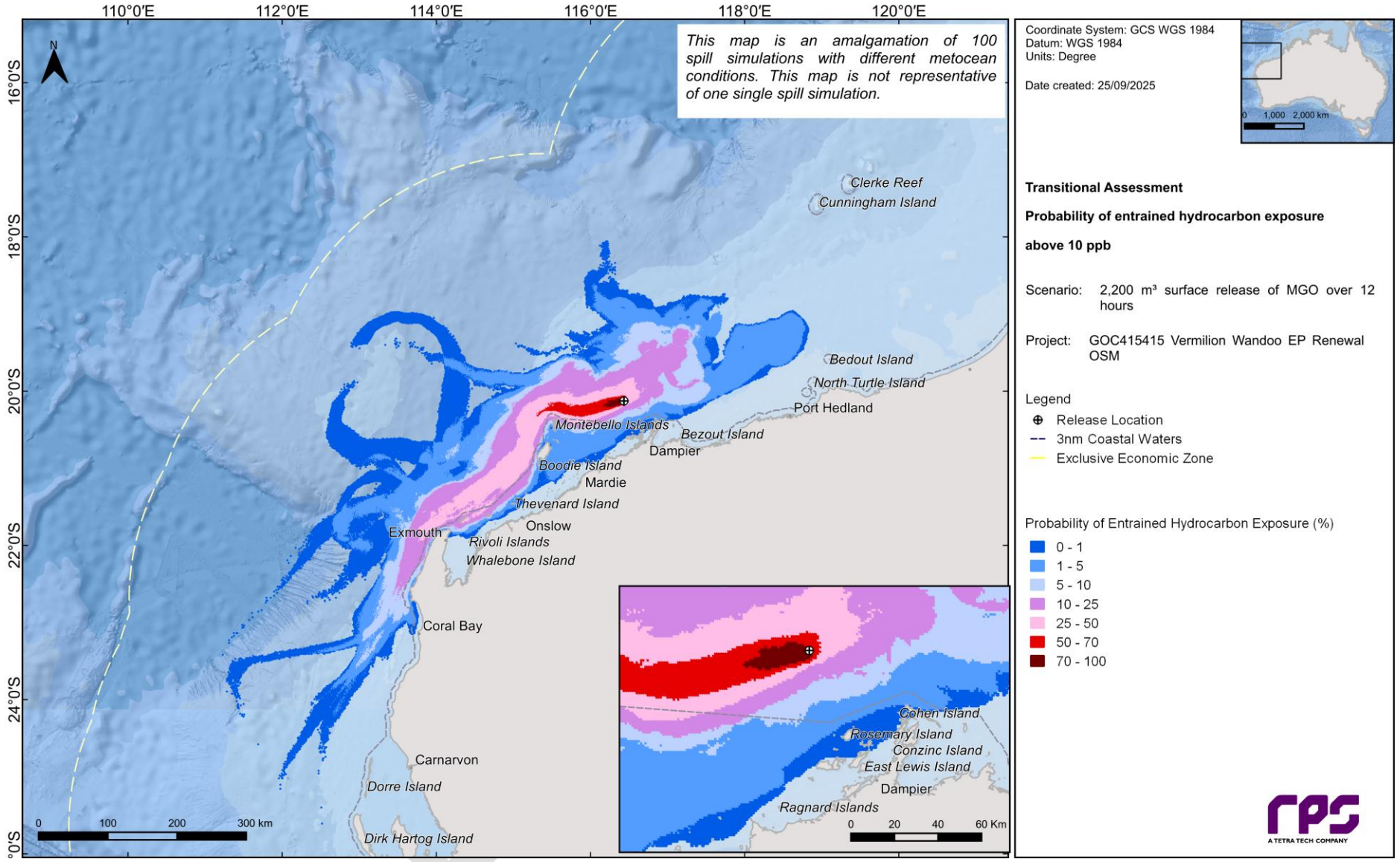


Figure 13.73 Probability of entrained hydrocarbon exposure at, or above, 10 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

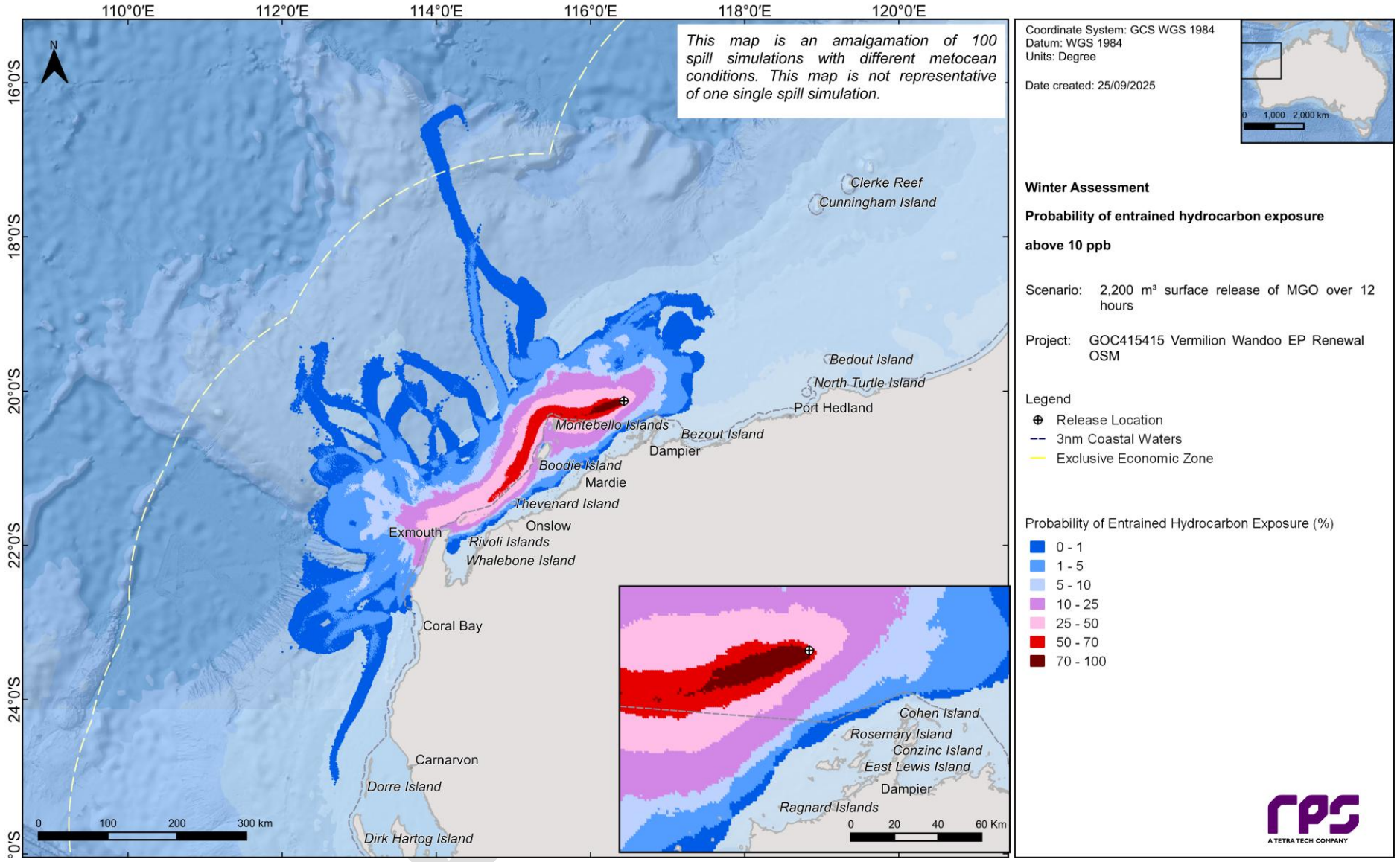


Figure 13.74 Probability of entrained hydrocarbon exposure at, or above, 10 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

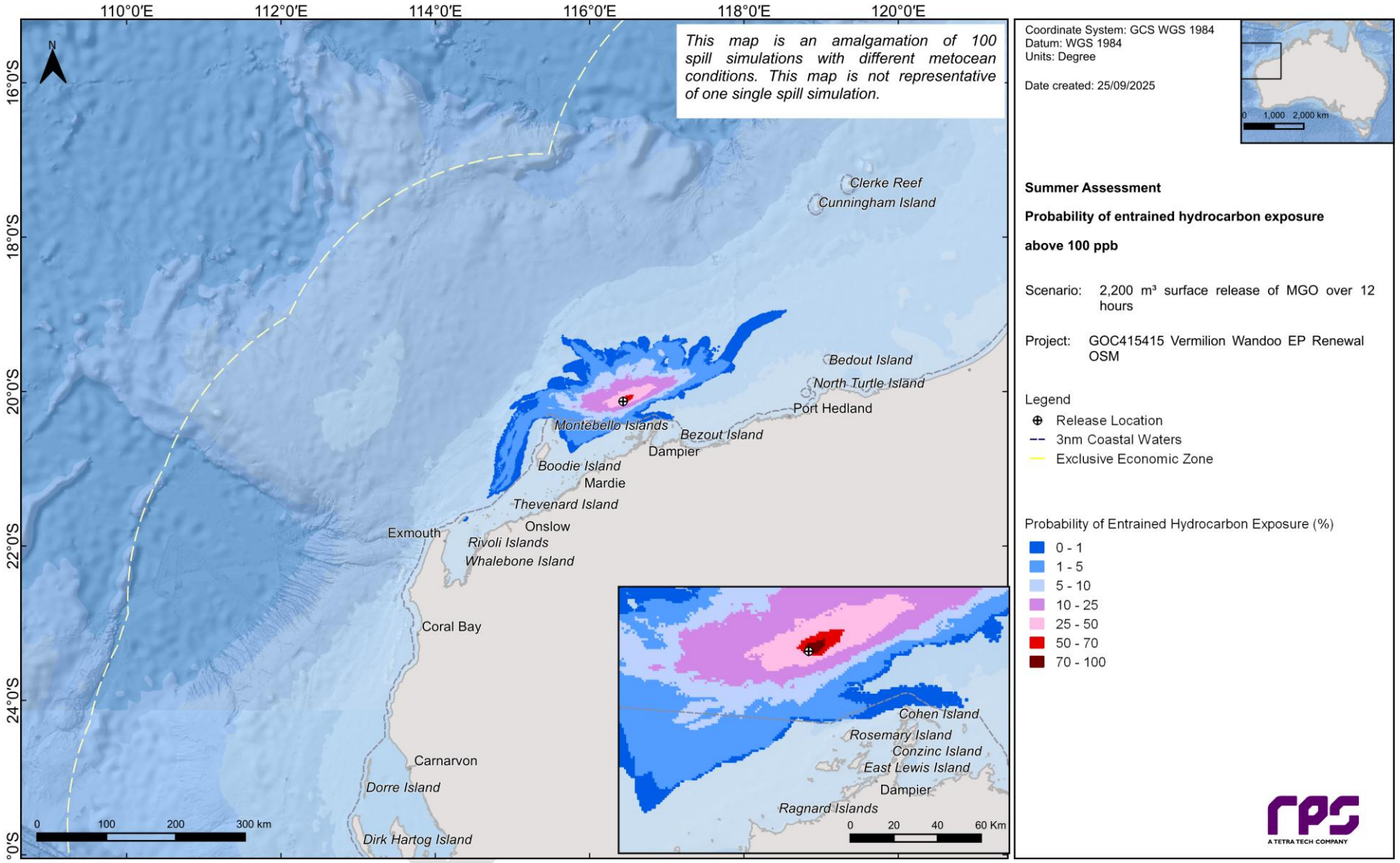


Figure 13.75 Probability of entrained hydrocarbon exposure at, or above, 100 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

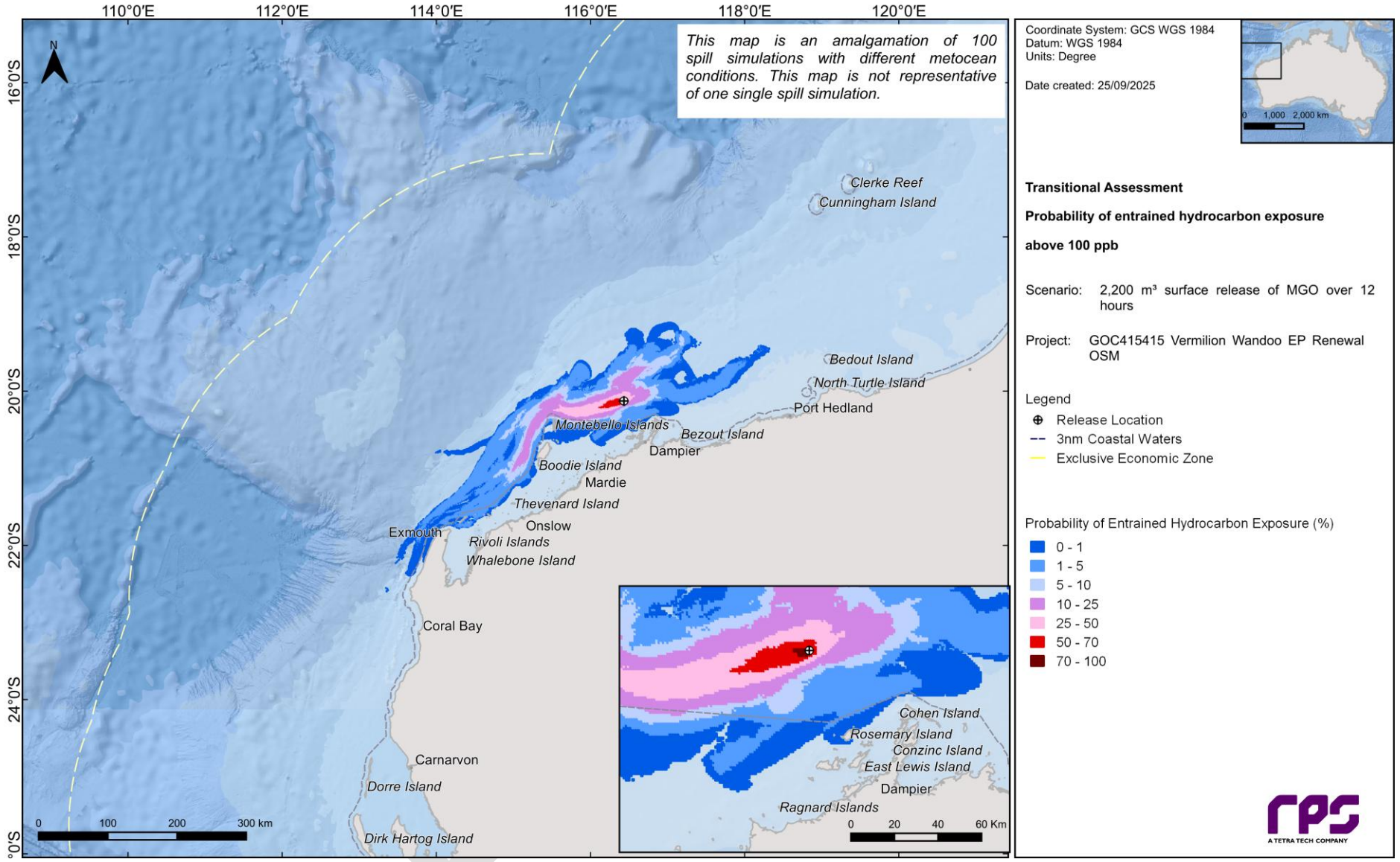


Figure 13.76 Probability of entrained hydrocarbon exposure at, or above, 100 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

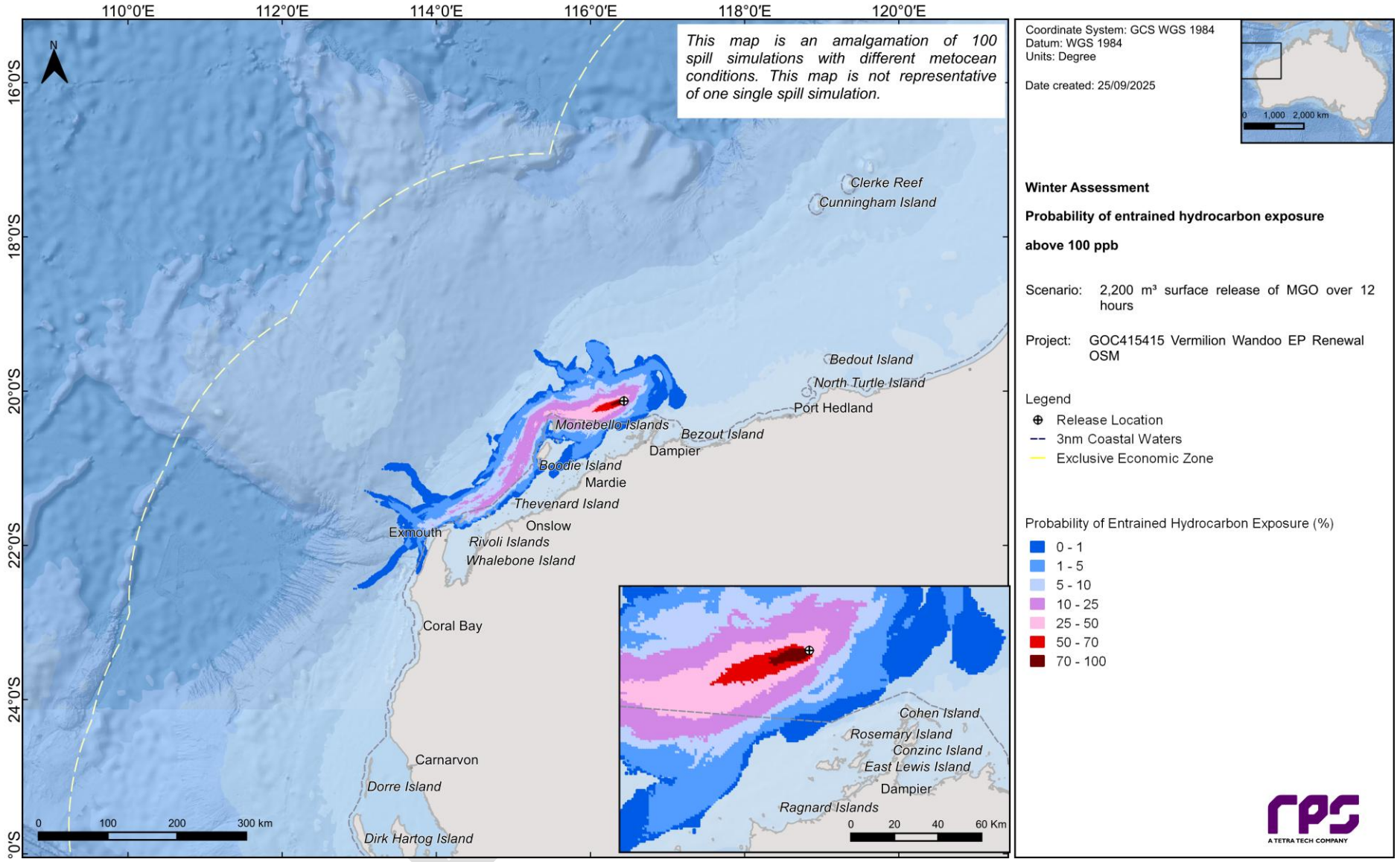


Figure 13.77 Probability of entrained hydrocarbon exposure at, or above, 100 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

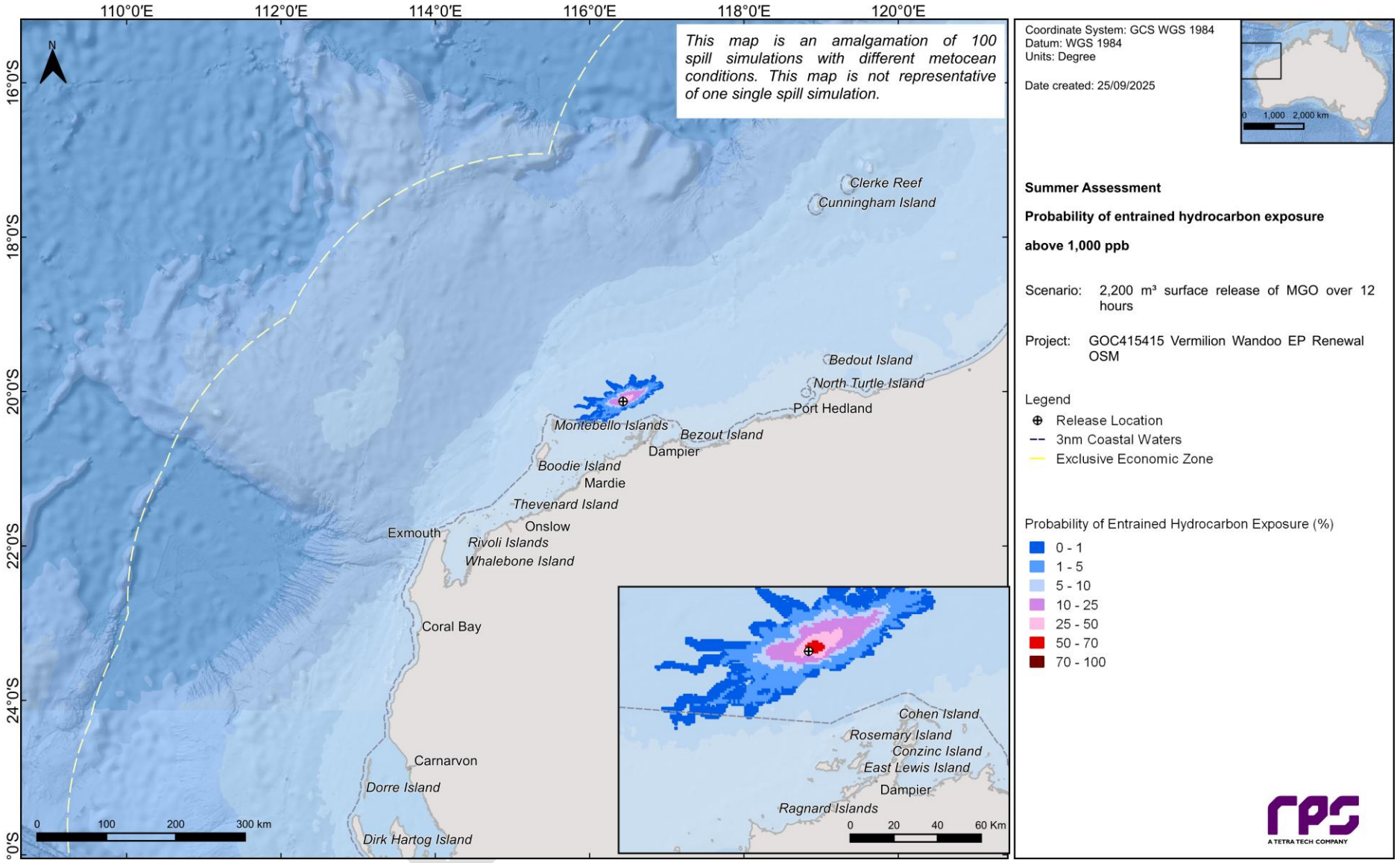


Figure 13.78 Probability of entrained hydrocarbon exposure at, or above, 1,000 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

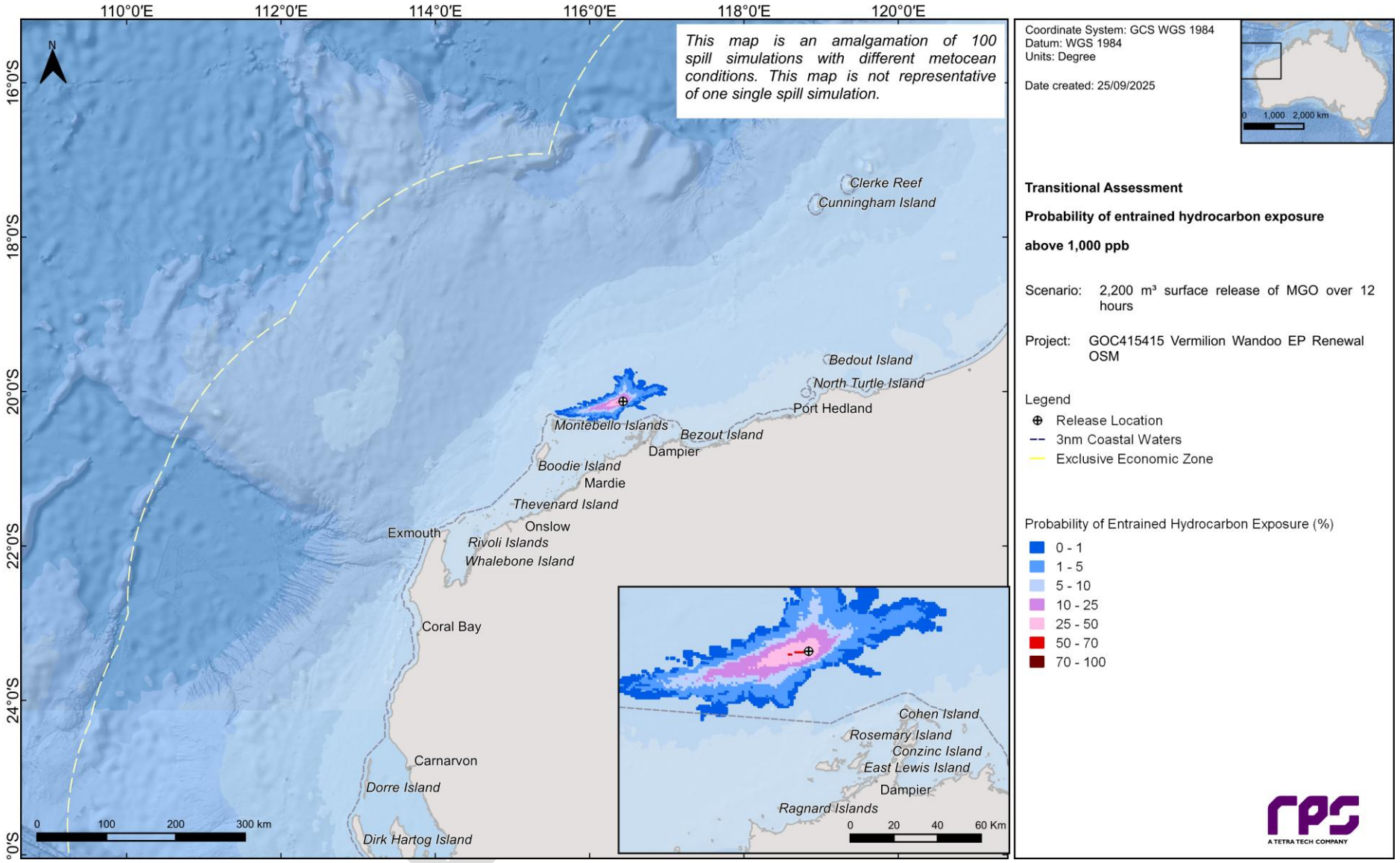


Figure 13.79 Probability of entrained hydrocarbon exposure at, or above, 1,000 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

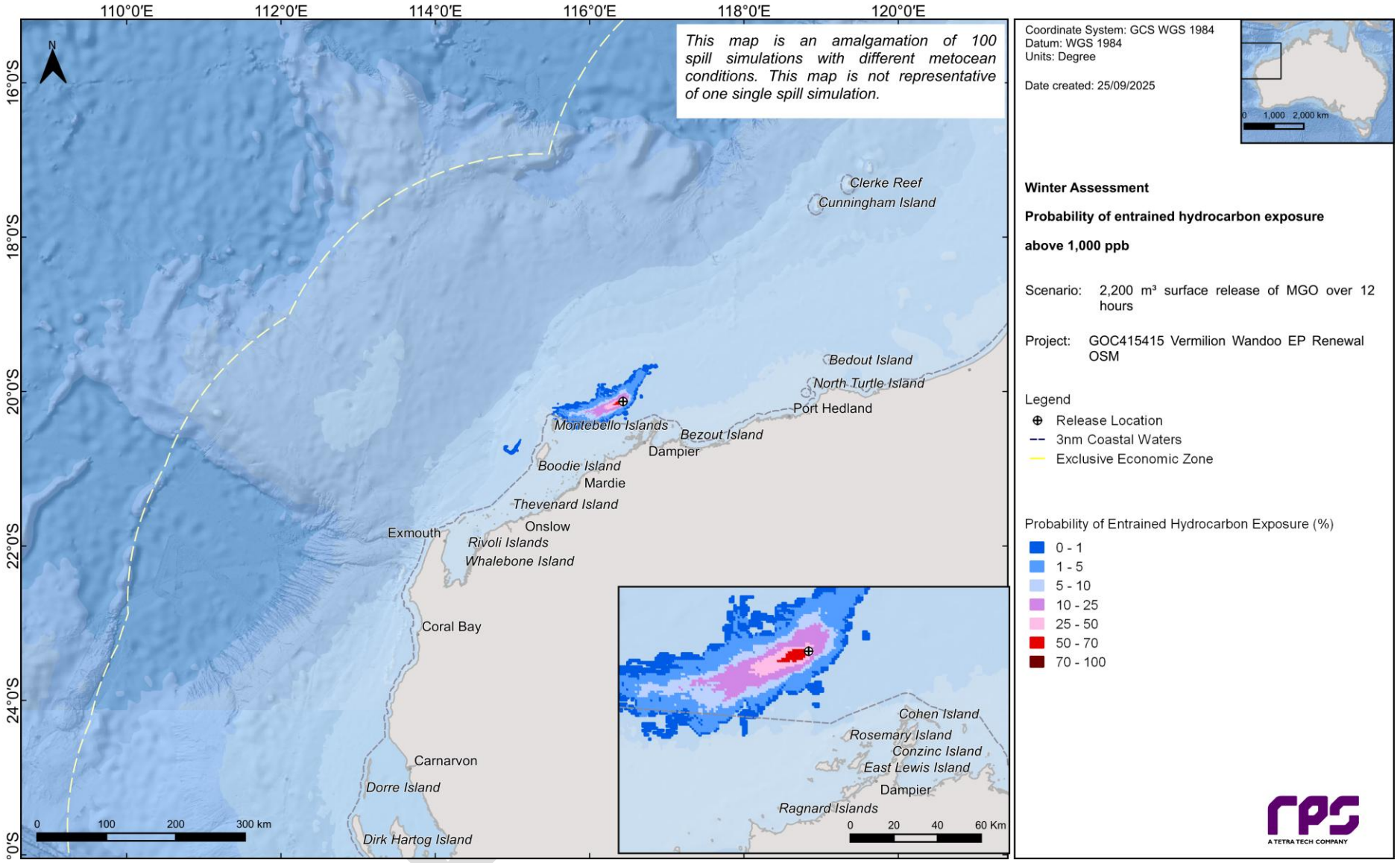


Figure 13.80 Probability of entrained hydrocarbon exposure at, or above, 1,000 ppb following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

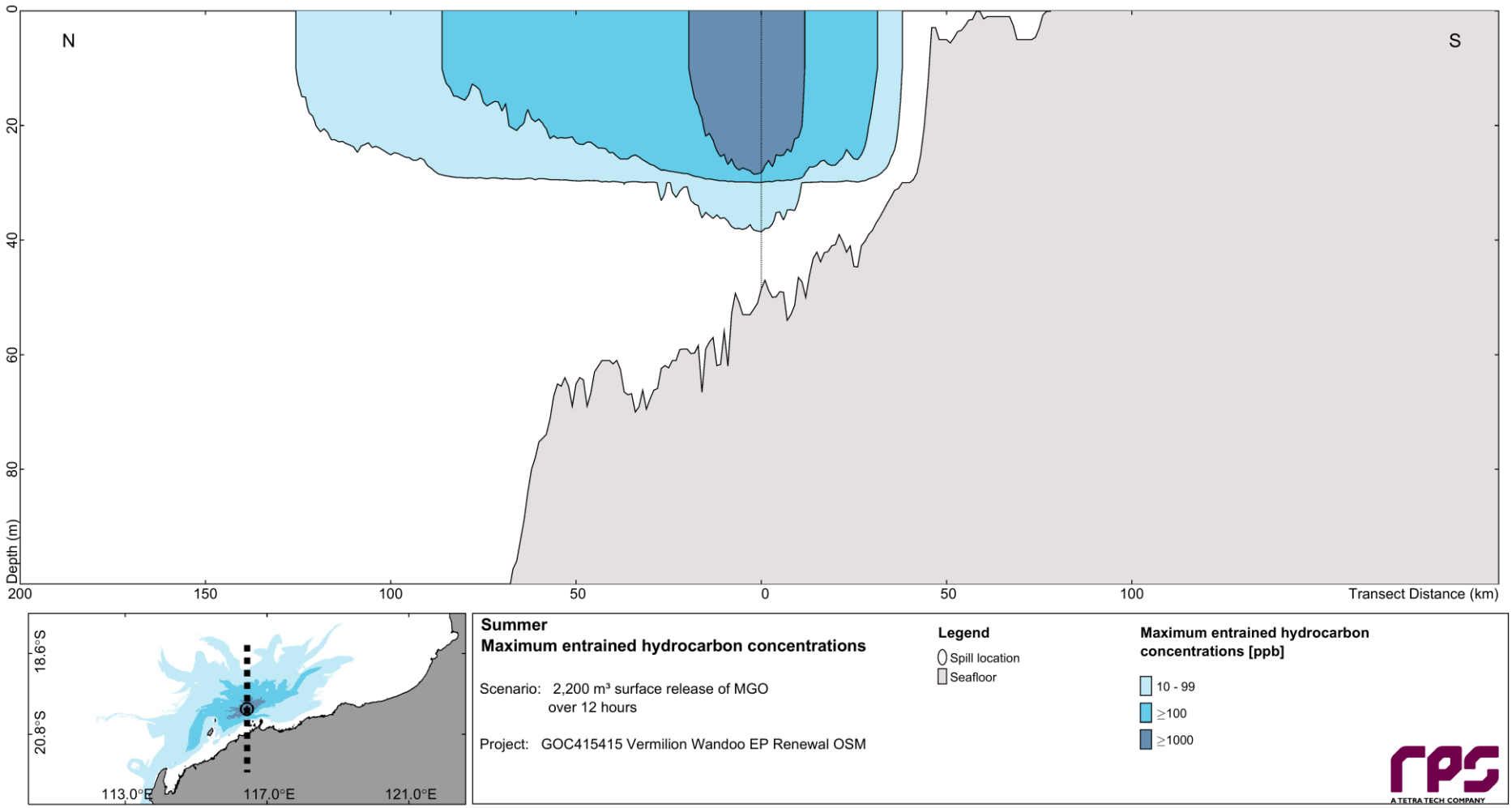


Figure 13.81 North-south cross-section transect of entrained hydrocarbon concentrations following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

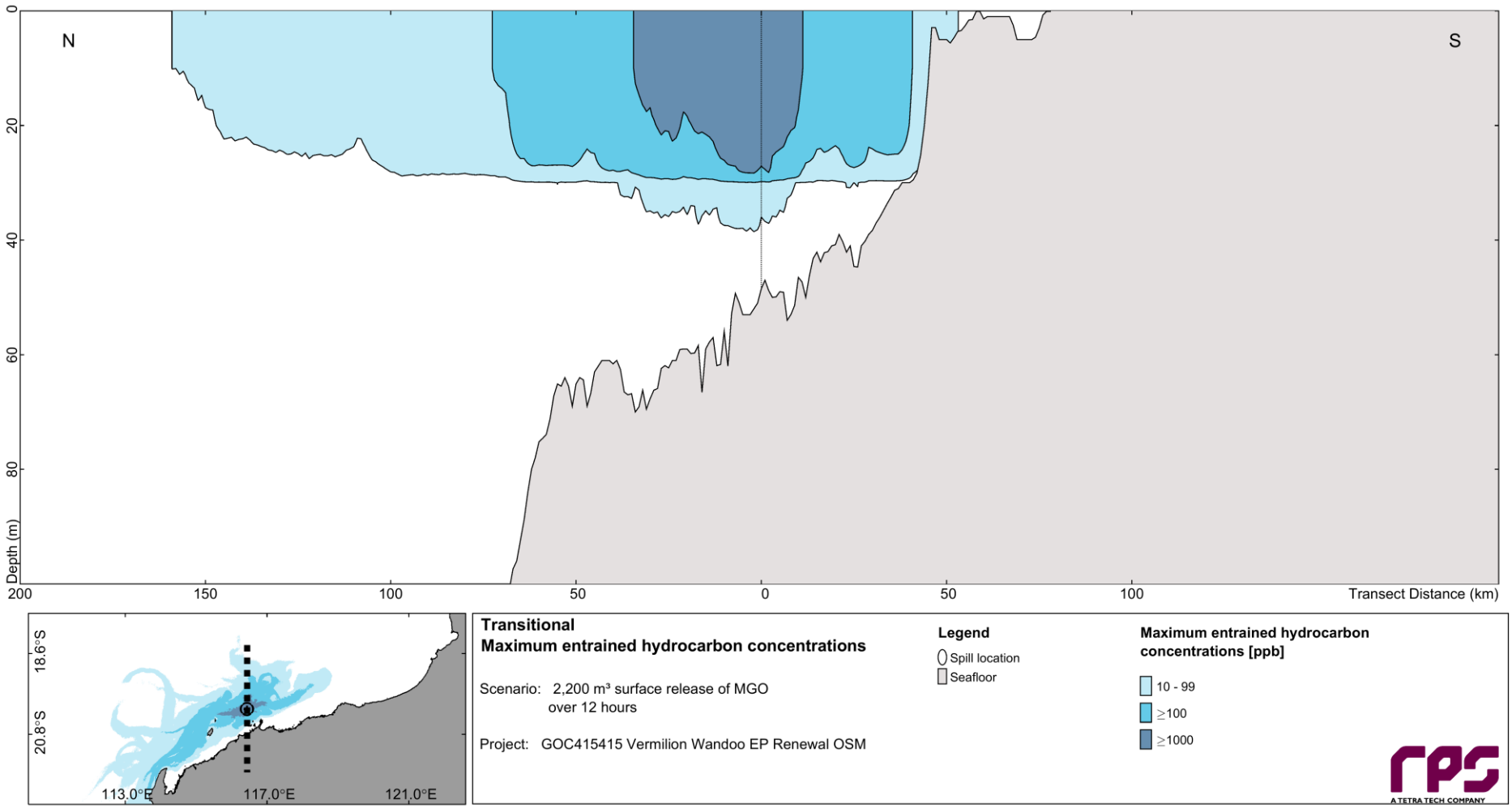


Figure 13.82 North-south cross-section transect of entrained hydrocarbon concentrations following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

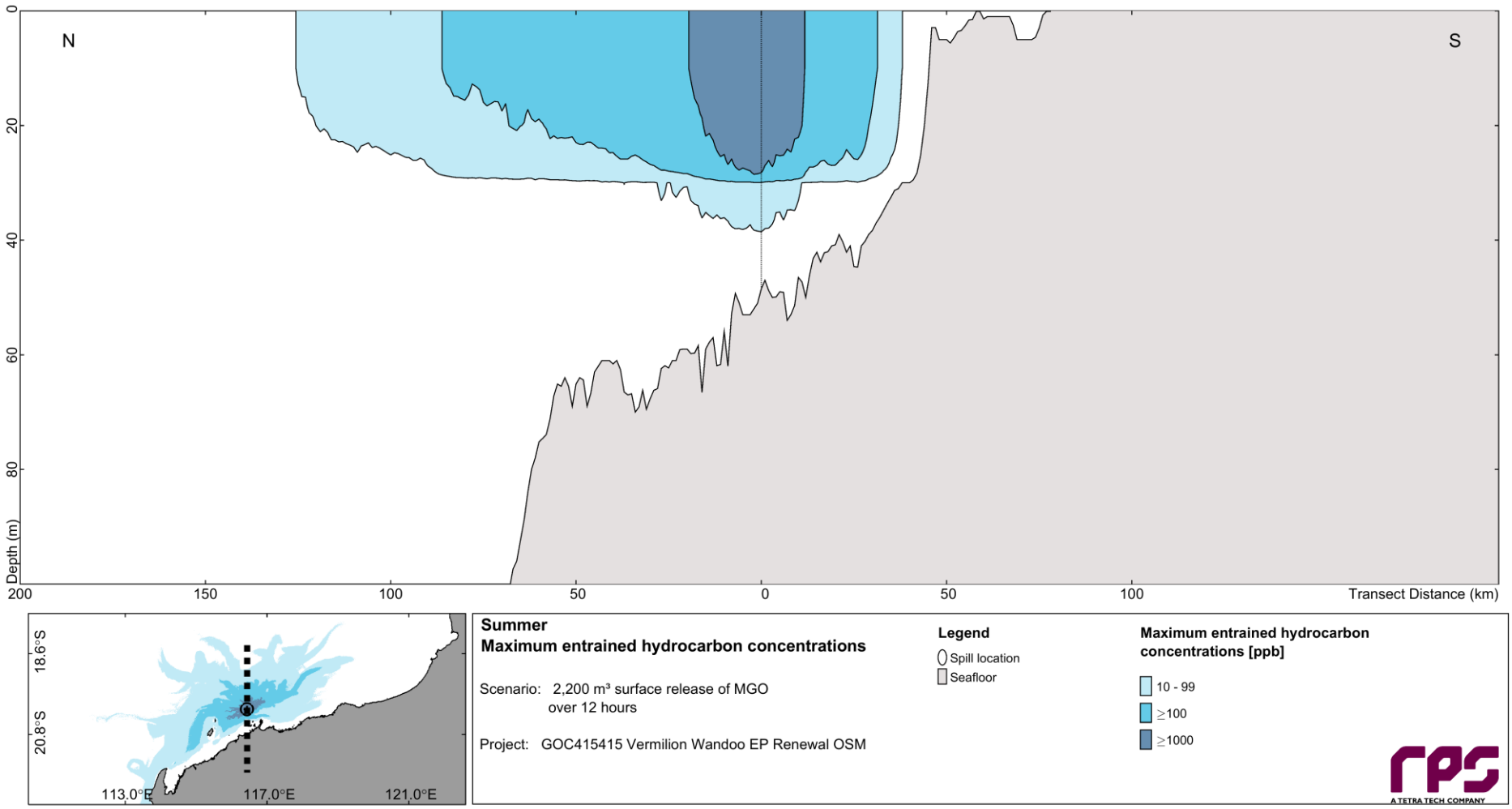


Figure 13.83 North-south cross-section transect of entrained hydrocarbon concentrations following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

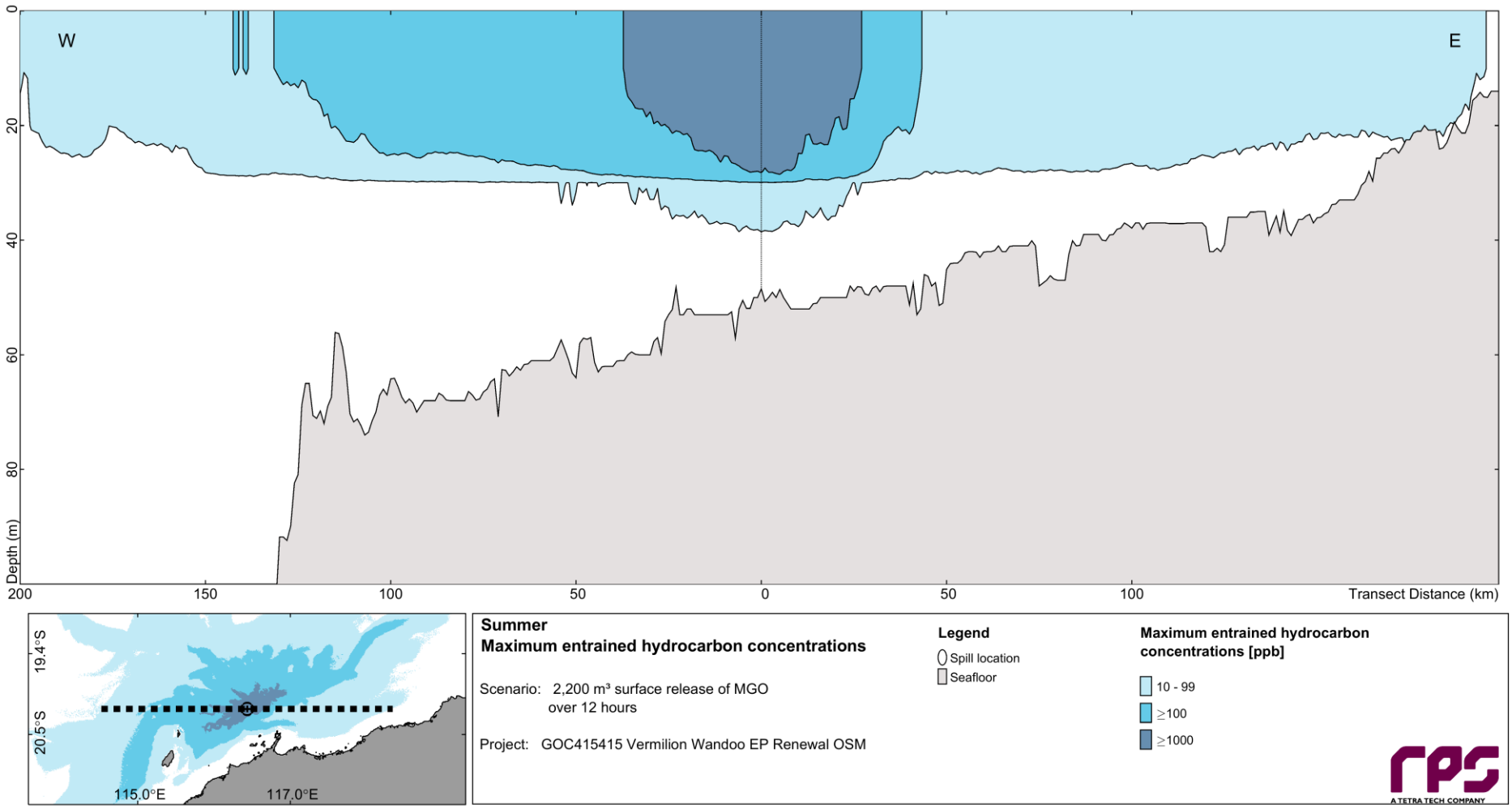


Figure 13.84 East-west cross-section transect of entrained hydrocarbon concentrations following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during summer conditions.

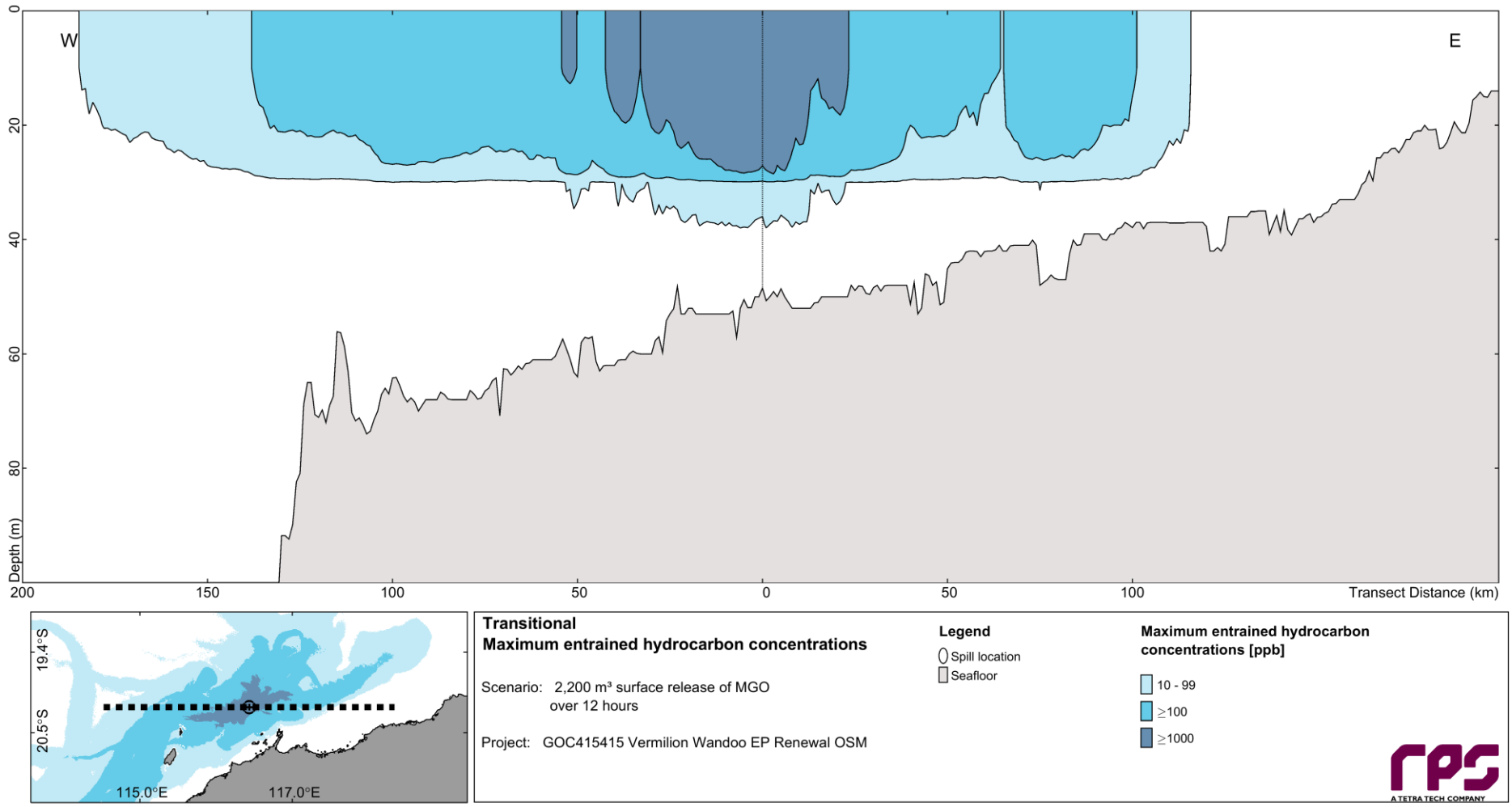


Figure 13.85 East-west cross-section transect of entrained hydrocarbon concentrations following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during transitional conditions.

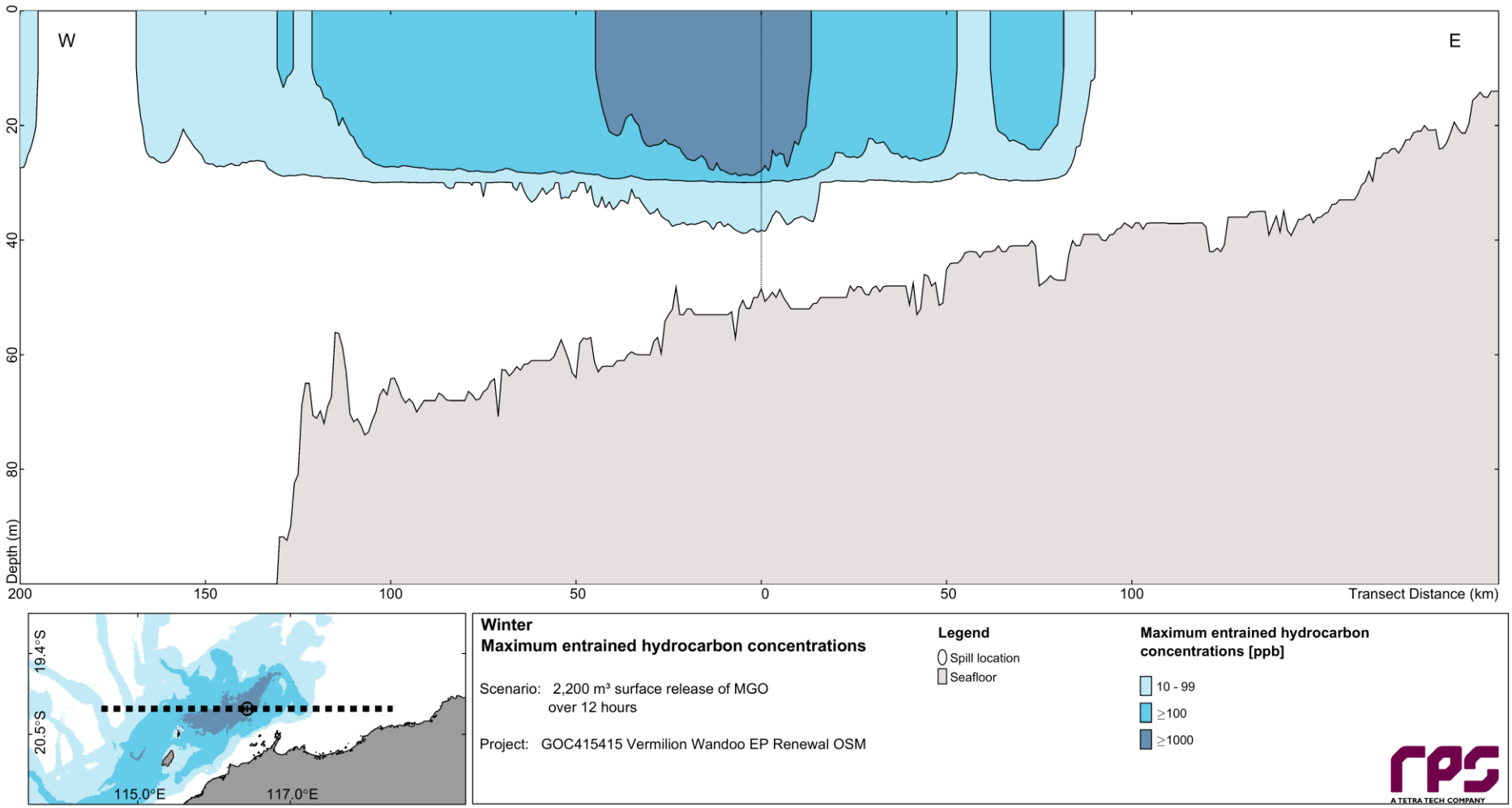


Figure 13.86 East-west cross-section transect of entrained hydrocarbon concentrations following a surface release of MGO from Wandoo B's Shaft 2. The results were calculated from 100 spill simulations that commenced during winter conditions.

14 MODELLING RESULTS: CRUDE RELEASE FROM THE TANKER COLLISION

This scenario investigated the potential exposure from a 10,000 m^3 surface release of crude over 24 hours resulting from the tanker collision. The crude was tracked for 50 days to allow the concentrations to decrease below the lowest reporting thresholds. The modelling for this scenario assumed no mitigation efforts are undertaken to collect or otherwise affect the natural transport and weathering.

14.1 Stochastic Analysis

14.1.1 Socio-Economic and Ecological EMBAs

Figure 14.1 and Figure 14.2 illustrate the socio-economic and ecological EMBAs following a surface release of crude from the tanker collision. These figures represent the largest spatial extent predicted, derived by merging all three hundred spill simulations based on the defined thresholds (see Section 11.1.2) for each oil phase.

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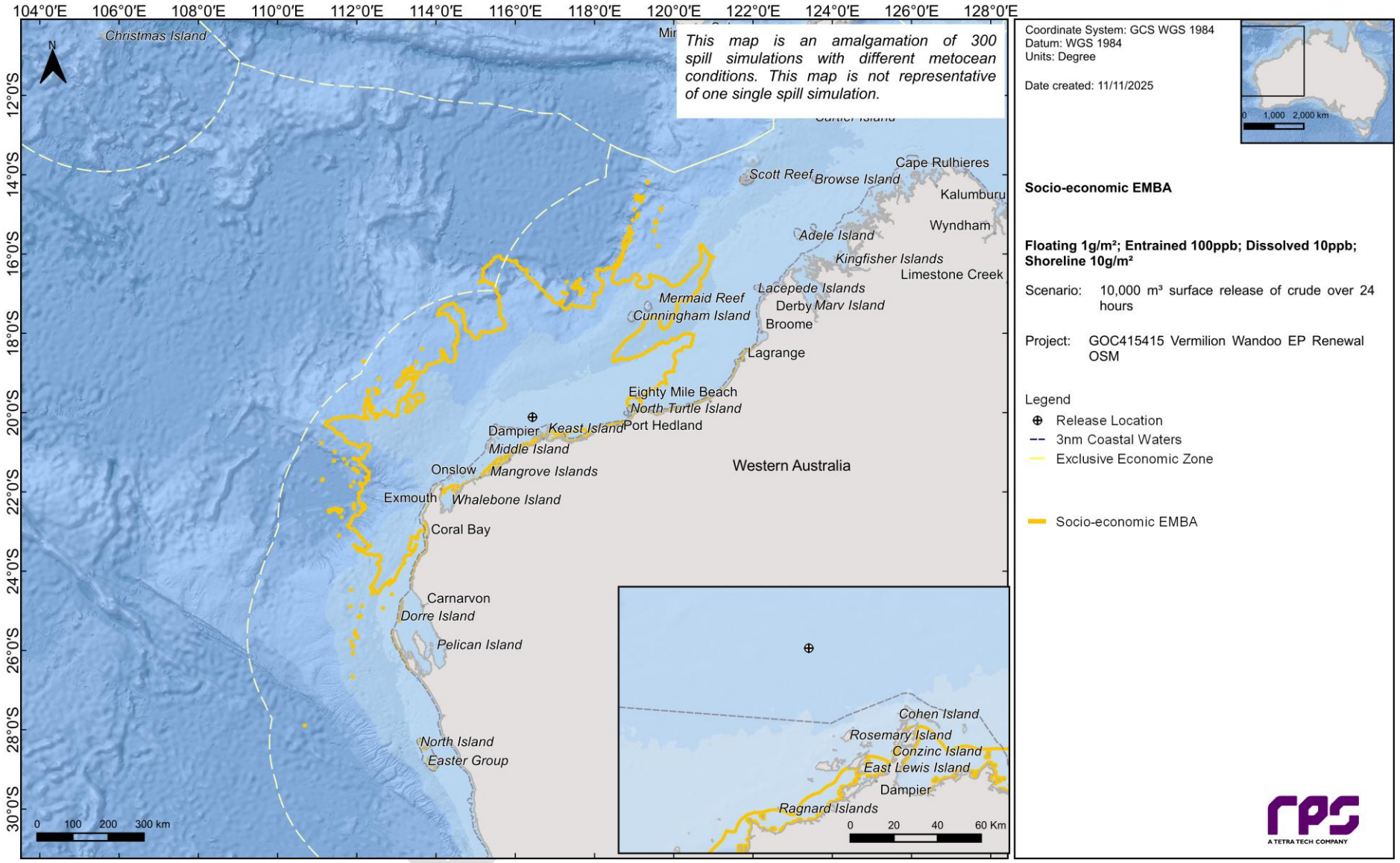


Figure 14.1 Socio-economic EMBA following a surface release of crude from the tanker collision. The EMBA was determined by merging the results of all 300 simulations.

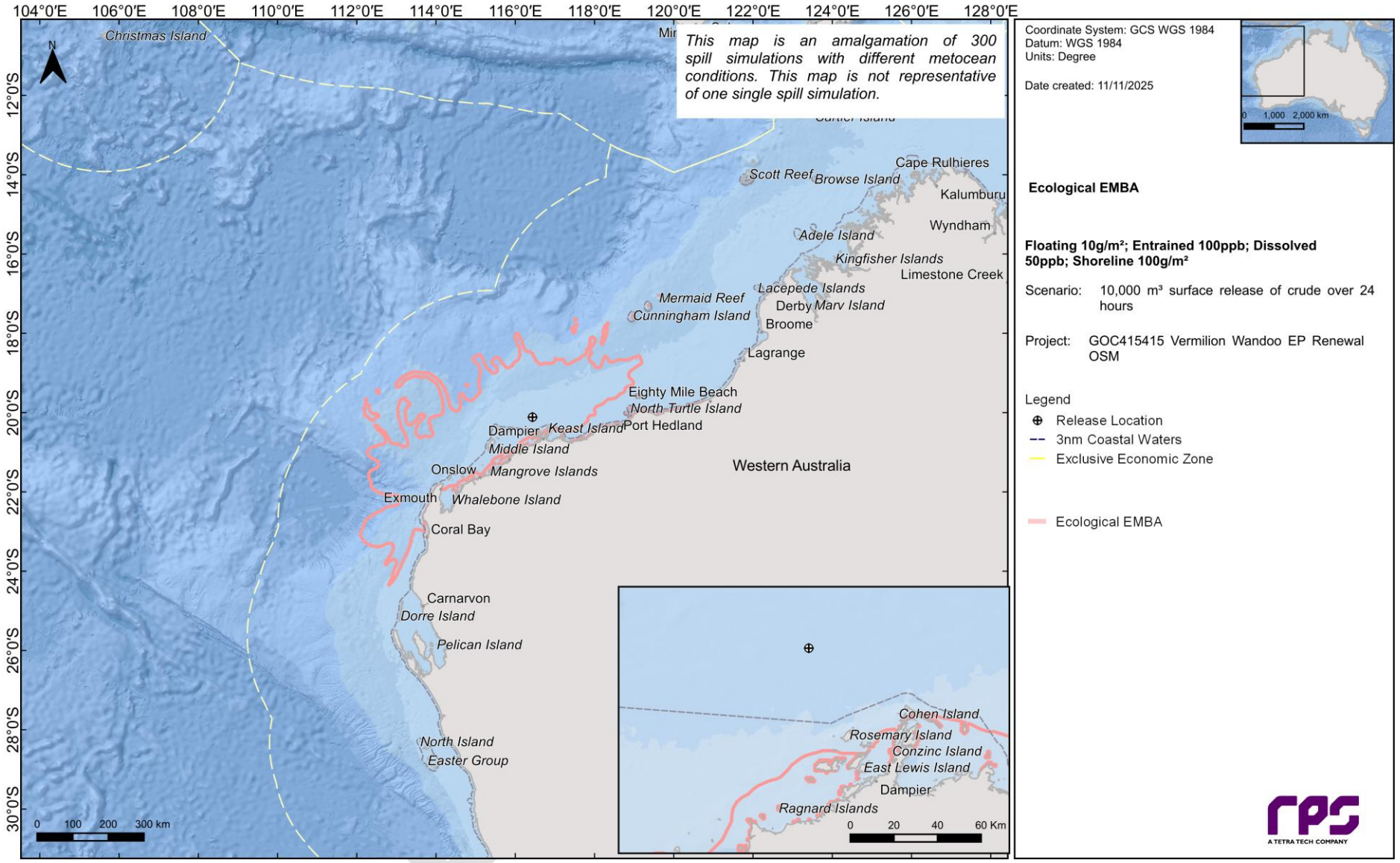


Figure 14.2 Ecological EMBA following a surface release of crude from the tanker collision. The EMBA was determined by merging the results of all 300 simulations.

14.1.2 Scientific Monitoring Planning Area

Figure 14.3 illustrates the SMPA following a surface release of crude from the tanker collision. These figure represent the largest spatial extent predicted, derived by merging all three hundred spill simulations based on the defined thresholds (see Section 11.1.2) for each oil phase.

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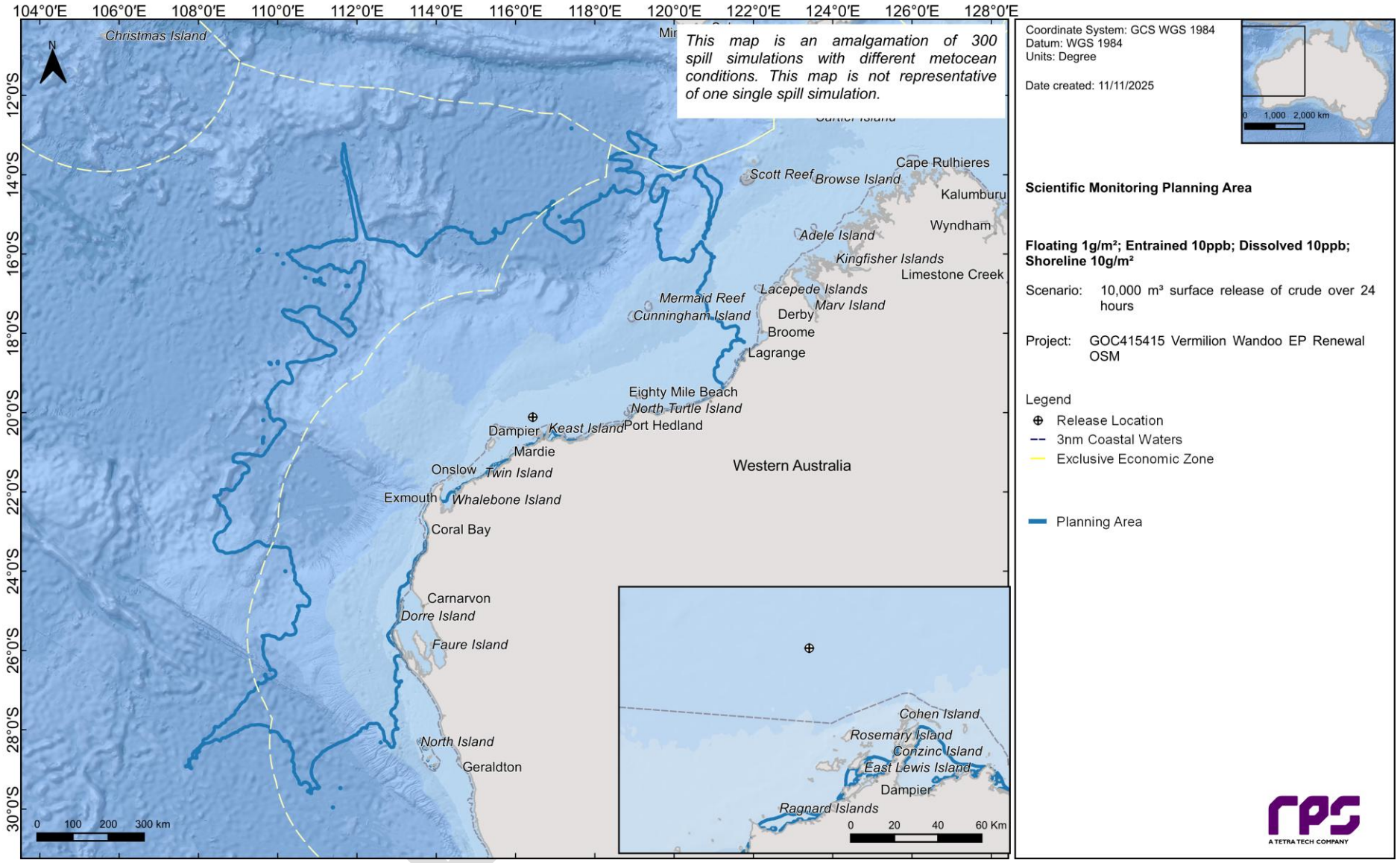


Figure 14.3 Scientific monitoring planning area following a surface release of crude from the tanker collision. The SMPA was determined by merging the results of all 300 simulations.

14.1.3 Floating Oil Exposure

Table 14-1 summarises the maximum distances from the release location to floating oil exposure thresholds for each season. Concentrations exceeding 1 g/m^2 could extend up to 728 km from the release location. The maximum distances reduced to 367 km and 129 km as the threshold increases to 10 g/m^2 and 50 g/m^2, respectively.

Table 14-2 presents the receptors predicted to be exposed by floating oil for each season.

The Montebello AMP showed the highest overall probability of exposure at, or above, 1 g/m², with 69% for spills starting in winter and 47% during transitional conditions. In contrast, Glomar Shoals KEF recorded the highest probability of floating oil exposure at, or above, 1 g/m² during summer at 33%. Additionally, the Montebello AMP experienced the fastest time to exposure at 1 day 2 hours following the commencement of a spill under summer conditions.

Figure 14.4 to Figure 14.6 illustrate the extent floating oil exposure zones for each season. Figure 14.7 to Figure 14.24 depict the seasonal minimum times before exposure and probability of exposure for each threshold and season.

Table 14-1 Maximum distances from the release location to floating oil exposure thresholds following a surface release of crude from the tanker collision. Results were calculated from 100 spill simulations per season.

Season	Distance and direction travelled	Floating oil exposure thresholds		
		1 g/m^2	10 g/m^2	50 g/m^2
Summer	Maximum distance (km) from release location	661	232	129
	Direction	Northeast	Southwest	West
Transitional	Maximum distance (km) from release location	728	244	60
	Direction	Northeast	Southwest	West
Winter	Maximum distance (km) from release location	636	367	98
	Direction	Southwest	Southwest	West

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Table 14-2 Receptors predicted to be exposed by floating oil following a surface release of crude from the tanker collision. Results were calculated from100 spill simulations per season.

Category	Name	Summer						Transitional						Winter					
		Probability (%) of floating oil at			Minimum times before floating oil exposure			Probability (%) of floating oil at			Minimum times before floating oil exposure			Probability (%) of floating oil at			Minimum times before floating oil exposure		
		≥ 1 g/m²	≥ 10 g/m²	≥ 50 g/m²	≥ 1 g/m²	≥ 10 g/m²	≥ 50 g/m²	≥ 1 g/m²	≥ 10 g/m²	≥ 50 g/m²	≥ 1 g/m²	≥ 10 g/m²	≥ 50 g/m²	≥ 1 g/m²	≥ 10 g/m²	≥ 50 g/m²	≥ 1 g/m²	≥ 10 g/m²	≥ 50 g/m²
AMP	Argo-Rowley Terrace	4	NC	NC	26 d, 12 hrs	NC	NC	2	NC	NC	24 d, 3 hrs	NC	NC	3	NC	NC	22 d, 7 hrs	NC	NC
	Dampier	10	NC	NC	5 d, 15 hrs	NC	NC	4	NC	NC	13 d, 8 hrs	NC	NC	3	NC	NC	16 d, 4 hrs	NC	NC
	Gascoyne	3	NC	NC	13 d, 7 hrs	NC	NC	8	NC	NC	10 d, 10 hrs	NC	NC	19	3	NC	9 d, 4 hrs	13 d, 0 hrs	NC
	Kimberley	1	NC	NC	45 d, 9 hrs	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Mermaid Reef	4	NC	NC	32 d, 6 hrs	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Montebello	18	2	1	1 d, 2 hrs	3 d, 8 hrs	3 d, 9 hrs	47	11	1	1 d, 9 hrs	1 d, 21 hrs	3 d, 11 hrs	69	9	NC	1 d, 6 hrs	1 d, 23 hrs	NC
IPA	Nyangumarta Warrarn	1	NC	NC	43 d, 17 hrs	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
KEF	Ancient coastline at 125 m depth contour	27	2	NC	6 d, 11 hrs	7 d, 8 hrs	NC	26	1	NC	4 d, 21 hrs	6 d, 2 hrs	NC	30	5	NC	4 d, 8 hrs	4 d, 18 hrs	NC
	Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	3	NC	NC	12 d, 9 hrs	NC	NC	14	NC	NC	9 d, 1 hrs	NC	NC	24	2	NC	7 d, 10 hrs	8 d, 10 hrs	NC
	Commonwealth waters adjacent to Ningaloo Reef	2	NC	NC	19 d, 11 hrs	NC	NC	11	NC	NC	11 d, 9 hrs	NC	NC	23	3	NC	9 d, 1 hrs	10 d, 10 hrs	NC
	Continental Slope Demersal Fish Communities	4	1	NC	7 d, 16 hrs	8 d, 0 hrs	NC	24	1	NC	5 d, 21 hrs	10 d, 6 hrs	NC	19	2	NC	5 d, 10 hrs	10 d, 19 hrs	NC
	Exmouth Plateau	1	NC	NC	19 d, 22 hrs	NC	NC	4	NC	NC	12 d, 5 hrs	NC	NC	6	NC	NC	14 d, 6 hrs	NC	NC
	Glomar Shoals	33	2	NC	2 d, 16 hrs	3 d, 16 hrs	NC	32	4	NC	2 d, 12 hrs	3 d, 14 hrs	NC	23	8	NC	2 d, 3 hrs	2 d, 12 hrs	NC
	Mermaid Reef and Commonwealth waters surrounding Rowley Shoals	4	NC	NC	26 d, 12 hrs	NC	NC	2	NC	NC	33 d, 16 hrs	NC	NC	1	NC	NC	25 d, 3 hrs	NC	NC
MMA	Muiron Islands	1	NC	NC	22 d, 22 hrs	NC	NC	12	NC	NC	10 d, 8 hrs	NC	NC	20	1	NC	8 d, 9 hrs	11 d, 20 hrs	NC
MP	Barrow Island	4	NC	NC	13 d, 21 hrs	NC	NC	15	1	NC	5 d, 10 hrs	9 d, 3 hrs	NC	19	2	NC	3 d, 21 hrs	4 d, 22 hrs	NC
	Eighty Mile Beach	1	NC	NC	33 d, 18 hrs	NC	NC	1	NC	NC	28 d, 23 hrs	NC	NC	NC	NC	NC	NC	NC	NC
	Montebello Islands	3	NC	NC	6 d, 10 hrs	NC	NC	16	2	NC	3 d, 14 hrs	8 d, 1 hrs	NC	35	3	1	2 d, 18 hrs	3 d, 21 hrs	7 d, 16 hrs
	Ningaloo	2	NC	NC	19 d, 11 hrs	NC	NC	11	NC	NC	11 d, 9 hrs	NC	NC	23	3	NC	9 d, 1 hrs	10 d, 10 hrs	NC
	Rowley Shoals	3	NC	NC	26 d, 16 hrs	NC	NC	2	NC	NC	33 d, 16 hrs	NC	NC	1	NC	NC	25 d, 16 hrs	NC	NC
	Shark Bay	NC	NC	NC	NC	NC	NC	1	NC	NC	25 d, 4 hrs	NC	NC	2	NC	NC	41 d, 3 hrs	NC	NC
NR	Barrow Island	NC	NC	NC	NC	NC	NC	1	NC	NC	8 d, 6 hrs	NC	NC	1	NC	NC	12 d, 17 hrs	NC	NC
	Great Sandy Island	1	NC	NC	26 d, 4 hrs	NC	NC	1	NC	NC	22 d, 21 hrs	NC	NC	1	NC	NC	13 d, 2 hrs	NC	NC
	Lowendal Islands	1	NC	NC	38 d, 8 hrs	NC	NC	1	NC	NC	5 d, 12 hrs	NC	NC	5	NC	NC	7 d, 0 hrs	NC	NC
	Thevenard Island	NC	NC	NC	NC	NC	NC	5	NC	NC	8 d, 10 hrs	NC	NC	4	NC	NC	7 d, 8 hrs	NC	NC
RAMSAR	Eighty-mile Beach	1	NC	NC	43 d, 17 hrs	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
RSB	Australind Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	12 d, 11 hrs	NC	NC
	Barrow Island Reefs and Shoals	NC	NC	NC	NC	NC	NC	1	NC	NC	22 d, 21 hrs	NC	NC	2	NC	NC	13 d, 1 hrs	NC	NC
	Baylis Patches	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	14 d, 8 hrs	NC	NC
	Brewis Reef	NC	NC	NC	NC	NC	NC	3	NC	NC	8 d, 11 hrs	NC	NC	5	NC	NC	7 d, 6 hrs	NC	NC
	Clerke Reef	2	NC	NC	31 d, 18 hrs	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Cod Bank	3	NC	NC	15 d, 8 hrs	NC	NC	1	NC	NC	26 d, 1 hrs	NC	NC	NC	NC	NC	NC	NC	NC
	Combe Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	3	NC	NC	12 d, 0 hrs	NC	NC
	Courtenay Shoal	6	NC	NC	10 d, 14 hrs	NC	NC	1	NC	NC	19 d, 19 hrs	NC	NC	NC	NC	NC	NC	NC	NC
	Dailey Shoal	1	NC	NC	29 d, 1 hrs	NC	NC	4	NC	NC	28 d, 22 hrs	NC	NC	6	NC	NC	9 d, 21 hrs	NC	NC
	Dockrell Reef	NC	NC	NC	NC	NC	NC	1	NC	NC	29 d, 16 hrs	NC	NC	NC	NC	NC	NC	NC	NC
	Fairway Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	10 d, 23 hrs	NC	NC
	Flinders Shoal	NC	NC	NC	NC	NC	NC	1	NC	NC	26 d, 2 hrs	NC	NC	NC	NC	NC	NC	NC	NC
	Glennie Patches	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	12 d, 19 hrs	NC	NC
	Glomar Shoal	26	NC	NC	4 d, 20 hrs	NC	NC	20	1	NC	5 d, 19 hrs	16 d, 8 hrs	NC	14	3	NC	3 d, 20 hrs	4 d, 12 hrs	NC
	Gorgon Patch	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	12 d, 23 hrs	NC	NC
	Hammersley Shoal	10	2	NC	5 d, 20 hrs	11 d, 8 hrs	NC	3	NC	NC	19 d, 3 hrs	NC	NC	NC	NC	NC	NC	NC	NC
	Hastings Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	12 d, 23 hrs	NC	NC
	Hayman Rock	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	14 d, 7 hrs	NC	NC
	Herald Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	16 d, 1 hrs	NC	NC
	Hood Reef	NC	NC	NC	NC	NC	NC	2	NC	NC	29 d, 4 hrs	NC	NC	3	NC	NC	8 d, 22 hrs	NC	NC
	Imperieuse Reef	3	NC	NC	27 d, 0 hrs	NC	NC	1	NC	NC	35 d, 0 hrs	NC	NC	1	NC	NC	38 d, 8 hrs	NC	NC
	Inner Northwest Patch	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	12 d, 20 hrs	NC	NC
	Koolinda Patch	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	13 d, 11 hrs	NC	NC
	Little Shoals	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	14 d, 12 hrs	NC	NC
	Locker Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	14 d, 1 hrs	NC	NC
	Madeleine Shoals	9	NC	NC	5 d, 15 hrs	NC	NC	4	NC	NC	16 d, 18 hrs	NC	NC	2	NC	NC	17 d, 3 hrs	NC	NC
	Manicom Bank	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	13 d, 4 hrs	NC	NC

	McLennan Bank	1	NC	NC	31 d, 22 hrs	NC	NC	1	NC	NC	16 d, 6 hrs	NC	NC	NC	NC	NC	NC	NC	NC
	Meda Reef	1	NC	NC	27 d, 7 hrs	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Mermaid Reef	4	NC	NC	33 d, 14 hrs	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Miles Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	13 d, 10 hrs	NC	NC
	Montebello Shoals	2	NC	NC	8 d, 14 hrs	NC	NC	13	NC	NC	5 d, 16 hrs	NC	NC	22	1	NC	3 d, 1 hrs	7 d, 10 hrs	NC
	Moresby Shoals	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	16 d, 1 hrs	NC	NC
	Ningaloo Reef	NC	NC	NC	NC	NC	NC	3	NC	NC	20 d, 23 hrs	NC	NC	4	NC	NC	12 d, 3 hrs	NC	NC
	North West Reef	1	NC	NC	26 d, 21 hrs	NC	NC	1	NC	NC	29 d, 0 hrs	NC	NC	1	NC	NC	12 d, 20 hrs	NC	NC
	Otway Reef	NC	NC	NC	NC	NC	NC	2	NC	NC	29 d, 11 hrs	NC	NC	4	NC	NC	9 d, 11 hrs	NC	NC
	Outtrim Patches	1	NC	NC	23 d, 6 hrs	NC	NC	6	NC	NC	15 d, 15 hrs	NC	NC	10	NC	NC	8 d, 13 hrs	NC	NC
	Paroo Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	12 d, 18 hrs	NC	NC
	Penguin Bank	1	NC	NC	17 d, 0 hrs	NC	NC	8	NC	NC	6 d, 21 hrs	NC	NC	17	1	NC	6 d, 6 hrs	13 d, 5 hrs	NC
	Poivre Reef	1	NC	NC	37 d, 12 hrs	NC	NC	7	NC	NC	8 d, 23 hrs	NC	NC	13	NC	NC	6 d, 21 hrs	NC	NC
	Rankin Bank	6	NC	NC	10 d, 0 hrs	NC	NC	17	NC	NC	7 d, 4 hrs	NC	NC	28	2	NC	6 d, 18 hrs	9 d, 20 hrs	NC
	Ripple Shoals	NC	NC	NC	NC	NC	NC	3	NC	NC	9 d, 14 hrs	NC	NC	3	NC	NC	12 d, 11 hrs	NC	NC
	Roller Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	14 d, 12 hrs	NC	NC
	Rosily Shoals	1	NC	NC	20 d, 14 hrs	NC	NC	5	NC	NC	7 d, 11 hrs	NC	NC	15	2	NC	6 d, 18 hrs	7 d, 18 hrs	NC
	Saladin Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	13 d, 3 hrs	NC	NC
	Santo Rock	NC	NC	NC	NC	NC	NC	2	NC	NC	30 d, 7 hrs	NC	NC	3	NC	NC	13 d, 4 hrs	NC	NC
	South West Reef	1	NC	NC	27 d, 14 hrs	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Southwest Patch	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	13 d, 2 hrs	NC	NC
	Spider Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	11 d, 9 hrs	NC	NC
	Sultan Reef	NC	NC	NC	NC	NC	NC	1	NC	NC	8 d, 14 hrs	NC	NC	2	1	NC	11 d, 22 hrs	15 d, 10 hrs	NC
	Taunton Reef	NC	NC	NC	NC	NC	NC	1	NC	NC	26 d, 23 hrs	NC	NC	2	NC	NC	12 d, 3 hrs	NC	NC
	Tongue Shoals	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	12 d, 20 hrs	NC	NC
	Trap Reef	NC	NC	NC	NC	NC	NC	4	NC	NC	8 d, 10 hrs	NC	NC	8	NC	NC	6 d, 21 hrs	NC	NC
	Tryal Rocks	6	NC	NC	6 d, 2 hrs	NC	NC	20	1	NC	3 d, 11 hrs	7 d, 11 hrs	NC	38	NC	NC	3 d, 11 hrs	NC	NC
	Ward Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	13 d, 23 hrs	NC	NC
	Web Reef	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	2	NC	NC	11 d, 11 hrs	NC	NC
	Weeks Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	1	NC	NC	13 d, 0 hrs	NC	NC
State Waters	Western Australia	11	3	NC	1 d, 13 hrs	4 d, 22 hrs	NC	19	2	NC	2 d, 7 hrs	5 d, 20 hrs	NC	42	4	2	1 d, 18 hrs	1 d, 19 hrs	3 d, 15 hrs

NC: No contact to receptor predicted for specified threshold.

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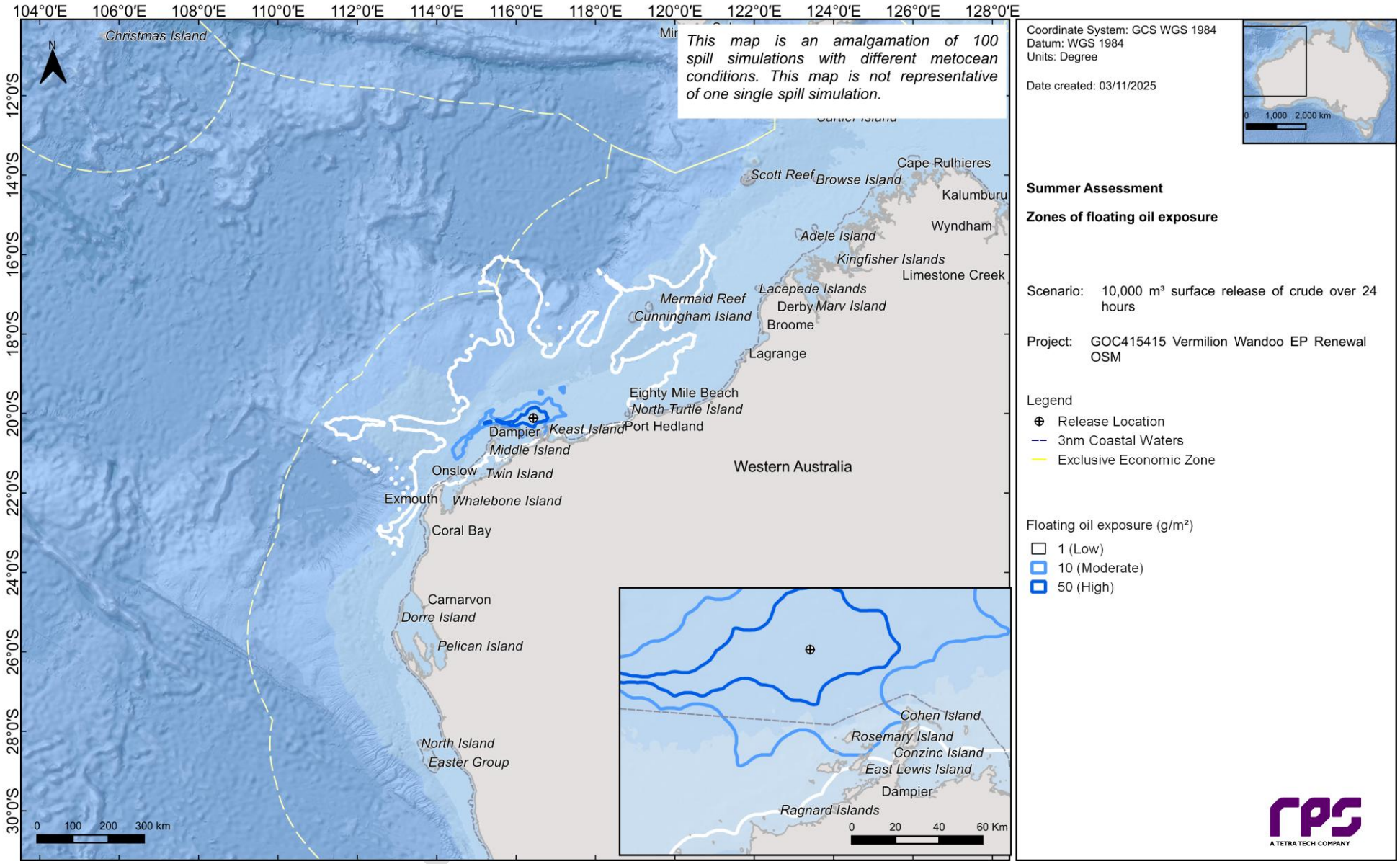


Figure 14.4 Predicted zones of floating oil exposure following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

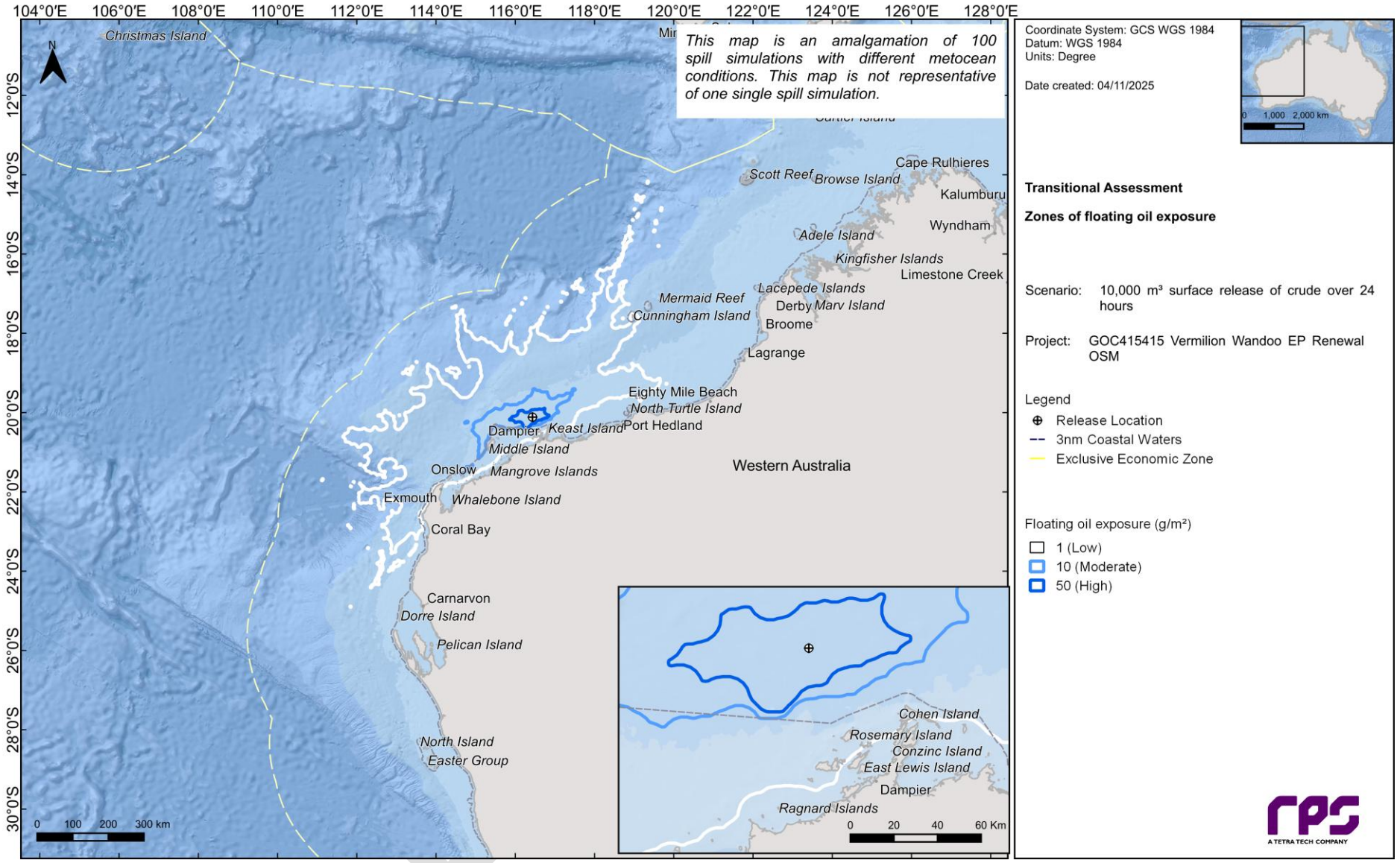


Figure 14.5 Predicted zones of floating oil exposure following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

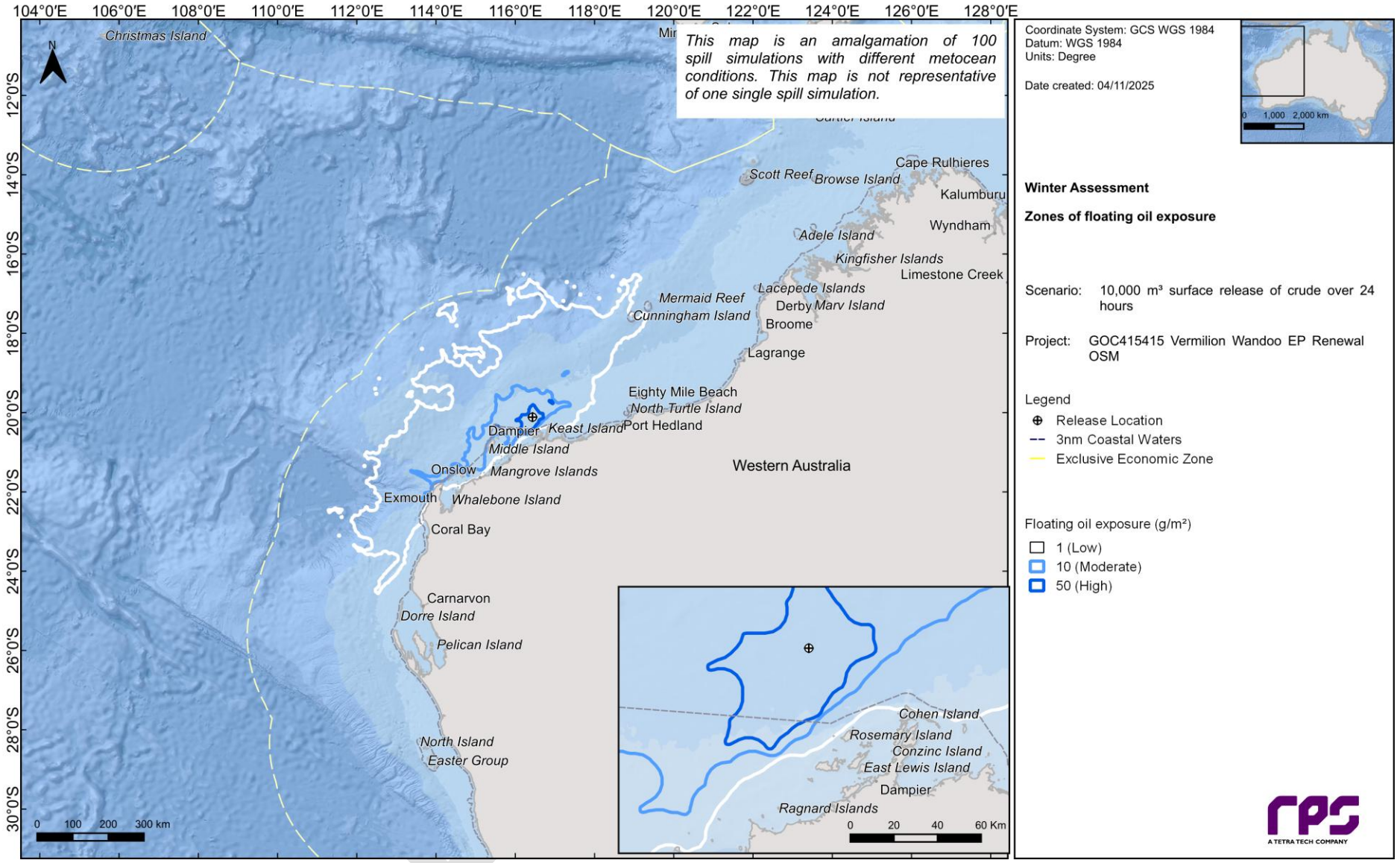


Figure 14.6 Predicted zones of floating oil exposure following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

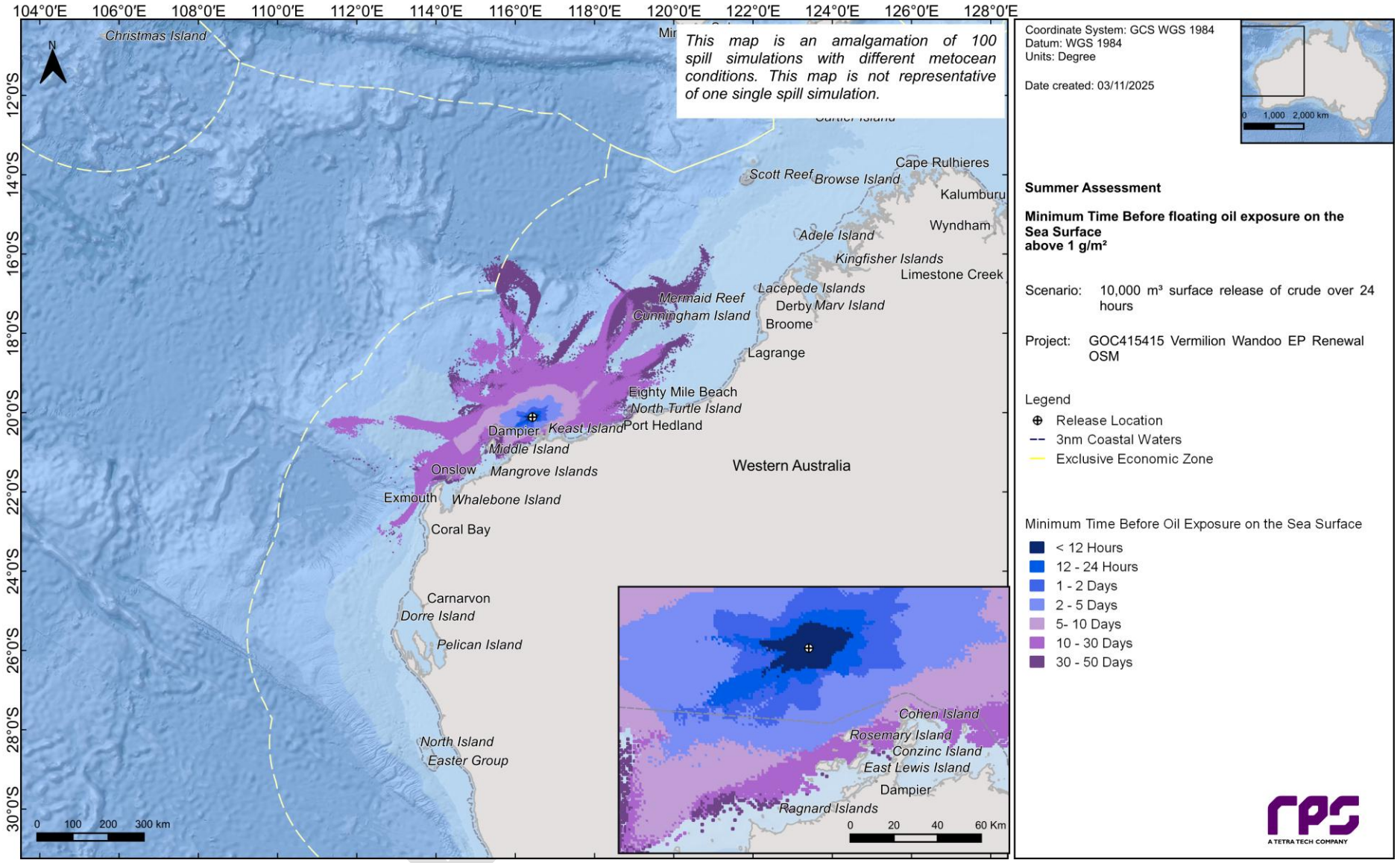


Figure 14.7 Minimum time before floating oil exposure at, or above, 1 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

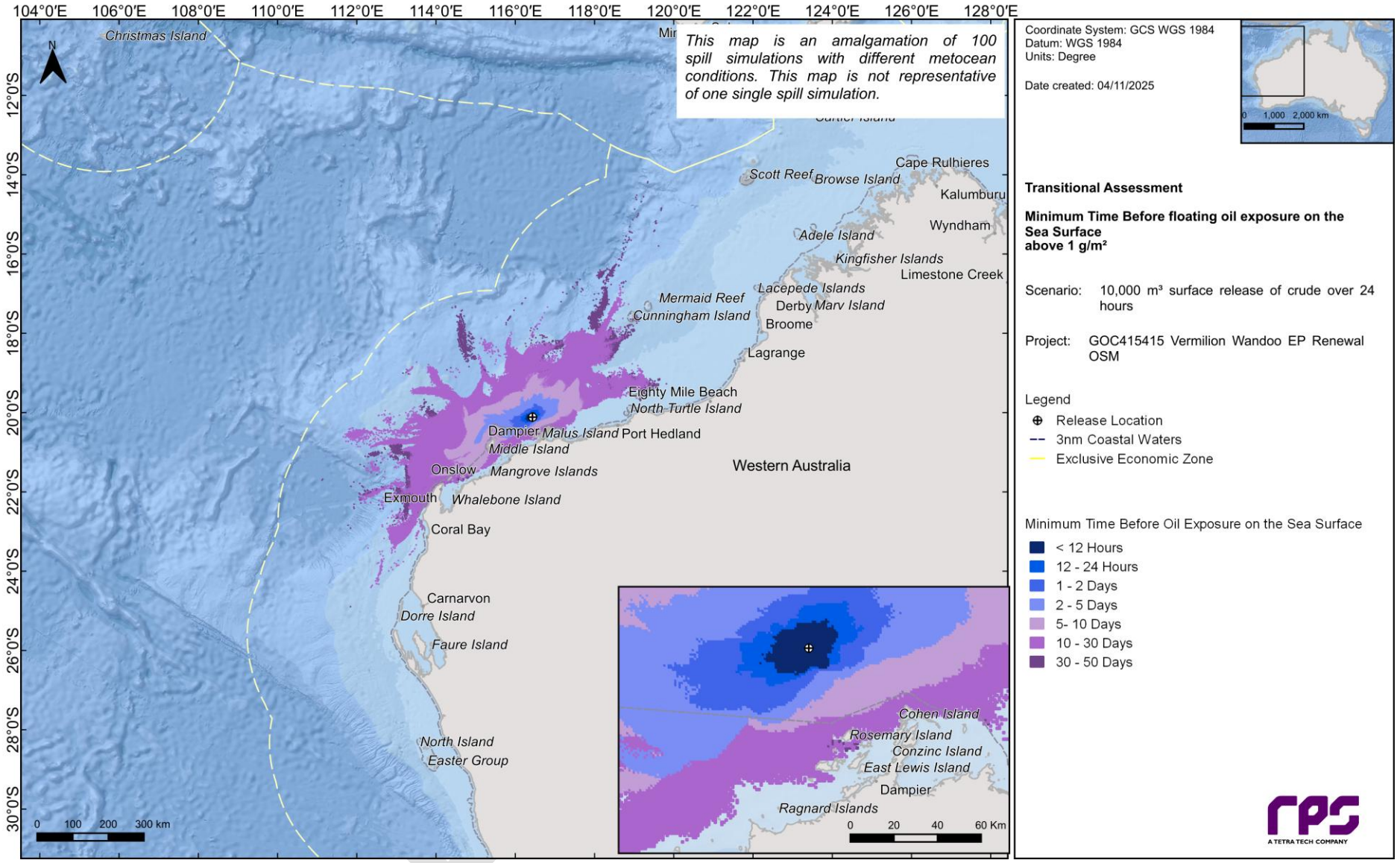


Figure 14.8 Minimum time before floating oil exposure at, or above, 1 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

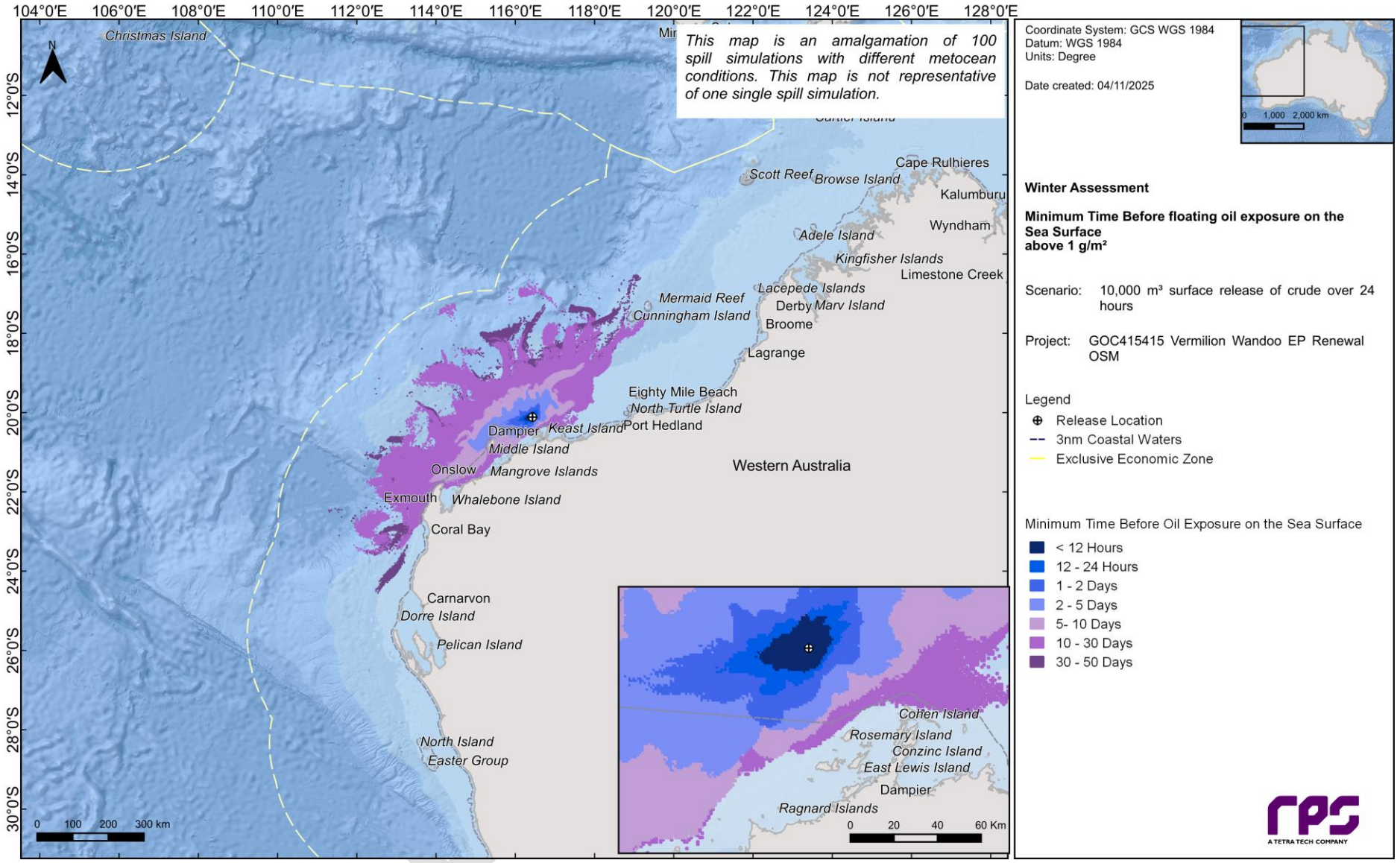


Figure 14.9 Minimum time before floating oil exposure at, or above, 1 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

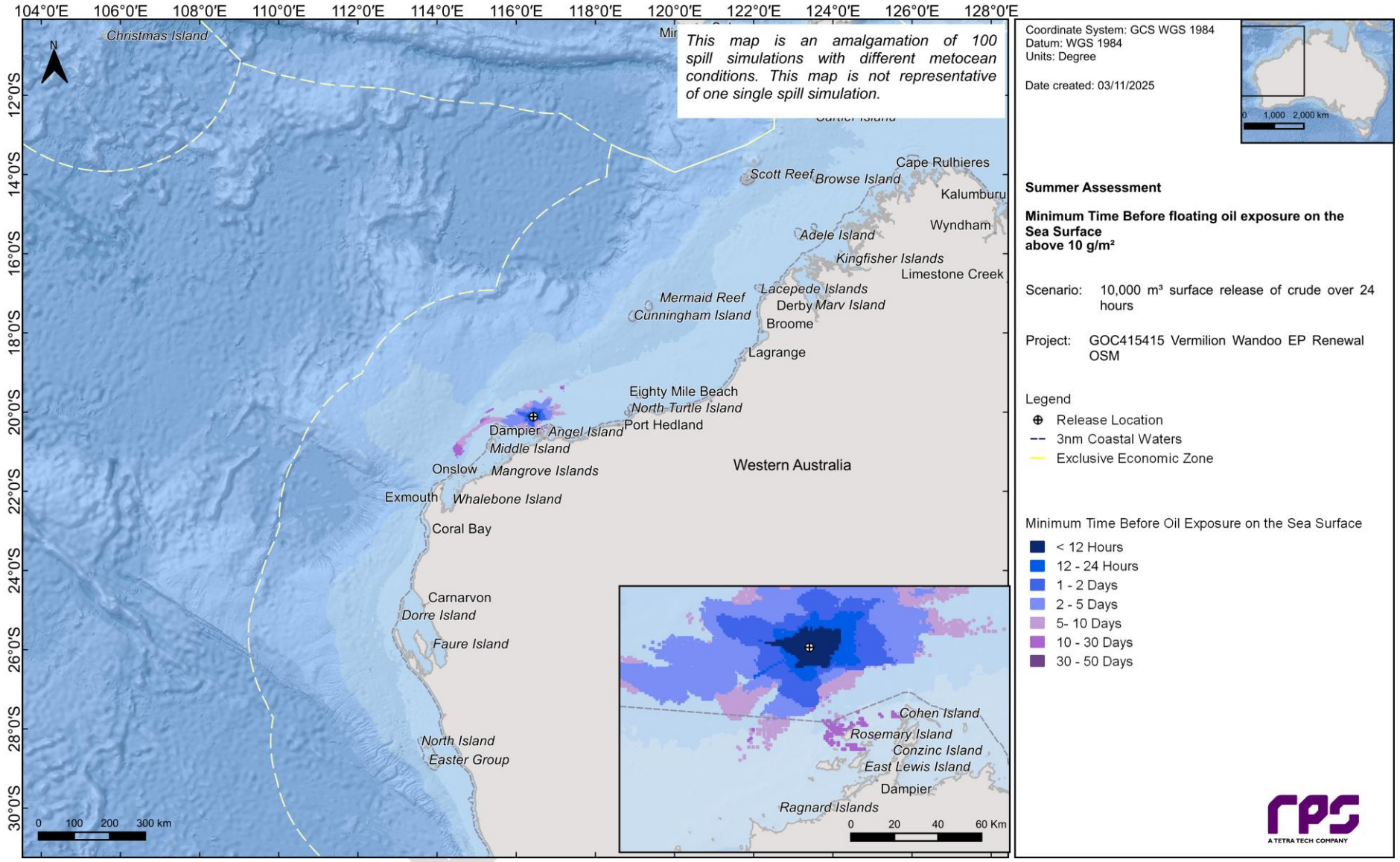


Figure 14.10 Minimum time before floating oil exposure at, or above, 10 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

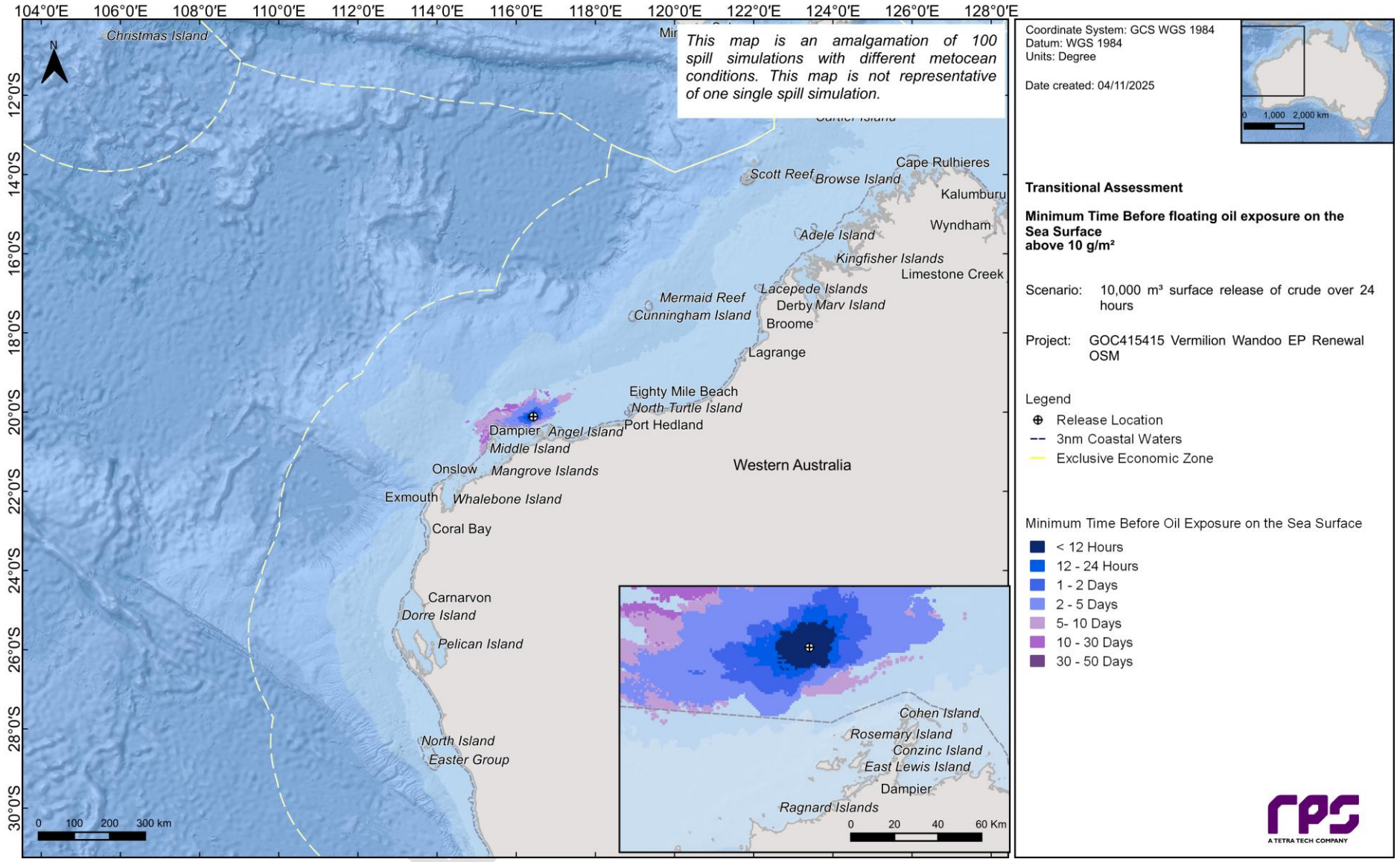


Figure 14.11 Minimum time before floating oil exposure at, or above, 10 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

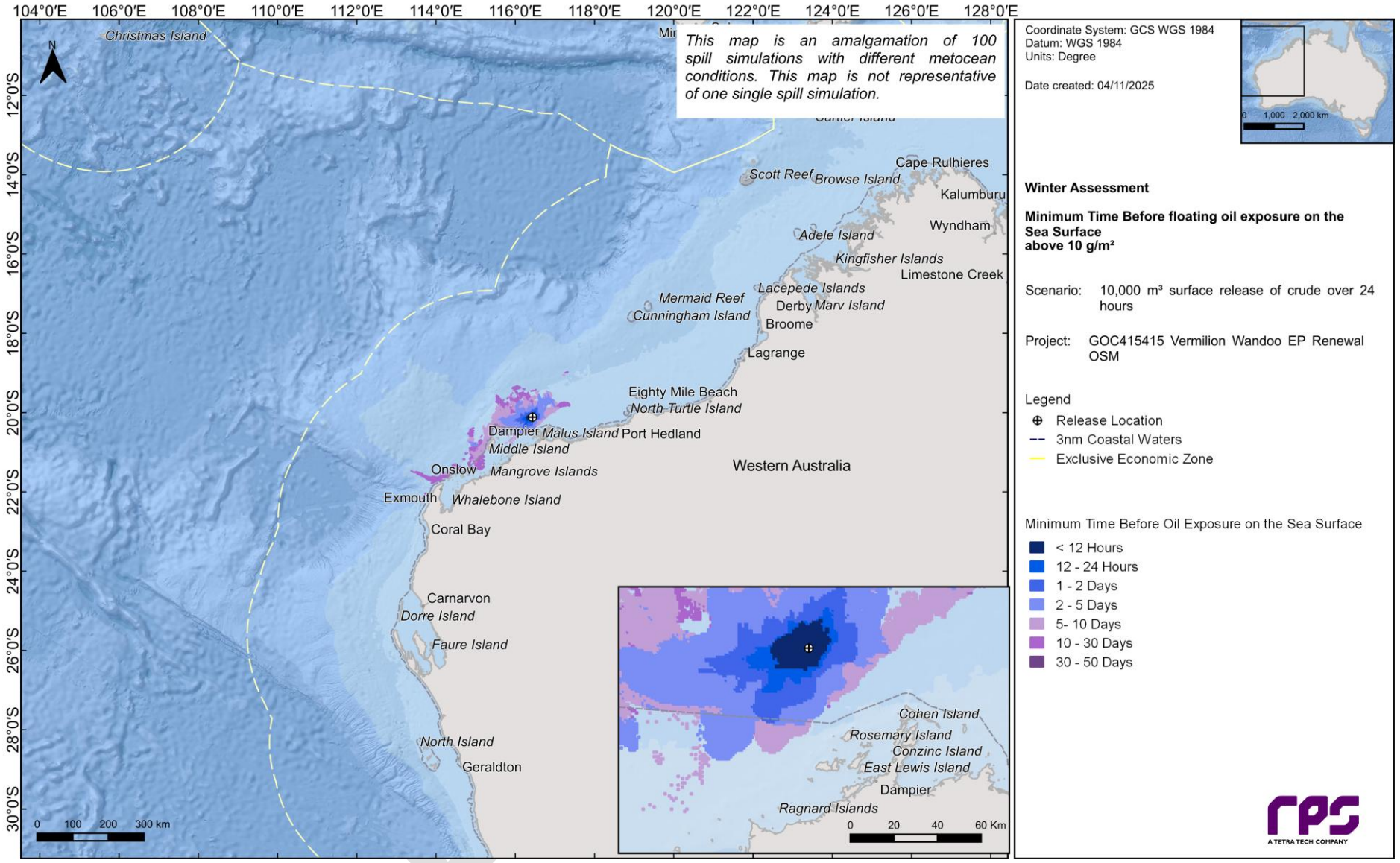


Figure 14.12 Minimum time before floating oil exposure at, or above, 10 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

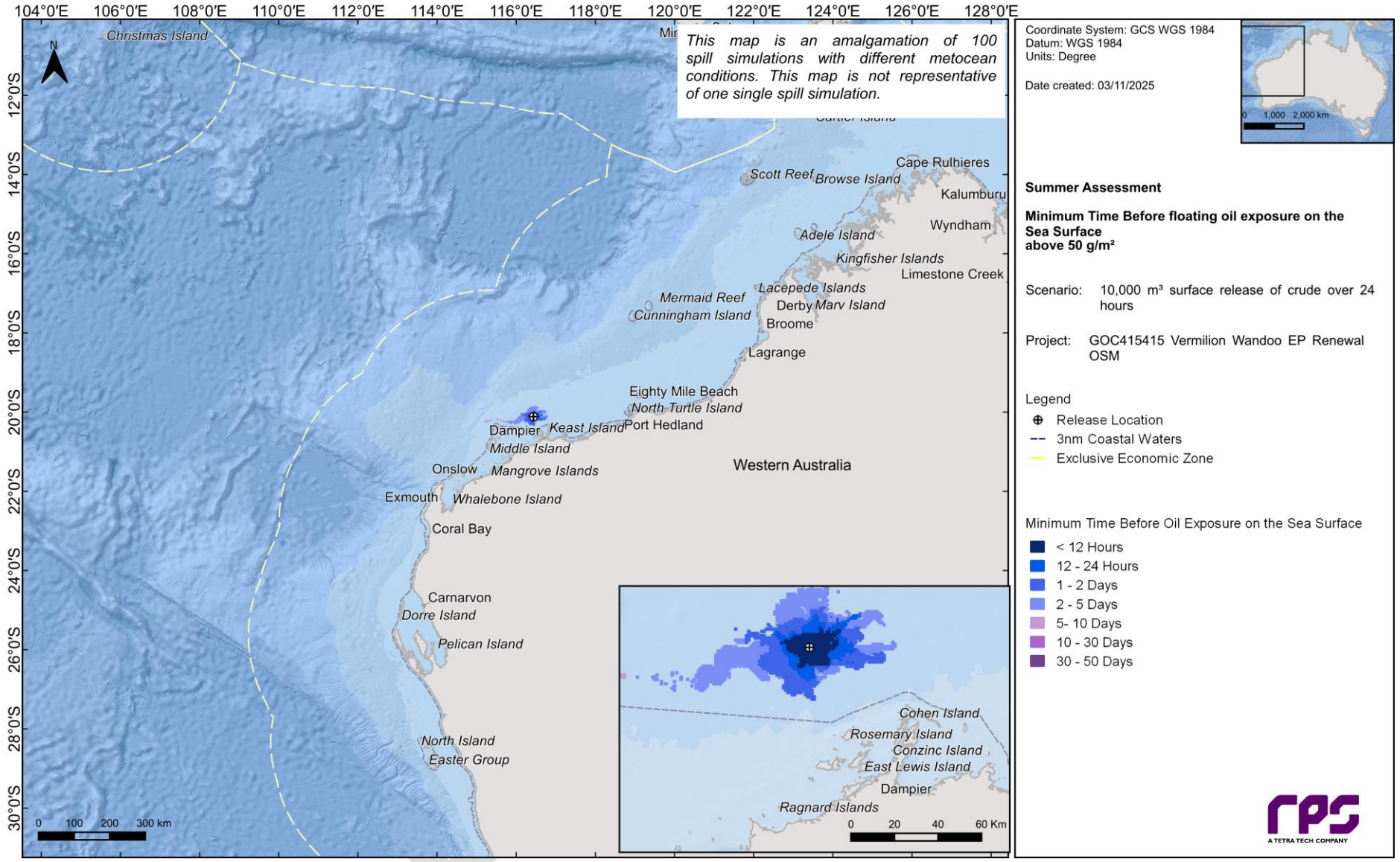


Figure 14.13 Minimum time before floating oil exposure at, or above, 50 g/m^2 following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

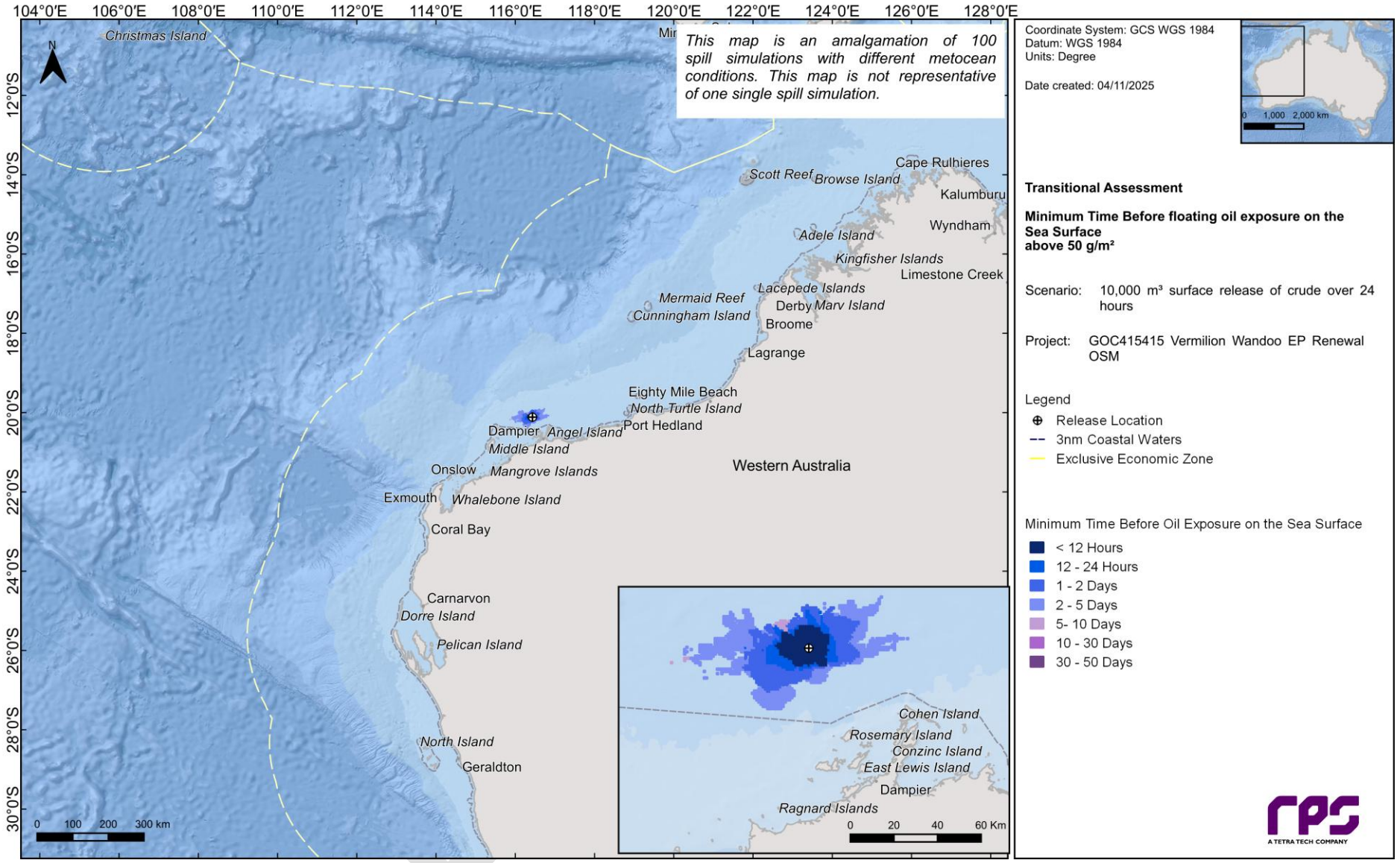


Figure 14.14 Minimum time before floating oil exposure at, or above, 50 g/m^2 following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

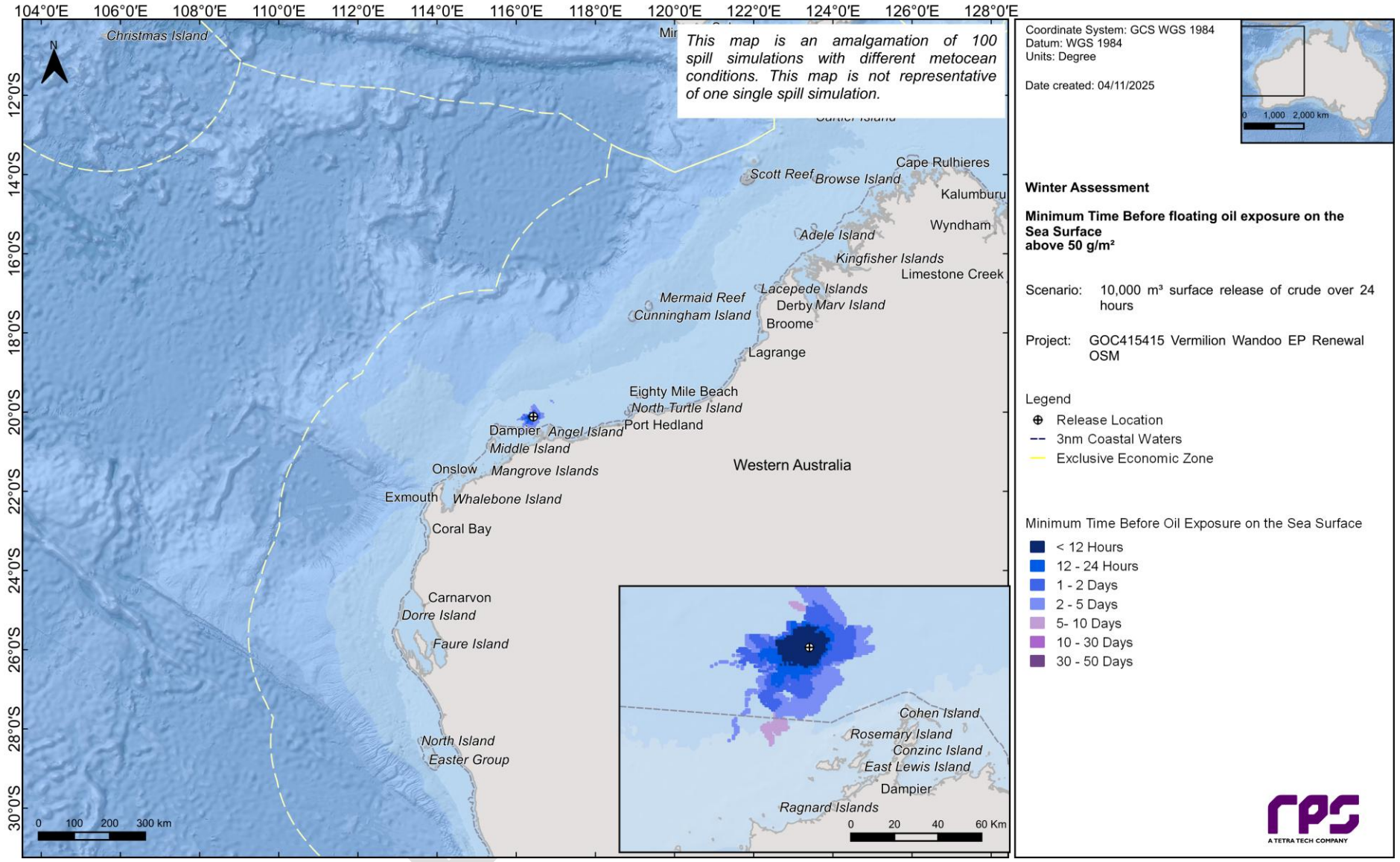


Figure 14.15 Minimum time before floating oil exposure at, or above, 50 g/m^2 following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

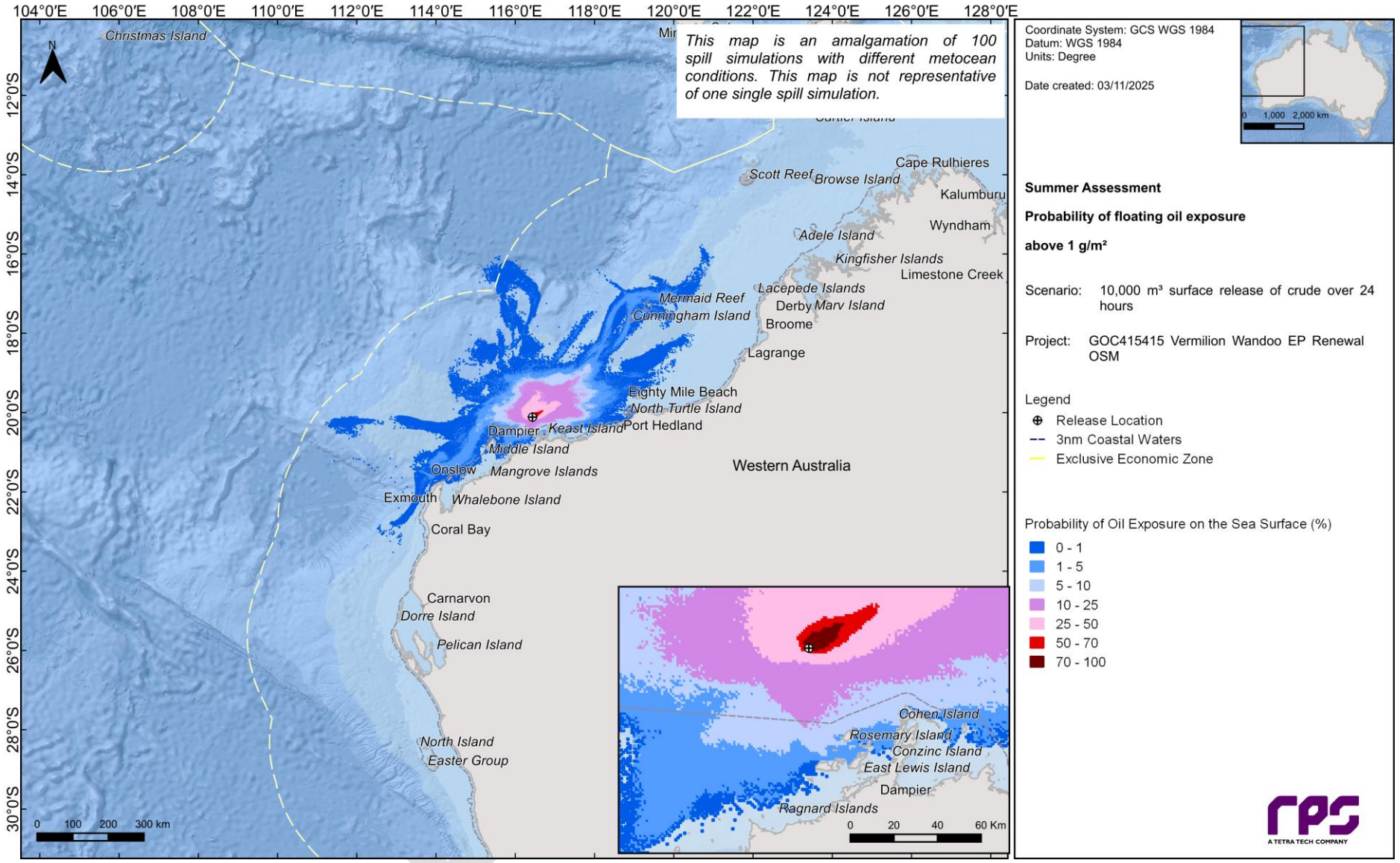


Figure 14.16 Probability of floating oil exposure at, or above, 1 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

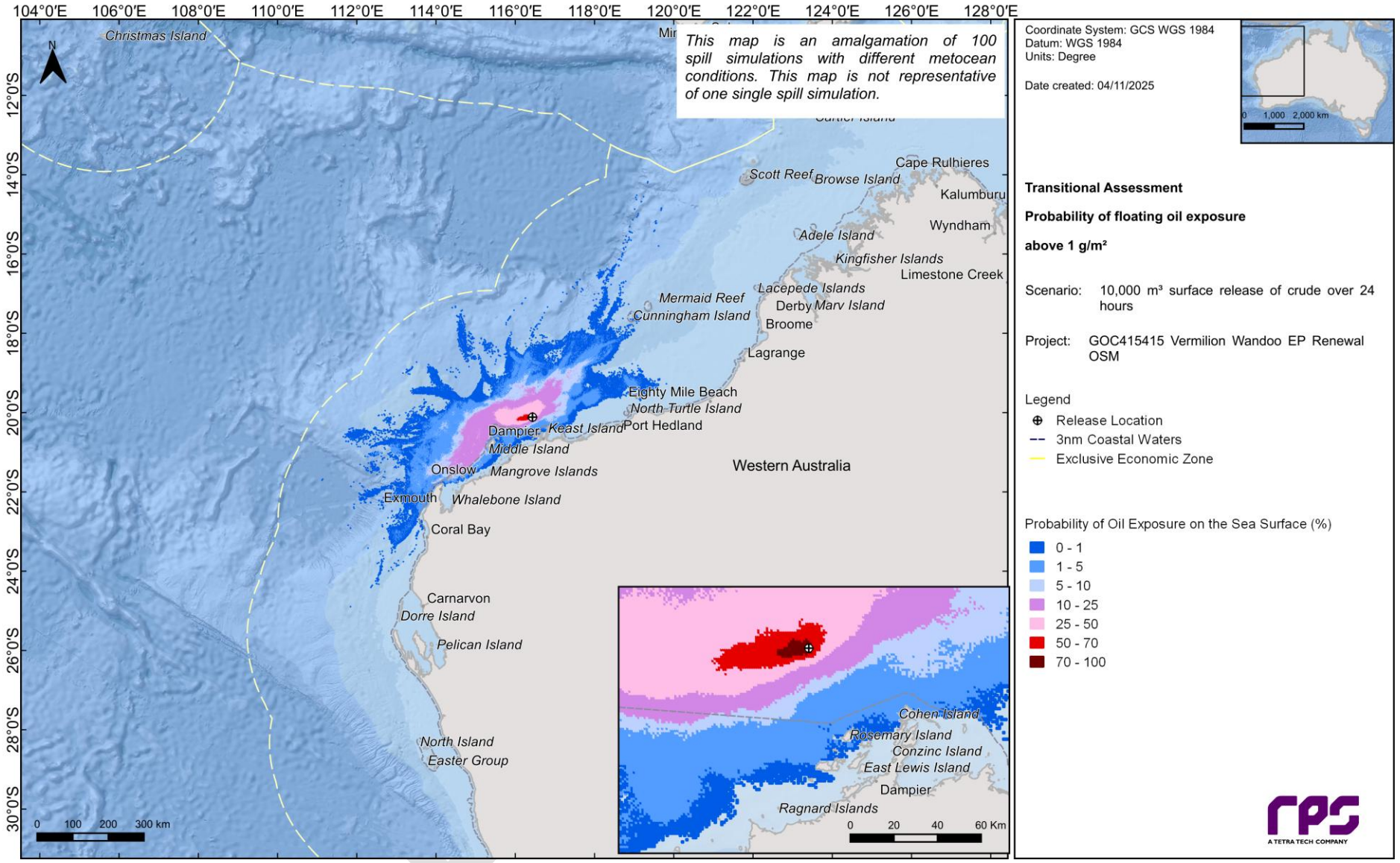


Figure 14.17 Probability of floating oil exposure at, or above, 1 g/m^2 following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

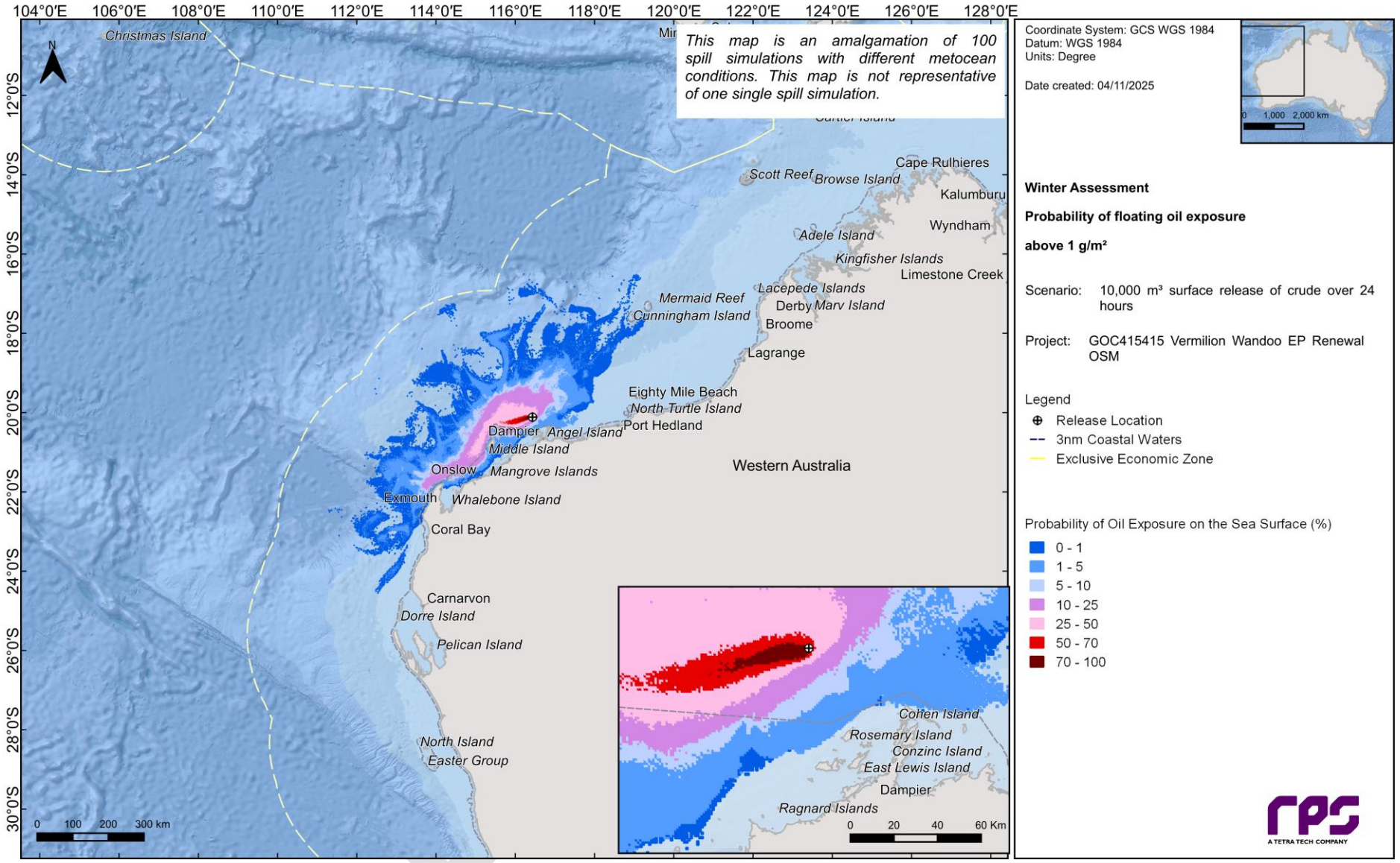


Figure 14.18 Probability of floating oil exposure at, or above, 1 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

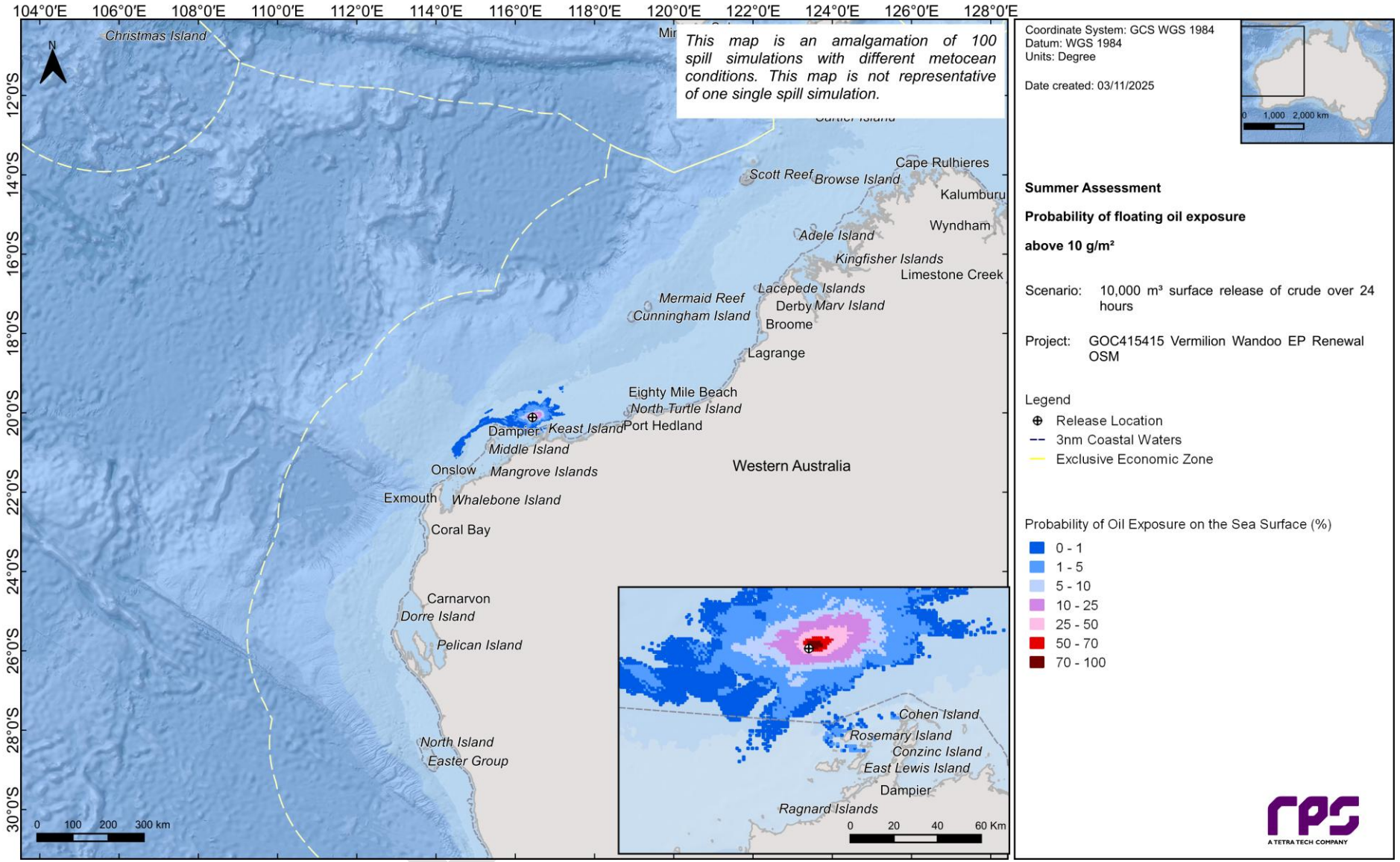


Figure 14.19 Probability of floating oil exposure at, or above, 10 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

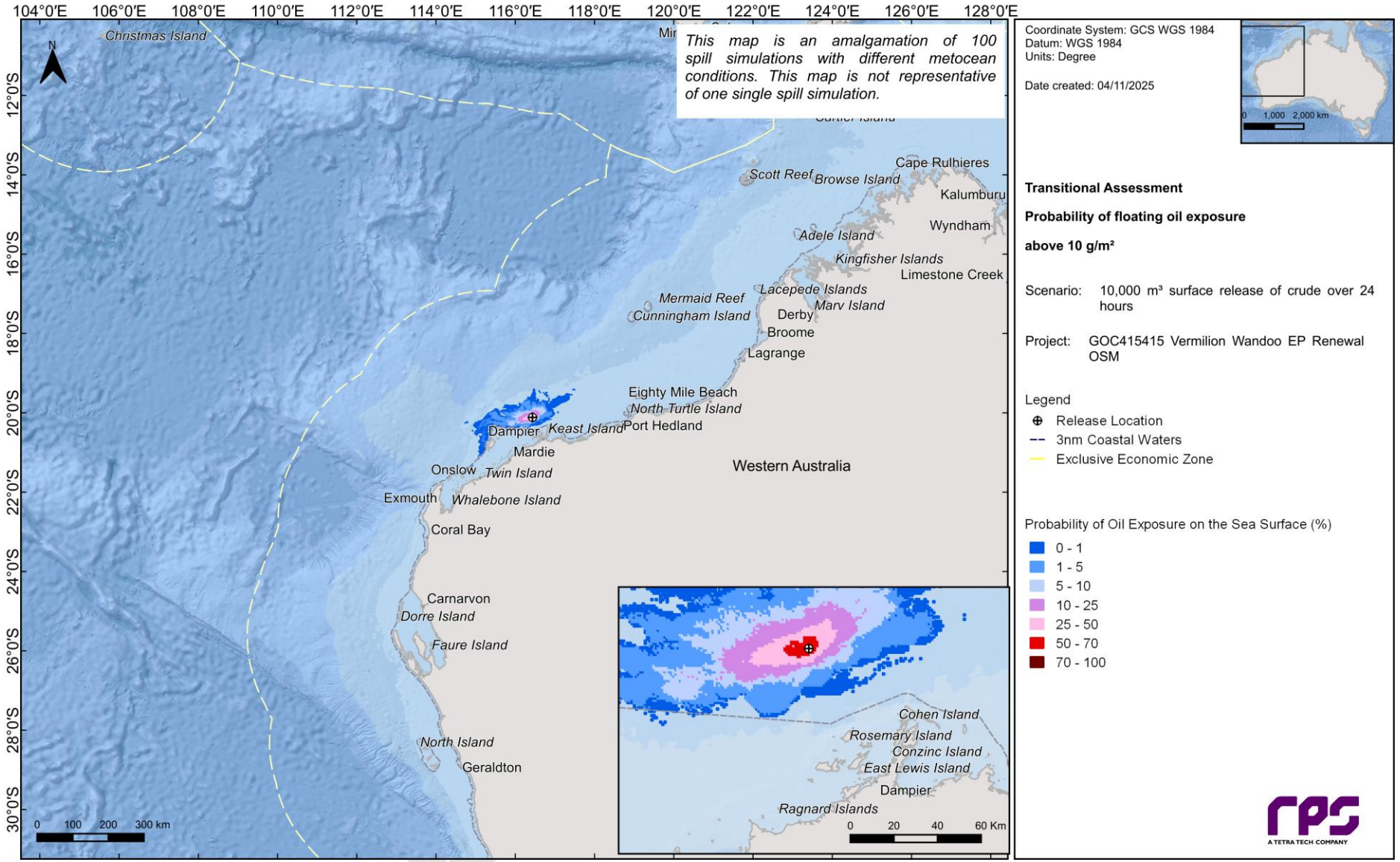


Figure 14.20 Probability of floating oil exposure at, or above, 10 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

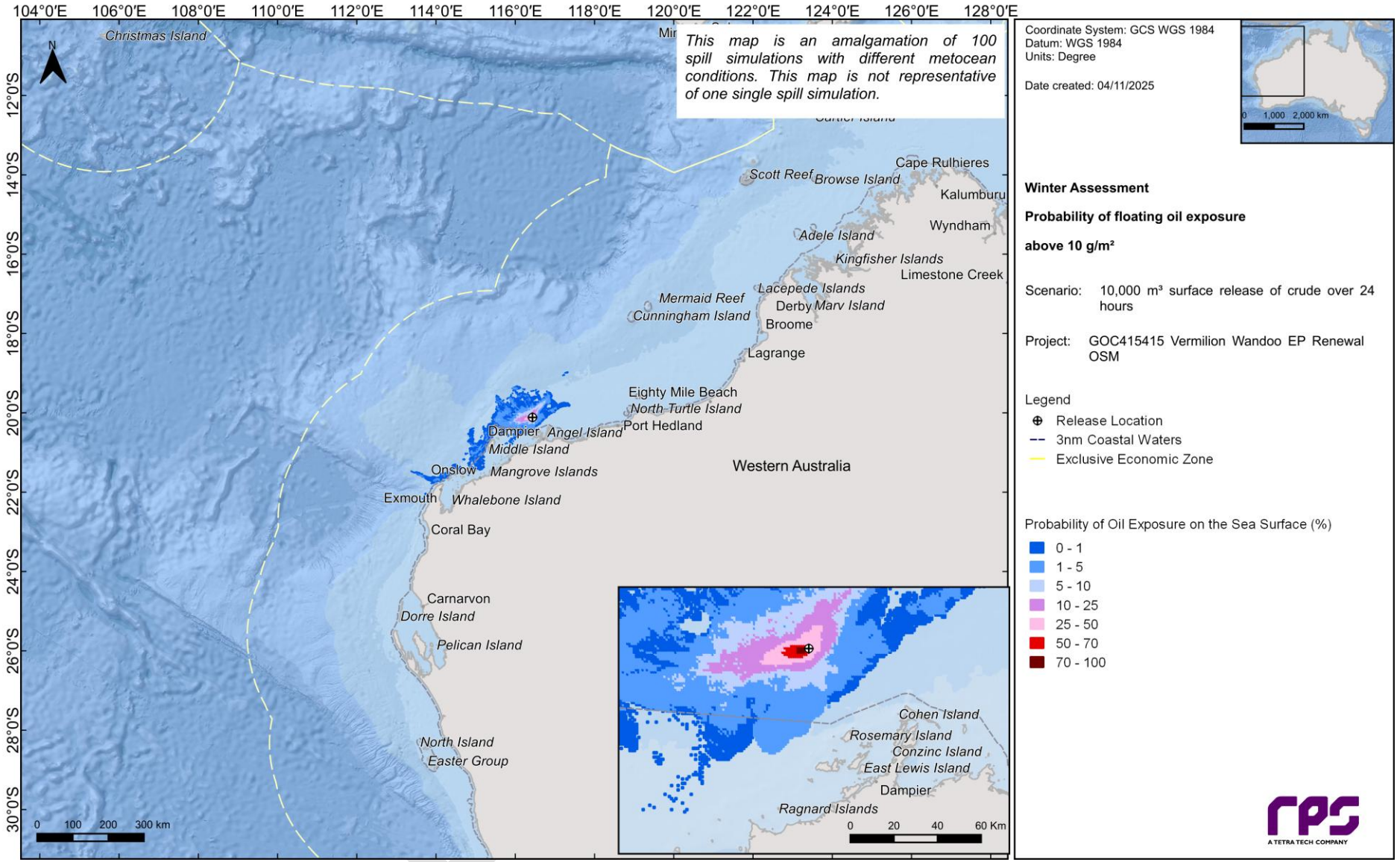


Figure 14.21 Probability of floating oil exposure at, or above, 10 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

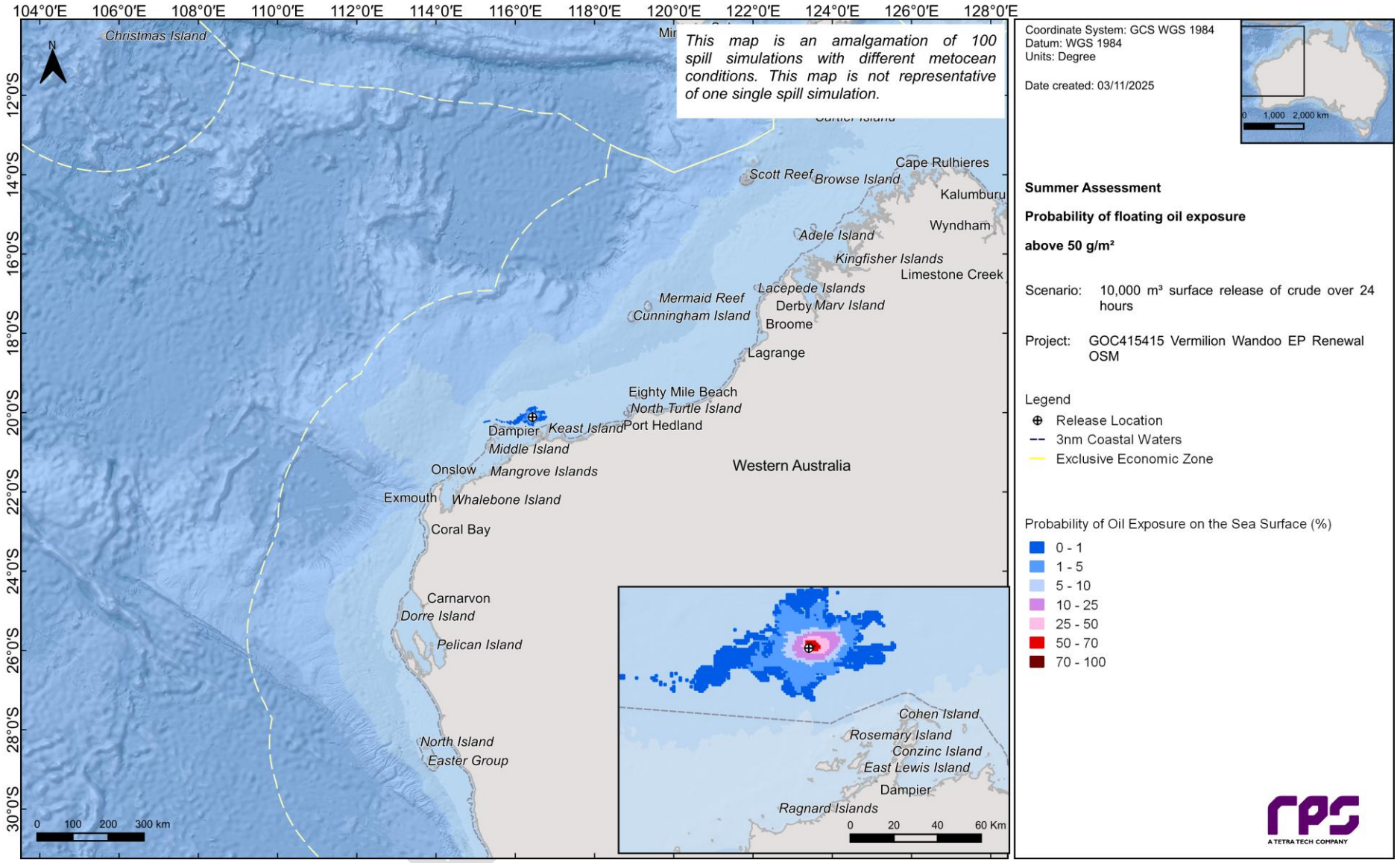


Figure 14.22 Probability of floating oil exposure at, or above, 50 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

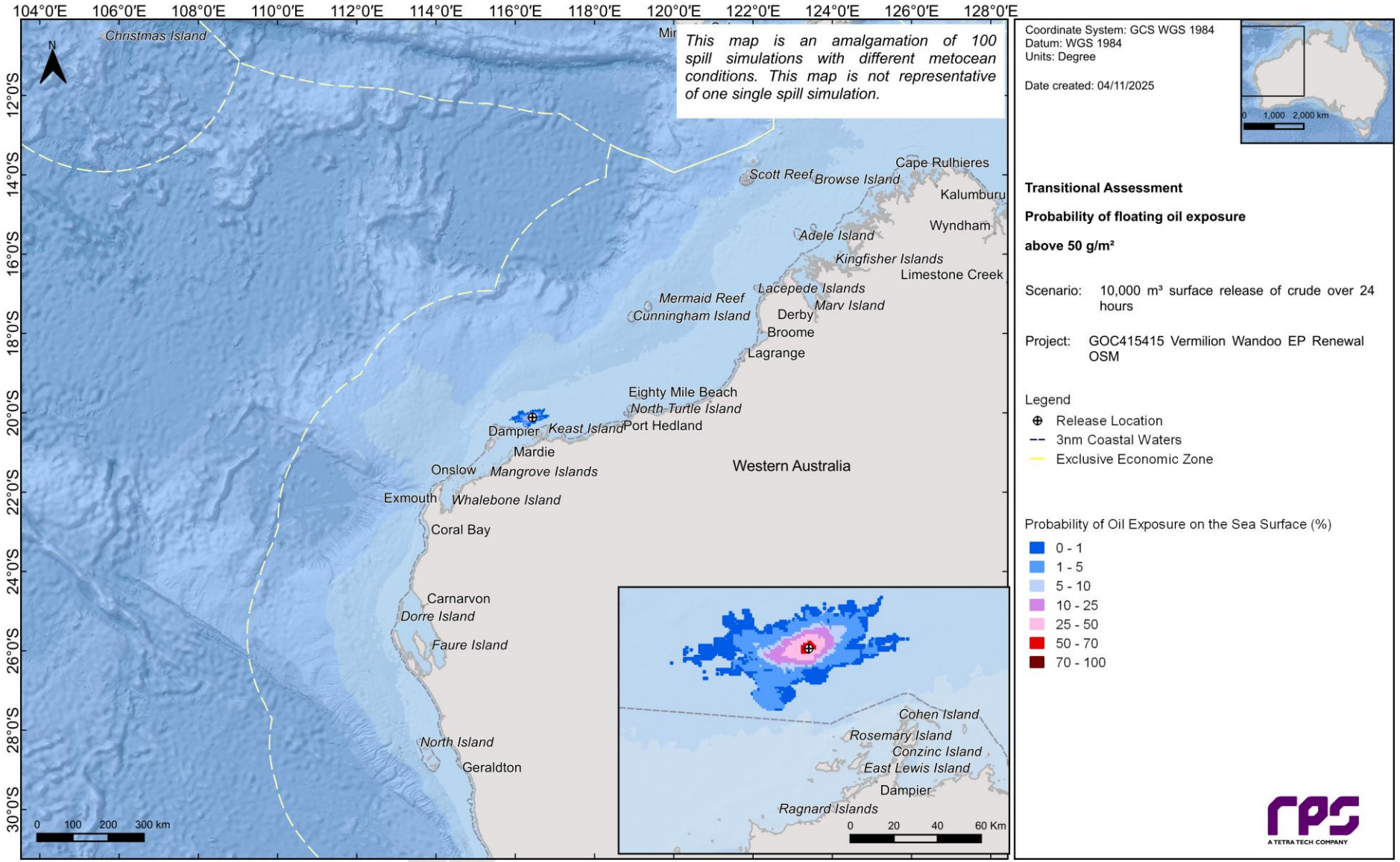


Figure 14.23 Probability of floating oil exposure at, or above, 50 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

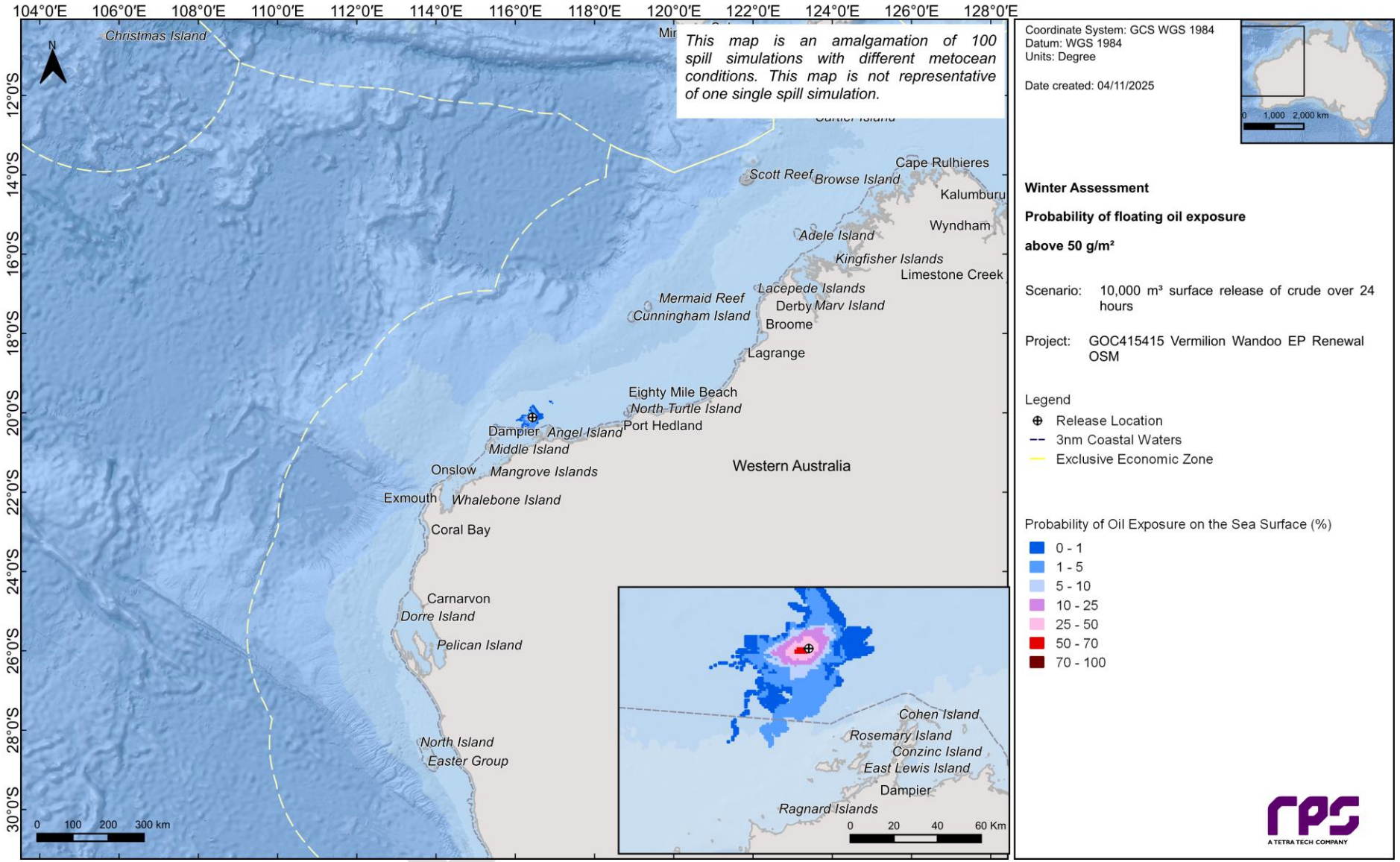


Figure 14.24 Probability of floating oil exposure at, or above, 50 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

14.1.4 Shoreline accumulation

Table 14-3 summarises the predicted oil accumulation on shorelines across different seasons and thresholds. The highest probability of accumulation at, or above, the 10 g/m^2 threshold was recorded during winter, reaching 99%. The shortest time for oil to accumulate on any shoreline at this threshold was 2 days 22 hours, also during winter. The maximum volume of oil ashore from a single spill was 3,595.4 m^3, commencing in summer.

Table 14-4Table 12-4 to Table 14-6 present the predicted oil accumulation for WAMOPRA shoreline cells for each season.

The highest overall probability of oil accumulation at, or above, the 10 g/m² threshold was forecast for WA11.West (326) – Baresand Point – Entrance Point E, with a 73% probability of accumulation during winter conditions. Under transitional conditions, the highest probability was 40% at WA11.West (329) - Locker Point – Baresand Point. During summer, the highest probability decreased to 21% and was observed at both WA11.East (105) - West Intercourse Island - Dolphin Island N point (C), and WA12 (312) – Yan Well coast to Condini Landing (C).

Across all seasons, WA11.West (318) – Barrow Island and Montebello Islands (A) recorded the fastest oil accumulation on any shoreline, taking 3 days 19 hours during summer conditions, 3 days 22 hours during transitional conditions, and 2 days 22 hours during winter conditions following the commencement of a spill.

This same shoreline also registered the highest volume of oil ashore during winter (2,312 m^3) and transitional conditions (1,298 m^3). During summer conditions, WA11.East (316) - West Intercourse Island - Dolphin Island N point (F) recorded the highest volume ashore (1,590 m^3).

The maximum potential shoreline oil accumulation for each season are presented in Figure 14.25 to Figure 14.27Figure 12.27. Probabilities of oil accumulation for each of the thresholds and seasons are presented in Figure 14.28 to Figure 14.36.

Table 14-3 Summary of oil accumulation on any shoreline following a surface release of crude from the tanker collision. Results were calculated from 100 spill simulations per season.

Shoreline statistics	Summer			Transitional			Winter		
	Shoreline accumulation thresholds			Shoreline accumulation thresholds			Shoreline accumulation thresholds		
	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²
Probability of contact to any shoreline (%)	70	50	27	75	60	31	99	89	61
Absolute minimum time to shore	3 d, 19 hrs	3 d, 23 hrs	4 d, 17 hrs	3 d, 22 hrs	4 d, 5 hrs	4 d, 14 hrs	2 d, 22 hrs	3 d, 3 hrs	3 d, 15 hrs
Maximum accumulated volume (m^3) from a single spill simulation	3,595.4	3,538.7	3,030.5	2,310.7	2,253.0	1,755.0	2,633.45	2,589.65	2,285.79
Average accumulated volume (m^3) across all spill simulations	277.3	259.4	163.1	213.0	202.7	139.1	441.8	424.9	321.2
Maximum length of shoreline (km) from a single spill simulation	618.0	307.0	63.0	369.0	204.0	48.0	305.0	155.0	51.0
Average length of shoreline (km) across all spill simulations	85.5	36.2	5.4	54.1	23.8	5.0	95.3	41.8	9.7

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Table 14-4 Summary of shoreline oil accumulation on WAMOPRA shoreline cells following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

WAMOPRA shoreline cells	Maximum probability (%) of oil accumulation at			Minimum time before oil accumulation at			Maximum shoreline oil accumulation (g/m²) in a given grid cell		Maximum volume (m^3) of accumulated oil ashore at ≥ 10 g/m²		Maximum volume (m^3) of accumulated oil ashore at ≥ 100 g/m²		Maximum volume (m^3) of accumulated oil ashore at ≥ 1,000 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 10 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 100 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 1,000 g/m²	
	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all simulations	for the worst simulation	averaged over all simulations	for the worst simulation	averaged over all simulations	for the worst simulation	averaged over all simulations	for the worst simulation	averaged over all simulations	for the worst simulation	averaged over all simulations	for the worst simulation	averaged over all simulations	for the worst simulation
WA10 (122) - Vlamingh Head - North West Cape	2	NC	NC	25 d, 9 hrs	NC	NC	0.4	23	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA10 (123) - Low Point - Vlamingh Head (A)	3	NC	NC	18 d, 0 hrs	NC	NC	0.9	44	<1	2	NC	NC	NC	NC	<1	7	NC	NC	NC	NC
WA10 (124) - Low Point - Vlamingh Head (B)	2	NC	NC	37 d, 4 hrs	NC	NC	0.9	81	<1	6	NC	NC	NC	NC	<1	16	NC	NC	NC	NC
WA10 (125) - Osprey Bay - Low Point	2	NC	NC	29 d, 0 hrs	NC	NC	0.4	42	<1	2	NC	NC	NC	NC	<1	5	NC	NC	NC	NC
WA10 (126) - Winderabandi Point - Osprey Bay	1	NC	NC	35 d, 7 hrs	NC	NC	0.4	37	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA11.East (100) - Sherlock coast - Cape Cossigny (B)	12	6	NC	18 d, 19 hrs	19 d, 20 hrs	NC	32	861	3	71	3	66	NC	NC	2	33	<1	22	NC	NC
WA11.East (101) - Cape Lambert - Sherlock coast (A)	10	5	NC	15 d, 11 hrs	26 d, 18 hrs	NC	12	276	<1	12	<1	3	NC	NC	2	25	<1	1	NC	NC
WA11.East (102) - Cape Lambert - Sherlock coast (B)	14	10	NC	11 d, 4 hrs	20 d, 7 hrs	NC	52	683	2	28	2	21	NC	NC	2	25	<1	6	NC	NC
WA11.East (103) - West Intercourse Island - Dolphin Island N point (A)	6	1	NC	21 d, 3 hrs	47 d, 7 hrs	NC	3.1	233	<1	7	<1	3	NC	NC	<1	11	<1	1	NC	NC
WA11.East (104) - West Intercourse Island - Dolphin Island N point (B)	15	9	1	7 d, 21 hrs	18 d, 14 hrs	21 d, 21 hrs	40	1,322	2	53	2	50	<1	38	2	25	<1	16	<1	3
WA11.East (105) - West Intercourse Island - Dolphin Island N point (C)	21	16	12	5 d, 3 hrs	5 d, 13 hrs	6 d, 6 hrs	805	20,673	56	1,349	55	1,348	48	1,315	6	40	4	33	2	22
WA11.East (106) - West Intercourse Island - Dolphin Island N point (D)	9	6	NC	9 d, 8 hrs	11 d, 18 hrs	NC	19	476	<1	36	<1	25	NC	NC	2	32	<1	11	NC	NC
WA11.East (107) - West Intercourse Island - Dolphin Island N point (E)	7	3	NC	10 d, 21 hrs	30 d, 17 hrs	NC	7.9	490	<1	33	<1	27	NC	NC	<1	21	<1	11	NC	NC
WA11.East (108) - Pelican Point - West Intercourse Island	10	5	1	9 d, 16 hrs	14 d, 5 hrs	31 d, 19 hrs	38	2,036	2	119	2	114	<1	42	2	36	<1	21	<1	3
WA11.East (109) - James Point - Cape Preston	9	6	2	6 d, 7 hrs	9 d, 19 hrs	26 d, 7 hrs	60	3,062	3	199	3	193	2	88	<1	40	<1	28	<1	3
WA11.East (315) - Dolphin Island N point - Cinders Rd coast	18	12	5	8 d, 0 hrs	9 d, 22 hrs	13 d, 7 hrs	139	3,227	4	80	4	79	2	64	2	11	<1	10	<1	3
WA11.East (316) - West Intercourse Island - Dolphin Island N point (F)	18	12	11	4 d, 1 hr	4 d, 4 hrs	4 d, 23 hrs	907	22,878	59	1,590	58	1,587	53	1,517	6	64	3	39	2	21
WA11.East (317) - West Intercourse Island - Dolphin Island N point (G)	19	15	10	3 d, 20 hrs	3 d, 23 hrs	4 d, 17 hrs	981	22,868	26	481	25	480	20	445	4	44	2	33	<1	13
WA11.East (95) - Turner River NE foreland - Beebingara Creek coast E (A)	16	11	1	17 d, 21 hrs	19 d, 14 hrs	24 d, 13 hrs	68	2,014	5	149	4	146	<1	71	3	27	2	22	<1	4
WA11.East (96) - Turner River NE foreland - Beebingara Creek coast E (B)	16	11	2	16 d, 18 hrs	18 d, 20 hrs	21 d, 15 hrs	78	1,784	6	151	6	148	<1	58	3	30	2	20	<1	4
WA11.East (97) - Cape Thouin - Turner River NE foreland	14	11	5	16 d, 16 hrs	18 d, 17 hrs	20 d, 21 hrs	97	2,339	13	302	13	299	6	259	3	28	2	22	<1	16
WA11.East (98) - Cape Cossigny - Cape Thouin	13	8	3	15 d, 19 hrs	19 d, 15 hrs	24 d, 11 hrs	61	1,605	7	147	7	145	2	46	3	28	2	22	<1	4
WA11.East (99) - Sherlock coast - Cape Cossigny (A)	13	6	1	17 d, 3 hrs	19 d, 19 hrs	38 d, 22 hrs	48	1,029	5	115	5	107	<1	11	3	41	2	24	<1	1
WA11.West (110) - Mount Salt coast W - James Point	4	3	1	8 d, 23 hrs	9 d, 13 hrs	26 d, 19 hrs	31	2,389	3	247	3	240	2	145	<1	41	<1	29	<1	9
WA11.West (111) - Peter Creek coast E - Mount Salt coast W	5	3	2	8 d, 12 hrs	24 d, 9 hrs	26 d, 15 hrs	31	1,733	2	105	2	99	<1	43	<1	36	<1	16	<1	3
WA11.West (112) - Weld Island coast S - Peter Creek coast E	1	1	NC	26 d, 13 hrs	32 d, 14 hrs	NC	1.9	193	<1	18	<1	8	NC	NC	<1	28	<1	5	NC	NC
WA11.West (113) - Coolgra Point W - Yardie Landing (A)	1	1	NC	27 d, 12 hrs	32 d, 17 hrs	NC	2.2	223	<1	6	<1	4	NC	NC	<1	7	<1	2	NC	NC
WA11.West (114) - Coolgra Point W - Yardie Landing (B)	1	1	NC	28 d, 15 hrs	30 d, 7 hrs	NC	3.1	313	<1	9	<1	5	NC	NC	<1	15	<1	2	NC	NC
WA11.West (115) - Hope Point - Locker Point (A)	3	2	NC	26 d, 6 hrs	26 d, 18 hrs	NC	5.7	388	<1	19	<1	13	NC	NC	<1	20	<1	5	NC	NC

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WA11.West (116) - Hope Point - Locker Point (B)	2	NC	NC	26 d, 10 hrs	NC	NC	0.7	60	<1	2	NC	NC	NC	NC	<1	8	NC	NC	NC	NC
WA11.West (318) - Barrow Island and Montebello Islands (A)	20	12	4	3 d, 19 hrs	5 d, 8 hrs	17 d, 9 hrs	104	4,294	15	333	14	324	7	251	7	59	3	44	<1	10
WA11.West (319) - Barrow Island and Montebello Islands (B)	18	9	1	4 d, 22 hrs	5 d, 11 hrs	17 d, 13 hrs	48	2,677	5	228	5	228	2	187	2	15	<1	15	<1	11
WA11.West (320) - Barrow Island and Montebello Islands (C)	12	5	1	6 d, 10 hrs	16 d, 19 hrs	39 d, 9 hrs	29	1,483	4	102	4	99	<1	52	2	41	<1	19	<1	4
WA11.West (321) - Barrow Island and Montebello Islands (D)	11	5	2	5 d, 23 hrs	17 d, 9 hrs	25 d, 23 hrs	48	2,377	4	188	3	186	2	91	2	34	<1	21	<1	5
WA11.West (323) - Yardie Landing - Weld Island coast S (A)	4	2	NC	8 d, 11 hrs	26 d, 6 hrs	NC	7.7	577	<1	24	<1	24	NC	NC	<1	7	<1	7	NC	NC
WA11.West (324) - Yardie Landing - Weld Island coast S (B)	5	2	NC	20 d, 15 hrs	26 d, 10 hrs	NC	12	569	<1	13	<1	13	NC	NC	<1	3	<1	3	NC	NC
WA11.West (325) - Coolgra Point W - Yardie Landing (C)	4	2	NC	21 d, 14 hrs	26 d, 10 hrs	NC	13	653	<1	25	<1	23	NC	NC	<1	14	<1	8	NC	NC
WA11.West (326) - Baresand Point - Entrance Point E	9	6	2	16 d, 1 hr	17 d, 3 hrs	23 d, 1 hr	72	3,681	4	132	4	129	<1	62	2	23	<1	22	<1	3
WA11.West (327) - Hope Point - Locker Point (E)	4	2	NC	26 d, 4 hrs	26 d, 7 hrs	NC	8.5	501	<1	11	<1	11	NC	NC	<1	2	<1	2	NC	NC
WA11.West (328) - Hope Point - Locker Point (F)	1	1	NC	25 d, 23 hrs	26 d, 22 hrs	NC	3	293	<1	6	<1	5	NC	NC	<1	7	<1	2	NC	NC
WA11.West (329) - Locker Point - Baresand Point	9	4	2	15 d, 2 hrs	16 d, 8 hrs	31 d, 12 hrs	38	2,650	4	181	4	179	2	80	2	28	<1	21	<1	5
WA12 (309) - Mermaid Reef	5	5	4	32 d, 0 hrs	32 d, 7 hrs	33 d, 16 hrs	196	8,640	4	175	4	175	4	175	<1	2	<1	2	<1	2
WA12 (310) - Clerke Reef	9	5	2	31 d, 0 hrs	31 d, 18 hrs	33 d, 19 hrs	62	3,029	3	140	3	138	3	137	<1	10	<1	7	<1	6
WA12 (311) - Imperieuse Reef	16	10	2	26 d, 4 hrs	26 d, 15 hrs	27 d, 19 hrs	131	5,444	7	249	7	243	5	243	2	19	<1	12	<1	11
WA12 (312) - Yan Well coast - Condini Landing (C)	21	15	4	17 d, 16 hrs	22 d, 9 hrs	34 d, 5 hrs	122	2,232	3	55	3	55	2	44	<1	4	<1	4	<1	2
WA12 (313) - Wattle Well coast - Yan Well coast (C)	20	13	6	18 d, 2 hrs	22 d, 1 hrs	27 d, 11 hrs	133	1,985	4	61	4	61	3	61	<1	4	<1	4	<1	4
WA12 (314) - Wattle Well coast - Yan Well coast (D)	20	14	8	18 d, 20 hrs	20 d, 6 hrs	24 d, 14 hrs	324	8,472	4	88	4	88	4	88	<1	1	<1	1	<1	1
WA12 (76) - Cape Gourdon - Cape Villaret (B)	1	NC	NC	47 d, 0 hrs	NC	NC	0.3	35	<1	2	NC	NC	NC	NC	<1	7	NC	NC	NC	NC
WA12 (77) - Saddle Hill - Cape Gourdon (A)	1	NC	NC	48 d, 14 hrs	NC	NC	0.4	42	<1	2	NC	NC	NC	NC	<1	5	NC	NC	NC	NC
WA12 (78) - Saddle Hill - Cape Gourdon (B)	1	NC	NC	44 d, 18 hrs	NC	NC	0.8	76	<1	7	NC	NC	NC	NC	<1	15	NC	NC	NC	NC
WA12 (79) - Tryon Point - False Cape Bossut (A)	1	NC	NC	42 d, 17 hrs	NC	NC	0.6	56	<1	3	NC	NC	NC	NC	<1	10	NC	NC	NC	NC
WA12 (80) - Tryon Point - False Cape Bossut (B)	1	NC	NC	43 d, 12 hrs	NC	NC	0.3	29	<1	<1	NC	NC	NC	NC	<1	5	NC	NC	NC	NC
WA12 (81) - Cape Jaubert - Tryon Point	1	NC	NC	42 d, 7 hrs	NC	NC	0.3	22	<1	<1	NC	NC	NC	NC	<1	5	NC	NC	NC	NC
WA12 (83) - Samphire bore coast - Cape Jaubert (B)	1	NC	NC	40 d, 23 hrs	NC	NC	0.3	16	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA12 (84) - Samphire bore coast - Cape Jaubert (C)	4	NC	NC	34 d, 17 hrs	NC	NC	1.2	57	<1	3	NC	NC	NC	NC	<1	11	NC	NC	NC	NC
WA12 (85) - Cooraidegel Well coast - Eighty Mile Beach Caravan Park NE (A)	5	1	NC	33 d, 19 hrs	43 d, 17 hrs	NC	3	135	<1	7	<1	3	NC	NC	<1	9	<1	2	NC	NC
WA12 (86) - Cooraidegel Well coast - Eighty Mile Beach Caravan Park NE (B)	7	2	NC	31 d, 17 hrs	41 d, 5 hrs	NC	7.6	404	<1	36	<1	33	NC	NC	<1	16	<1	12	NC	NC
WA12 (87) - Cooraidegel Well coast - Eighty Mile Beach Caravan Park NE (C)	8	3	NC	29 d, 3 hrs	41 d, 3 hrs	NC	14	747	<1	60	<1	60	NC	NC	<1	14	<1	14	NC	NC
WA12 (88) - Shoonta Well - Cooraidegel Well coast	10	6	NC	30 d, 20 hrs	36 d, 9 hrs	NC	34	899	3	89	3	85	NC	NC	2	24	<1	20	NC	NC
WA12 (89) - Condini Landing - Mulla Mulla Creek	10	6	1	29 d, 22 hrs	33 d, 23 hrs	40 d, 2 hrs	39	1,205	4	135	4	129	<1	25	3	43	<1	27	<1	2
WA12 (90) - Yan Well coast - Condini Landing (A)	9	6	NC	30 d, 11 hrs	33 d, 11 hrs	NC	16	480	<1	26	<1	23	NC	NC	<1	13	<1	10	NC	NC
WA12 (91) - Yan Well coast - Condini Landing (B)	16	10	2	22 d, 2 hrs	26 d, 19 hrs	35 d, 15 hrs	65	1,309	5	117	5	115	<1	14	3	35	2	29	<1	1
WA12 (92) - Wattle Well coast - Yan Well coast (A)	16	11	3	21 d, 16 hrs	24 d, 11 hrs	31 d, 21 hrs	83	2,748	7	193	7	191	3	173	3	18	2	16	<1	8
WA12 (93) - Wattle Well coast - Yan Well coast (B)	13	11	3	21 d, 13 hrs	25 d, 6 hrs	31 d, 12 hrs	84	2,625	10	233	9	230	4	176	3	33	2	25	<1	11
WA12 (94) - Beebingara Creek coast E - Wattle Well coast	15	9	1	18 d, 14 hrs	21 d, 3 hrs	27 d, 10 hrs	57	1,783	5	102	4	97	<1	44	3	33	2	23	<1	3

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NC: No contact to receptor predicted for specified threshold.

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Table 14-5 Summary of shoreline oil accumulation on WAMOPRA shoreline cells following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

WAMOPRA shoreline cells	Maximum probability (%) of oil accumulation at			Minimum time before oil accumulation at			Maximum shoreline oil accumulation (g/m²) in a given grid cell		Maximum volume (m^3) of accumulated oil ashore at ≥ 10 g/m²		Maximum volume (m^3) of accumulated oil ashore at ≥ 100 g/m²		Maximum volume (m^3) of accumulated oil ashore at ≥ 1,000 g/m²			Maximum length (km) of oil accumulation on shorelines at ≥ 10 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 100 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 1,000 g/m²	
	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all simulations	for the worst simulation	averaged over all simulations	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all simulations	for the worst simulation	averaged over all simulations	≥ 10 g/m²	≥ 100 g/m²
WA08 (332) - Bowes River - Broken Anchor Bay (A)	2	NC	NC	49 d, 7 hrs	NC	NC	0.3	32	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA08 (333) - Bowes River - Broken Anchor Bay (B)	1	NC	NC	45 d, 19 hrs	NC	NC	0.2	18	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA08 (334) - Glenfield Beach - Bowes River (A)	1	NC	NC	49 d, 16 hrs	NC	NC	0.2	16	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA09 (169) - Cape Inscription - Herald Bay N (B)	1	NC	NC	41 d, 0 hrs	NC	NC	0.3	17	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA09 (170) - Steep Point - Quoin Head (B)	4	NC	NC	37 d, 0 hrs	NC	NC	1.3	47	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA09 (171) - Steep Point - Quoin Head (C)	3	NC	NC	36 d, 20 hrs	NC	NC	0.6	46	<1	2	NC	NC	NC	NC	<1	8	NC	NC	NC	NC
WA09 (172) - Steep Point - Quoin Head (D)	3	NC	NC	35 d, 19 hrs	NC	NC	0.9	48	<1	3	NC	NC	NC	NC	<1	8	NC	NC	NC	NC
WA09 (173) - Steep Point - Quoin Head (E)	3	NC	NC	46 d, 12 hrs	NC	NC	1.6	78	<1	9	NC	NC	NC	NC	<1	19	NC	NC	NC	NC
WA09 (174) - Kakura Dunes coast - Zuytdorp Point (A)	3	NC	NC	47 d, 7 hrs	NC	NC	1.2	87	<1	3	NC	NC	NC	NC	<1	8	NC	NC	NC	NC
WA09 (330) - Dorre Island and Bernier Island (A)	1	NC	NC	34 d, 22 hrs	NC	NC	0.3	17	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA09 (331) - Dorre Island and Bernier Island (B)	7	NC	NC	35 d, 0 hrs	NC	NC	2	57	<1	4	NC	NC	NC	NC	<1	16	NC	NC	NC	NC
WA10 (121) - Bundegi - Shothole Canyon N (B)	7	NC	NC	20 d, 11 hrs	NC	NC	1.9	51	<1	3	NC	NC	NC	NC	<1	8	NC	NC	NC	NC
WA10 (122) - Vlamingh Head - North West Cape	16	6	NC	15 d, 16 hrs	17 d, 6 hrs	NC	18	517	<1	12	<1	10	NC	NC	2	9	<1	4	NC	NC
WA10 (123) - Low Point - Vlamingh Head (A)	14	6	NC	15 d, 23 hrs	22 d, 17 hrs	NC	30	867	2	56	2	55	NC	NC	2	14	<1	13	NC	NC
WA10 (124) - Low Point - Vlamingh Head (B)	19	6	3	20 d, 10 hrs	20 d, 21 hrs	24 d, 7 hrs	59	2,680	5	183	4	181	2	152	2	19	<1	18	<1	8
WA10 (125) - Osprey Bay - Low Point	10	4	NC	20 d, 20 hrs	25 d, 5 hrs	NC	26	819	2	31	<1	30	NC	NC	<1	16	<1	9	NC	NC
WA10 (126) - Winderabandi Point - Osprey Bay	9	2	NC	24 d, 10 hrs	35 d, 11 hrs	NC	6.9	294	<1	17	<1	10	NC	NC	<1	17	<1	5	NC	NC
WA10 (127) - Coast Hill - Point Cloates	10	2	NC	25 d, 18 hrs	30 d, 22 hrs	NC	10	428	<1	10	<1	9	NC	NC	<1	7	<1	4	NC	NC
WA11.East (104) - West Intercourse Island - Dolphin Island N point (B)	6	1	NC	18 d, 22 hrs	23 d, 0 hrs	NC	3.4	119	<1	4	<1	2	NC	NC	<1	9	<1	1	NC	NC
WA11.East (105) - West Intercourse Island - Dolphin Island N point (C)	8	6	4	8 d, 9 hrs	16 d, 17 hrs	19 d, 19 hrs	120	3,801	7	210	6	207	4	133	2	34	<1	22	<1	6
WA11.East (106) - West Intercourse Island - Dolphin Island N point (D)	2	1	NC	25 d, 18 hrs	31 d, 16 hrs	NC	1.6	141	<1	7	<1	4	NC	NC	<1	9	<1	3	NC	NC
WA11.East (107) - West Intercourse Island - Dolphin Island N point (E)	2	NC	NC	30 d, 2 hrs	NC	NC	0.4	36	<1	2	NC	NC	NC	NC	<1	7	NC	NC	NC	NC
WA11.East (108) - Pelican Point - West Intercourse Island	3	1	NC	27 d, 15 hrs	30 d, 12 hrs	NC	5.7	476	<1	19	<1	12	NC	NC	<1	23	<1	6	NC	NC
WA11.East (109) - James Point - Cape Preston	4	3	1	16 d, 6 hrs	17 d, 5 hrs	20 d, 8 hrs	28	1,560	<1	44	<1	38	<1	16	<1	26	<1	9	<1	1
WA11.East (315) - Dolphin Island N point - Cinders Rd coast	4	2	NC	15 d, 23 hrs	20 d, 12 hrs	NC	5.4	230	<1	6	<1	4	NC	NC	<1	9	<1	2	NC	NC
WA11.East (316) - West Intercourse Island - Dolphin Island N point (F)	9	4	3	10 d, 19 hrs	15 d, 14 hrs	23 d, 15 hrs	74	2,785	5	199	5	187	4	140	2	49	<1	23	<1	8
WA11.East (317) - West Intercourse Island - Dolphin Island N point (G)	7	4	3	13 d, 16 hrs	14 d, 4 hrs	24 d, 19 hrs	95	4,161	4	226	4	222	3	159	<1	38	<1	29	<1	8
WA11.East (97) - Cape Thouin - Turner River NE foreland	1	NC	NC	46 d, 6 hrs	NC	NC	0.3	22	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA11.East (98) - Cape Cossigny - Cape Thouin	1	NC	NC	45 d, 20 hrs	NC	NC	0.2	22	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC

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WA11.West (110) - Mount Salt coast W - James Point	3	2	NC	16 d, 13 hrs	33 d, 7 hrs	NC	5.2	336	<1	30	<1	25	NC	NC	<1	30	<1	14	NC	NC
WA11.West (111) - Peter Creek coast E - Mount Salt coast W	4	3	NC	14 d, 20 hrs	26 d, 4 hrs	NC	12	650	<1	35	<1	30	NC	NC	<1	24	<1	10	NC	NC
WA11.West (112) - Weld Island coast S - Peter Creek coast E	2	1	NC	25 d, 4 hrs	31 d, 8 hrs	NC	3.4	267	<1	13	<1	8	NC	NC	<1	21	<1	5	NC	NC
WA11.West (113) - Coolgra Point W - Yardie Landing (A)	2	1	NC	23 d, 2 hrs	33 d, 12 hrs	NC	2	165	<1	5	<1	4	NC	NC	<1	4	<1	2	NC	NC
WA11.West (114) - Coolgra Point W - Yardie Landing (B)	3	1	NC	28 d, 8 hrs	30 d, 10 hrs	NC	4.3	345	<1	5	<1	4	NC	NC	<1	3	<1	1	NC	NC
WA11.West (115) - Hope Point - Locker Point (A)	10	7	NC	12 d, 19 hrs	19 d, 16 hrs	NC	32	754	<1	9	<1	8	NC	NC	<1	5	<1	2	NC	NC
WA11.West (116) - Hope Point - Locker Point (B)	1	NC	NC	34 d, 10 hrs	NC	NC	0.1	11	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA11.West (318) - Barrow Island and Montebello Islands (A)	32	22	13	3 d, 22 hrs	4 d, 5 hrs	4 d, 14 hrs	1,018	22,661	74	1,298	72	1,288	60	1,226	10	61	5	50	2	24
WA11.West (319) - Barrow Island and Montebello Islands (B)	21	11	3	4 d, 19 hrs	4 d, 21 hrs	5 d, 17 hrs	193	15,379	16	943	15	943	12	935	3	15	2	15	<1	14
WA11.West (320) - Barrow Island and Montebello Islands (C)	12	5	2	5 d, 20 hrs	6 d, 8 hrs	7 d, 20 hrs	51	3,281	10	369	9	366	6	290	3	51	2	40	<1	15
WA11.West (321) - Barrow Island and Montebello Islands (D)	22	12	5	5 d, 21 hrs	6 d, 6 hrs	10 d, 3 hrs	137	5,194	16	538	15	533	9	466	6	45	3	34	<1	17
WA11.West (323) - Yardie Landing - Weld Island coast S (A)	5	4	1	21 d, 6 hrs	25 d, 6 hrs	27 d, 7 hrs	24	1,175	<1	30	<1	30	<1	13	<1	7	<1	7	<1	1
WA11.West (324) - Yardie Landing - Weld Island coast S (B)	13	8	2	8 d, 13 hrs	8 d, 13 hrs	10 d, 13 hrs	70	3,255	2	65	2	65	2	65	<1	3	<1	3	<1	3
WA11.West (325) - Coolgra Point W - Yardie Landing (C)	12	8	2	8 d, 10 hrs	8 d, 11 hrs	8 d, 13 hrs	136	7,666	6	321	6	321	4	315	2	14	<1	14	<1	8
WA11.West (326) - Baresand Point - Entrance Point E	38	31	14	8 d, 18 hrs	10 d, 10 hrs	11 d, 11 hrs	488	6,640	32	681	31	681	22	637	6	24	4	24	<1	17
WA11.West (327) - Hope Point - Locker Point (E)	23	7	1	16 d, 10 hrs	23 d, 11 hrs	38 d, 23 hrs	40	1,233	<1	21	<1	21	<1	13	<1	2	<1	2	<1	1
WA11.West (328) - Hope Point - Locker Point (F)	7	2	NC	21 d, 12 hrs	29 d, 20 hrs	NC	4.6	208	<1	4	<1	4	NC	NC	<1	2	<1	2	NC	NC
WA11.West (329) - Locker Point - Baresand Point	40	36	11	8 d, 8 hrs	11 d, 8 hrs	12 d, 11 hrs	405	6,298	37	446	36	444	23	418	8	28	5	24	<1	11
WA12 (309) - Mermaid Reef	5	2	NC	38 d, 6 hrs	48 d, 10 hrs	NC	3.1	246	<1	5	<1	5	NC	NC	<1	2	<1	2	NC	NC
WA12 (310) - Clerke Reef	6	1	NC	26 d, 0 hrs	45 d, 11 hrs	NC	4.1	282	<1	11	<1	8	NC	NC	<1	9	<1	4	NC	NC
WA12 (311) - Imperieuse Reef	11	6	4	19 d, 7 hrs	22 d, 9 hrs	28 d, 10 hrs	71	1,496	5	99	5	98	2	42	2	19	<1	19	<1	3
WA12 (312) - Yan Well coast - Condini Landing (C)	4	4	NC	29 d, 4 hrs	30 d, 18 hrs	NC	15	636	<1	17	<1	17	NC	NC	<1	4	<1	4	NC	NC
WA12 (313) - Wattle Well coast - Yan Well coast (C)	1	NC	NC	47 d, 5 hrs	NC	NC	0.2	22	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA12 (83) - Samphire bore coast - Cape Jaubert (B)	2	NC	NC	48 d, 1 hr	NC	NC	0.6	30	<1	<1	NC	NC	NC	NC	<1	4	NC	NC	NC	NC
WA12 (84) - Samphire bore coast - Cape Jaubert (C)	3	NC	NC	46 d, 0 hrs	NC	NC	1.4	87	<1	7	NC	NC	NC	NC	<1	15	NC	NC	NC	NC
WA12 (85) - Cooraidegel Well coast - Eighty Mile Beach Caravan Park NE (A)	3	NC	NC	45 d, 4 hrs	NC	NC	0.9	73	<1	3	NC	NC	NC	NC	<1	8	NC	NC	NC	NC
WA12 (88) - Shoonta Well - Cooraidegel Well coast	1	NC	NC	49 d, 12 hrs	NC	NC	0.1	15	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA12 (92) - Wattle Well coast - Yan Well coast (A)	1	NC	NC	49 d, 23 hrs	NC	NC	0.1	15	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA13 (307) - Scott Reef South	2	NC	NC	48 d, 4 hrs	NC	NC	0.3	22	<1	<1	NC	NC	NC	NC	<1	3	NC	NC	NC	NC

NC: No contact to receptor predicted for specified threshold.

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Table 14-6 Summary of shoreline oil accumulation on WAMOPRA shoreline cells following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

WAMOPRA shoreline cells	Maximum probability (%) of oil accumulation at			Minimum time before oil accumulation at			Maximum shoreline oil accumulation (g/m²) in a given grid cell		Maximum volume (m³) of accumulated oil ashore at ≥ 10 g/m²		Maximum volume (m³) of accumulated oil ashore at ≥ 100 g/m²		Maximum volume (m³) of accumulated oil ashore at ≥ 1,000 g/m²			Maximum length (km) of oil accumulation on shorelines at ≥ 10 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 100 g/m²		Maximum length (km) of oil accumulation on shorelines at ≥ 1,000 g/m²	
	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all simulations	for the worst simulation	averaged over all simulations	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	≥ 10 g/m²	≥ 100 g/m²	≥ 1,000 g/m²	averaged over all simulations	for the worst simulation	averaged over all simulations	≥ 10 g/m²	≥ 100 g/m²
WA08 (332) - Bowes River - Broken Anchor Bay (A)	1	NC	NC	47 d, 17 hrs	NC	NC	0.4	31	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA08 (333) - Bowes River - Broken Anchor Bay (B)	2	NC	NC	41 d, 23 hrs	NC	NC	1.1	68	<1	2	NC	NC	NC	NC	<1	7	NC	NC	NC	NC
WA08 (335) - Glenfield Beach - Bowes River (B)	1	NC	NC	47 d, 23 hrs	NC	NC	0.2	16	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA08 (336) - Glenfield Beach - Bowes River (C)	1	NC	NC	49 d, 12 hrs	NC	NC	0.2	16	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA09 (171) - Steep Point - Quoin Head (C)	1	NC	NC	47 d, 14 hrs	NC	NC	0.3	15	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA09 (172) - Steep Point - Quoin Head (D)	2	NC	NC	39 d, 20 hrs	NC	NC	0.3	17	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA09 (173) - Steep Point - Quoin Head (E)	2	NC	NC	45 d, 9 hrs	NC	NC	0.4	23	<1	<1	NC	NC	NC	NC	<1	4	NC	NC	NC	NC
WA09 (330) - Dorre Island and Bernier Island (A)	1	NC	NC	38 d, 7 hrs	NC	NC	0.2	18	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA09 (331) - Dorre Island and Bernier Island (B)	2	NC	NC	37 d, 16 hrs	NC	NC	0.5	30	<1	<1	NC	NC	NC	NC	<1	5	NC	NC	NC	NC
WA10 (120) - Bundegi - Shothole Canyon N (A)	3	NC	NC	11 d, 22 hrs	NC	NC	0.7	25	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA10 (121) - Bundegi - Shothole Canyon N (B)	25	5	1	10 d, 17 hrs	12 d, 21 hrs	17 d, 18 hrs	31	1,372	<1	20	<1	18	<1	15	<1	10	<1	2	<1	1
WA10 (122) - Vlamingh Head - North West Cape	47	24	2	9 d, 23 hrs	11 d, 20 hrs	12 d, 20 hrs	174	6,198	6	200	5	199	3	194	3	9	2	8	<1	6
WA10 (123) - Low Point - Vlamingh Head (A)	31	10	1	10 d, 5 hrs	12 d, 23 hrs	25 d, 10 hrs	42	1,394	3	63	2	61	<1	15	3	14	<1	11	<1	1
WA10 (124) - Low Point - Vlamingh Head (B)	27	9	3	12 d, 15 hrs	14 d, 17 hrs	15 d, 8 hrs	134	6,716	13	483	12	483	10	450	4	19	<1	19	<1	15
WA10 (125) - Osprey Bay - Low Point	16	5	NC	15 d, 20 hrs	21 d, 14 hrs	NC	16	702	2	40	<1	38	NC	NC	2	16	<1	13	NC	NC
WA10 (126) - Winderabandi Point - Osprey Bay	9	4	NC	19 d, 1 hr	20 d, 20 hrs	NC	16	844	<1	22	<1	19	NC	NC	<1	18	<1	6	NC	NC
WA10 (127) - Coast Hill - Point Cloates	10	1	NC	20 d, 20 hrs	26 d, 9 hrs	NC	6.5	178	<1	3	<1	2	NC	NC	<1	6	<1	1	NC	NC
WA10 (128) - Point Maud - Coast Hill (A)	2	1	NC	32 d, 8 hrs	38 d, 0 hrs	NC	2.1	158	<1	10	<1	5	NC	NC	<1	12	<1	3	NC	NC
WA10 (129) - Point Maud - Coast Hill (B)	2	NC	NC	34 d, 21 hrs	NC	NC	1.4	89	<1	5	NC	NC	NC	NC	<1	10	NC	NC	NC	NC
WA10 (130) - Alison Point - Point Maud	2	NC	NC	33 d, 22 hrs	NC	NC	0.7	52	<1	4	NC	NC	NC	NC	<1	12	NC	NC	NC	NC
WA10 (131) - Gnarraloo Bay - Alison Point (A)	1	NC	NC	37 d, 23 hrs	NC	NC	0.4	36	<1	2	NC	NC	NC	NC	<1	9	NC	NC	NC	NC
WA10 (132) - Gnarraloo Bay - Alison Point (B)	1	NC	NC	36 d, 7 hrs	NC	NC	0.6	60	<1	3	NC	NC	NC	NC	<1	7	NC	NC	NC	NC
WA10 (133) - Red Bluff - Gnarraloo Bay (A)	1	NC	NC	34 d, 16 hrs	NC	NC	0.4	35	<1	2	NC	NC	NC	NC	<1	5	NC	NC	NC	NC
WA10 (134) - Red Bluff - Gnarraloo Bay (B)	2	NC	NC	33 d, 15 hrs	NC	NC	0.8	62	<1	3	NC	NC	NC	NC	<1	8	NC	NC	NC	NC
WA10 (135) - Red Bluff - Gnarraloo Bay (C)	2	NC	NC	34 d, 19 hrs	NC	NC	0.4	43	<1	2	NC	NC	NC	NC	<1	6	NC	NC	NC	NC
WA10 (136) - Point Quobba - Cape Cuvier (A)	1	NC	NC	38 d, 0 hrs	NC	NC	0.5	44	<1	2	NC	NC	NC	NC	<1	5	NC	NC	NC	NC
WA11.East (102) - Cape Lambert - Sherlock coast (B)	2	NC	NC	33 d, 10 hrs	NC	NC	0.3	18	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA11.East (104) - West Intercourse Island - Dolphin Island N point (B)	4	4	NC	17 d, 22 hrs	26 d, 20 hrs	NC	12	334	<1	12	<1	10	NC	NC	<1	13	<1	4	NC	NC
WA11.East (105) - West Intercourse Island - Dolphin Island N point (C)	5	4	NC	16 d, 1 hr	17 d, 7 hrs	NC	18	512	<1	23	<1	19	NC	NC	<1	18	<1	6	NC	NC

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WA11.East (108) - Pelican Point - West Intercourse Island	1	NC	NC	21 d, 19 hrs	NC	NC	0.2	12	<1	<1	NC	NC	NC	NC	<1	2	NC	NC	NC	NC
WA11.East (109) - James Point - Cape Preston	5	3	1	8 d, 10 hrs	8 d, 12 hrs	13 d, 2 hrs	20	1,815	<1	27	<1	25	<1	19	<1	10	<1	5	<1	1
WA11.East (315) - Dolphin Island N point - Cinders Rd coast	4	4	NC	18 d, 6 hrs	19 d, 7 hrs	NC	9.4	368	<1	11	<1	9	NC	NC	<1	10	<1	4	NC	NC
WA11.East (316) - West Intercourse Island - Dolphin Island N point (F)	3	1	NC	12 d, 14 hrs	22 d, 10 hrs	NC	2.6	217	<1	8	<1	6	NC	NC	<1	10	<1	3	NC	NC
WA11.East (317) - West Intercourse Island - Dolphin Island N point (G)	4	3	NC	12 d, 9 hrs	13 d, 0 hrs	NC	13	477	<1	10	<1	10	NC	NC	<1	2	<1	2	NC	NC
WA11.West (110) - Mount Salt coast W - James Point	4	1	NC	12 d, 2 hrs	12 d, 8 hrs	NC	7.7	699	<1	27	<1	22	NC	NC	<1	18	<1	7	NC	NC
WA11.West (111) - Peter Creek coast E - Mount Salt coast W	5	1	NC	17 d, 7 hrs	17 d, 10 hrs	NC	4.8	241	<1	4	<1	4	NC	NC	<1	4	<1	2	NC	NC
WA11.West (112) - Weld Island coast S - Peter Creek coast E	1	NC	NC	16 d, 11 hrs	NC	NC	0.1	14	<1	<1	NC	NC	NC	NC	<1	1	NC	NC	NC	NC
WA11.West (113) - Coolgra Point W - Yardie Landing (A)	2	1	NC	13 d, 11 hrs	16 d, 1 hrs	NC	5.1	499	<1	8	<1	8	NC	NC	<1	3	<1	2	NC	NC
WA11.West (114) - Coolgra Point W - Yardie Landing (B)	2	2	1	13 d, 2 hrs	13 d, 15 hrs	14 d, 10 hrs	83	7,667	<1	84	<1	83	<1	79	<1	12	<1	4	<1	1
WA11.West (115) - Hope Point - Locker Point (A)	15	6	2	7 d, 22 hrs	12 d, 13 hrs	12 d, 16 hrs	73	4,116	4	237	3	232	3	194	<1	30	<1	18	<1	7
WA11.West (116) - Hope Point - Locker Point (B)	4	1	NC	12 d, 4 hrs	24 d, 12 hrs	NC	2.6	154	<1	5	<1	4	NC	NC	<1	7	<1	2	NC	NC
WA11.West (117) - Hope Point - Locker Point (C)	3	1	NC	22 d, 3 hrs	24 d, 19 hrs	NC	2.5	186	<1	6	<1	4	NC	NC	<1	11	<1	2	NC	NC
WA11.West (118) - Hope Point - Locker Point (D)	1	NC	NC	24 d, 8 hrs	NC	NC	0.2	11	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
WA11.West (318) - Barrow Island and Montebello Islands (A)	66	55	30	2 d, 22 hrs	3 d, 3 hrs	3 d, 15 hrs	2,658	22,555	195	2,312	192	2,309	166	2,276	23	63	12	54	4	36
WA11.West (319) - Barrow Island and Montebello Islands (B)	48	33	11	3 d, 17 hrs	4 d, 17 hrs	5 d, 14 hrs	481	9,889	28	540	27	540	18	531	6	15	3	15	<1	13
WA11.West (320) - Barrow Island and Montebello Islands (C)	27	13	3	6 d, 21 hrs	7 d, 12 hrs	10 d, 18 hrs	151	8,472	18	887	16	884	10	831	7	46	3	36	<1	19
WA11.West (321) - Barrow Island and Montebello Islands (D)	43	19	5	4 d, 21 hrs	4 d, 23 hrs	5 d, 5 hrs	156	7,073	26	550	24	543	14	507	10	47	4	38	<1	18
WA11.West (323) - Yardie Landing - Weld Island coast S (A)	3	NC	NC	13 d, 15 hrs	NC	NC	1.2	61	<1	2	NC	NC	NC	NC	<1	3	NC	NC	NC	NC
WA11.West (324) - Yardie Landing - Weld Island coast S (B)	22	10	4	8 d, 10 hrs	11 d, 23 hrs	12 d, 9 hrs	201	12,450	6	341	6	341	5	341	<1	3	<1	3	<1	3
WA11.West (325) - Coolgra Point W - Yardie Landing (C)	27	11	4	7 d, 6 hrs	7 d, 9 hrs	8 d, 9 hrs	153	5,950	9	345	9	345	6	324	3	14	1	14	<1	9
WA11.West (326) - Baresand Point - Entrance Point E	73	57	29	7 d, 1 hrs	7 d, 7 hrs	7 d, 16 hrs	977	8,819	52	608	50	607	32	581	12	24	7	24	2	15
WA11.West (327) - Hope Point - Locker Point (E)	43	19	1	9 d, 14 hrs	9 d, 19 hrs	11 d, 16 hrs	91	2,382	2	49	2	49	<1	49	<1	2	<1	2	<1	2
WA11.West (328) - Hope Point - Locker Point (F)	32	9	2	11 d, 2 hrs	11 d, 22 hrs	20 d, 6 hrs	70	2,132	2	53	2	52	<1	22	2	13	<1	11	<1	1
WA11.West (329) - Locker Point - Baresand Point	72	57	30	8 d, 11 hrs	8 d, 14 hrs	8 d, 22 hrs	1,069	8,673	87	807	85	805	62	769	15	29	9	28	3	15
WA12 (309) - Mermaid Reef	5	1	NC	34 d, 9 hrs	44 d, 9 hrs	NC	4.1	264	<1	5	<1	5	NC	NC	<1	2	<1	2	NC	NC
WA12 (310) - Clerke Reef	12	4	1	25 d, 21 hrs	29 d, 1 hrs	33 d, 4 hrs	31	1,442	2	56	<1	56	<1	15	<1	11	<1	10	<1	1
WA12 (311) - Imperieuse Reef	14	12	2	20 d, 8 hrs	22 d, 1 hrs	34 d, 11 hrs	66	1,427	4	80	4	79	<1	15	3	19	<1	11	<1	1

NC: No contact to receptor predicted for specified threshold.

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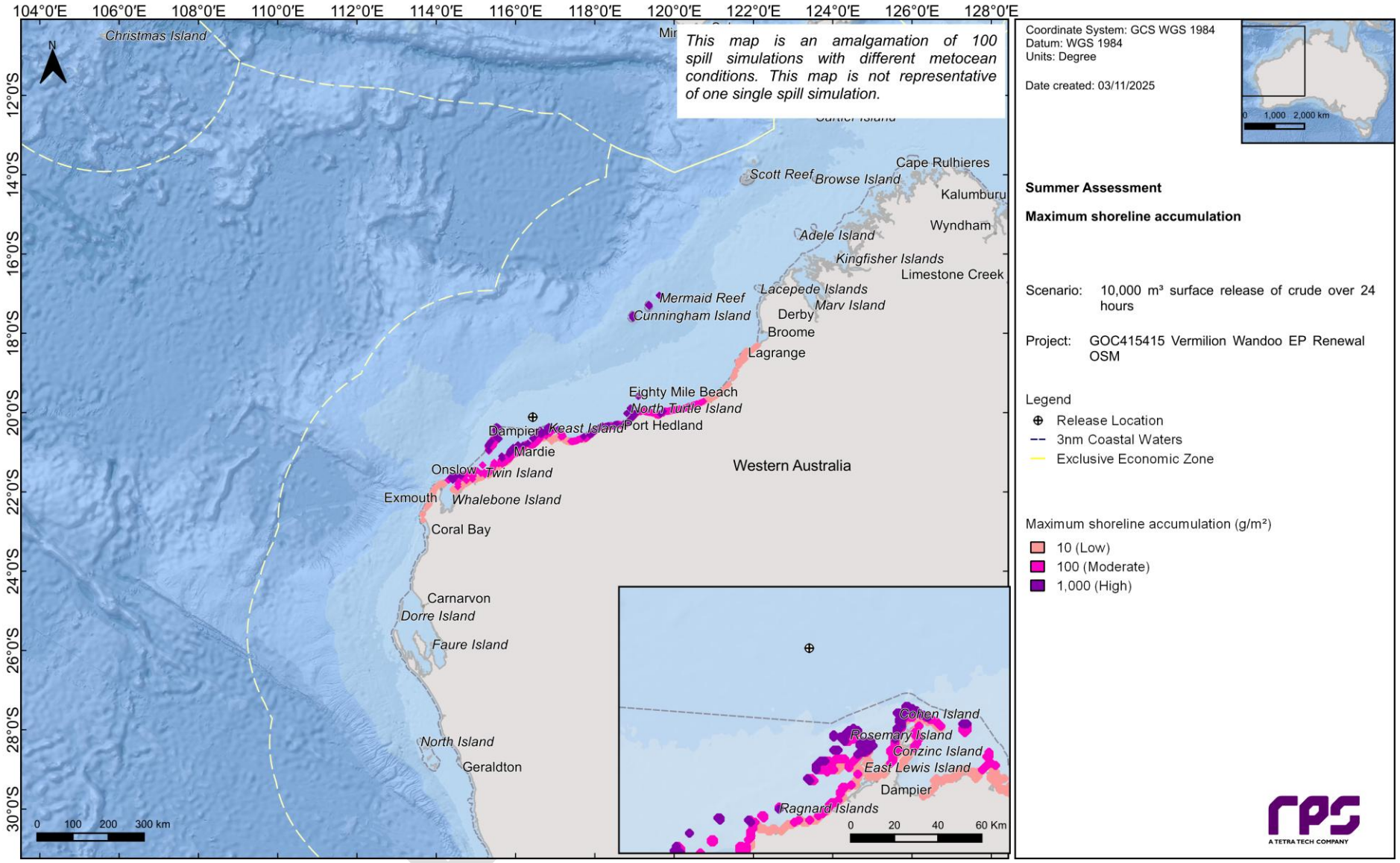


Figure 14.25 Maximum potential shoreline oil accumulation following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

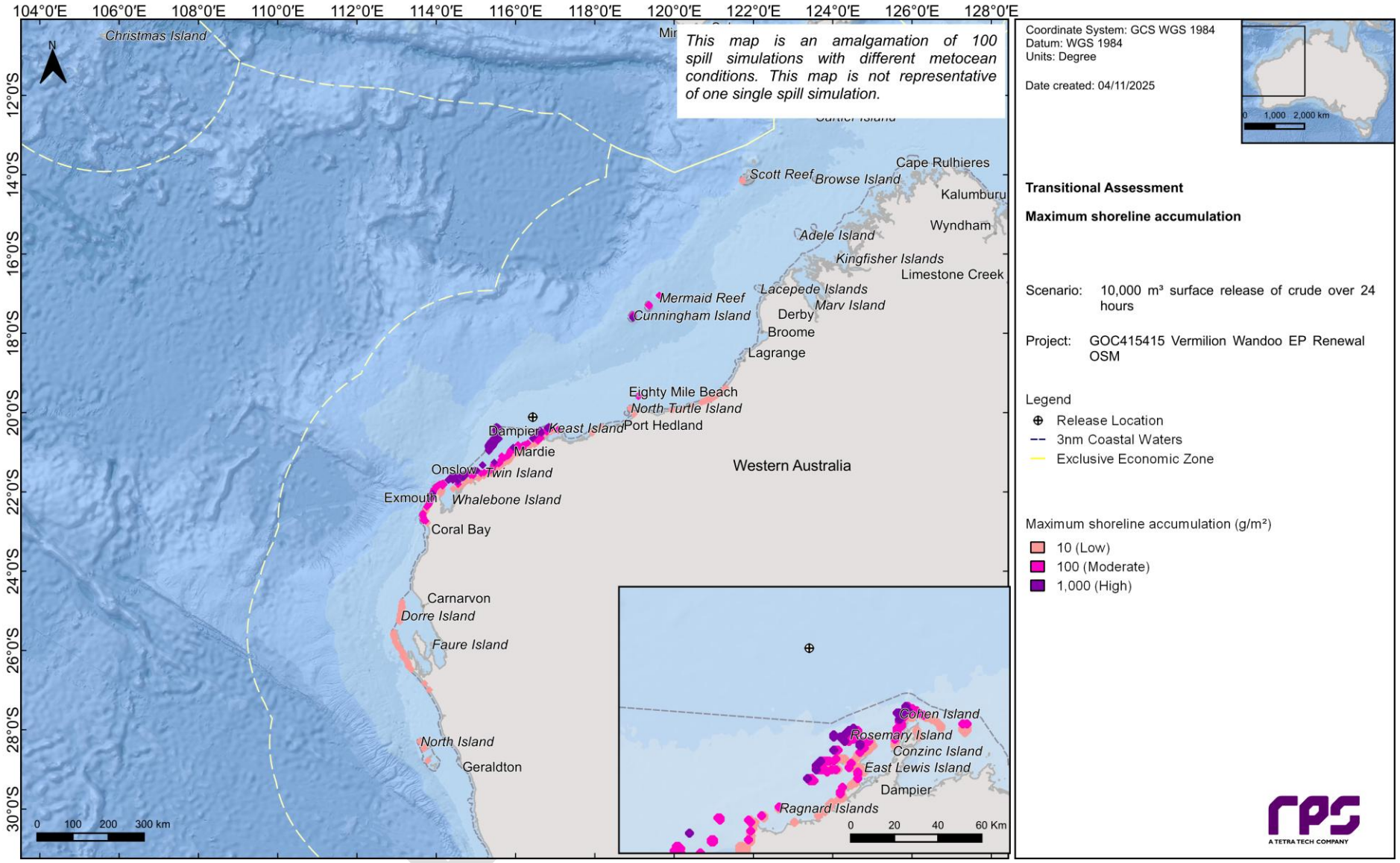


Figure 14.26 Maximum potential shoreline oil accumulation following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

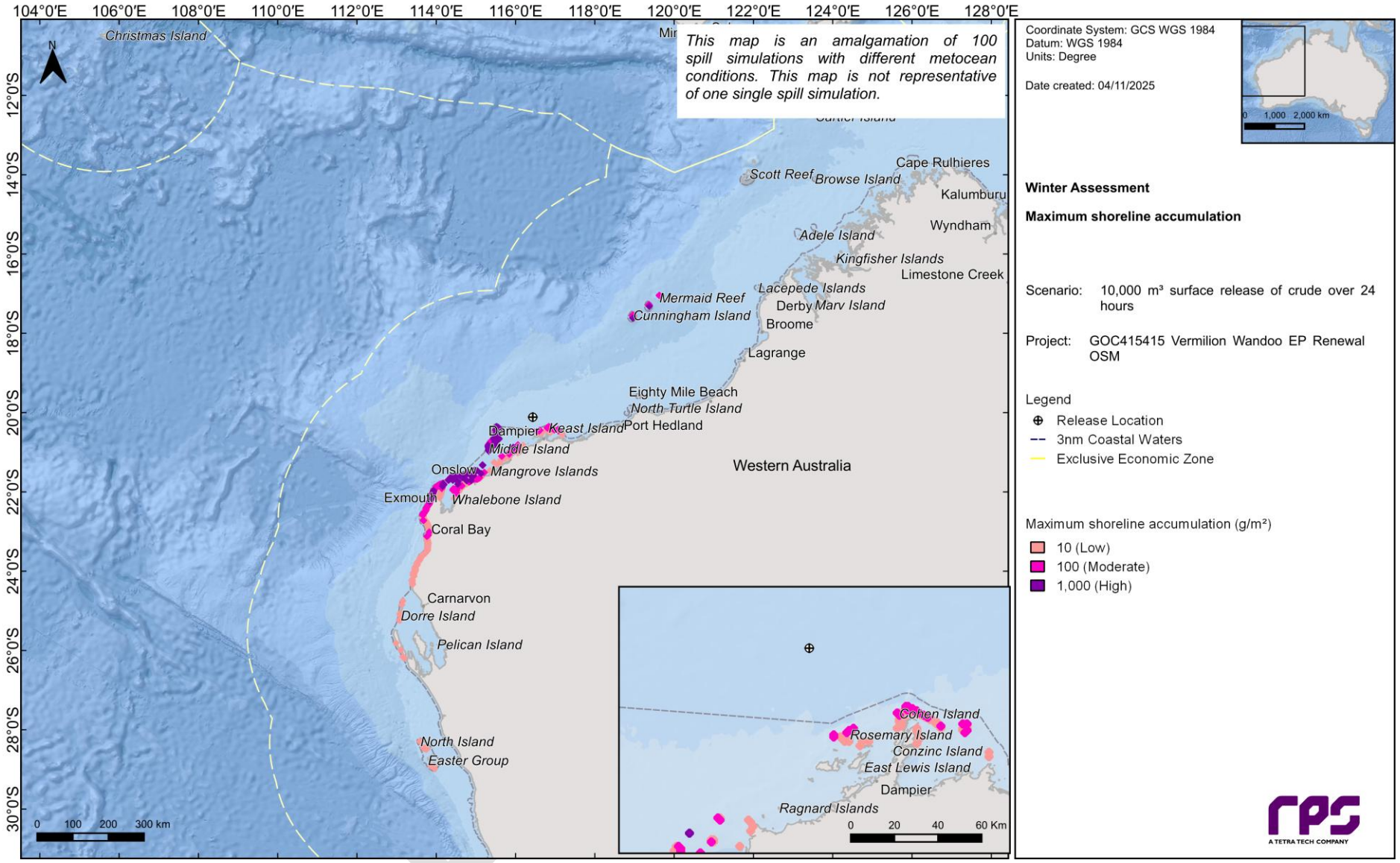


Figure 14.27 Maximum potential shoreline oil accumulation following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

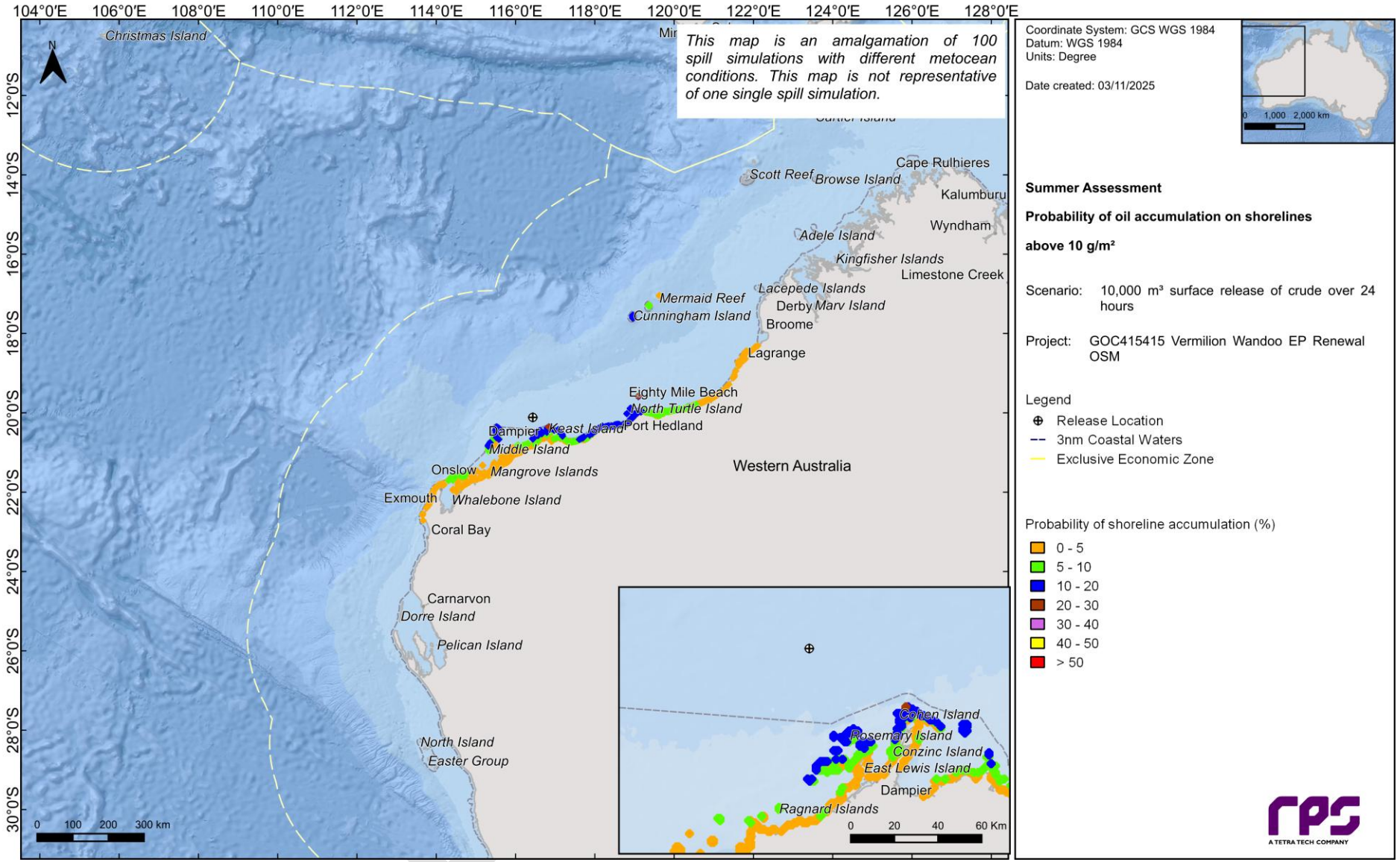


Figure 14.28 Predicted probability of shoreline oil accumulation at, or above, 10 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

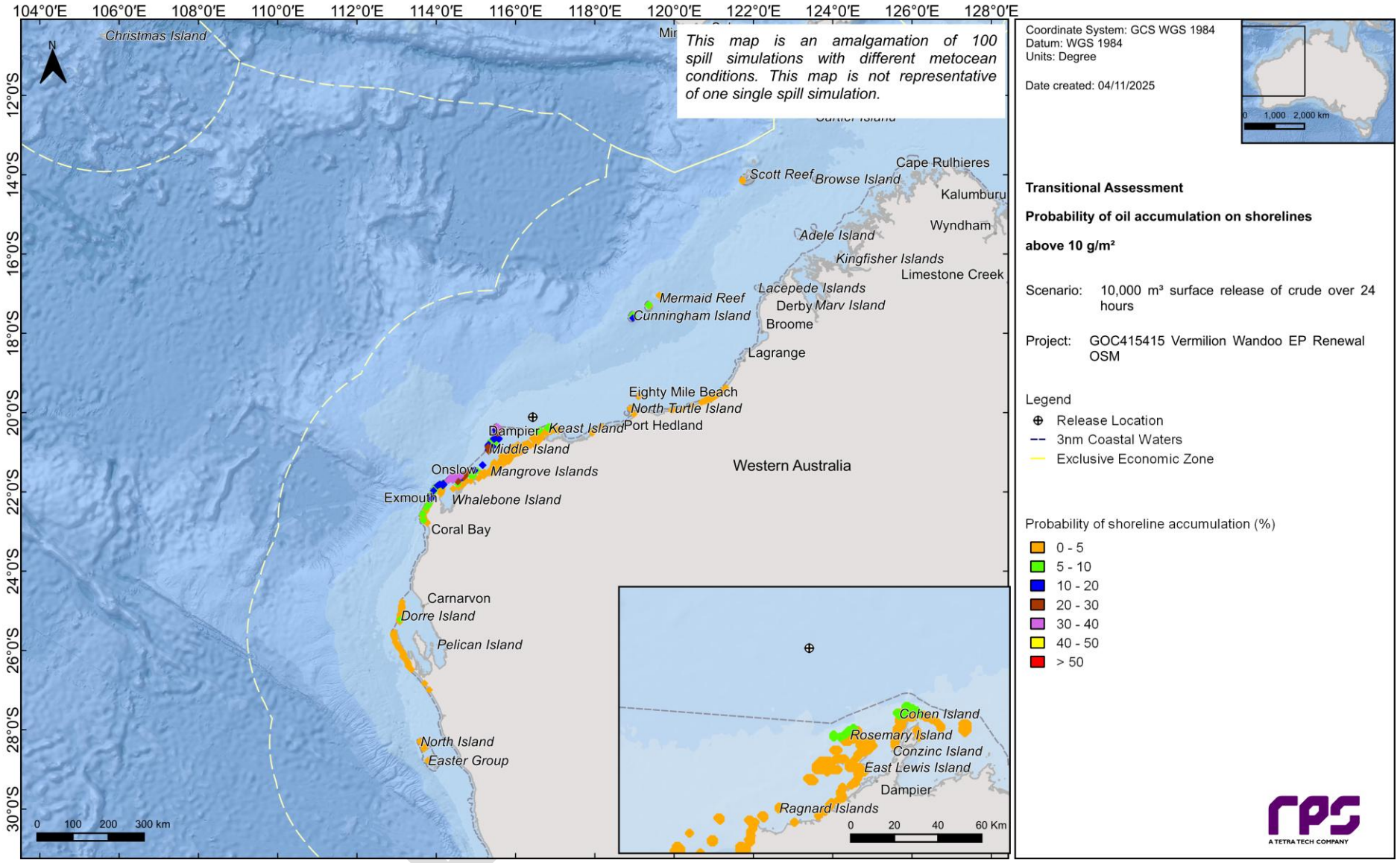


Figure 14.29 Predicted probability of shoreline oil accumulation at, or above, 10 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

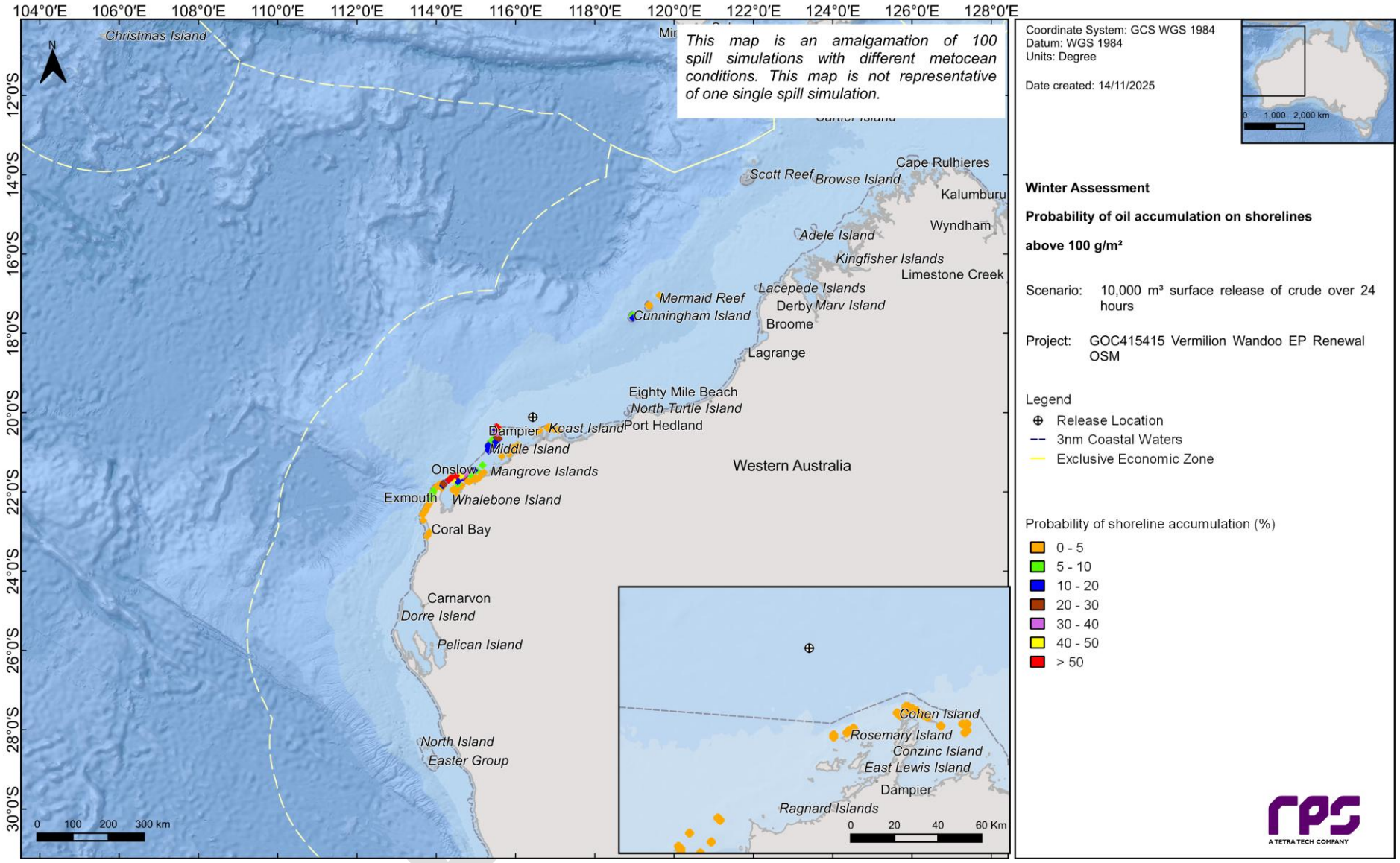


Figure 14.30 Predicted probability of shoreline oil accumulation at, or above, 10 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

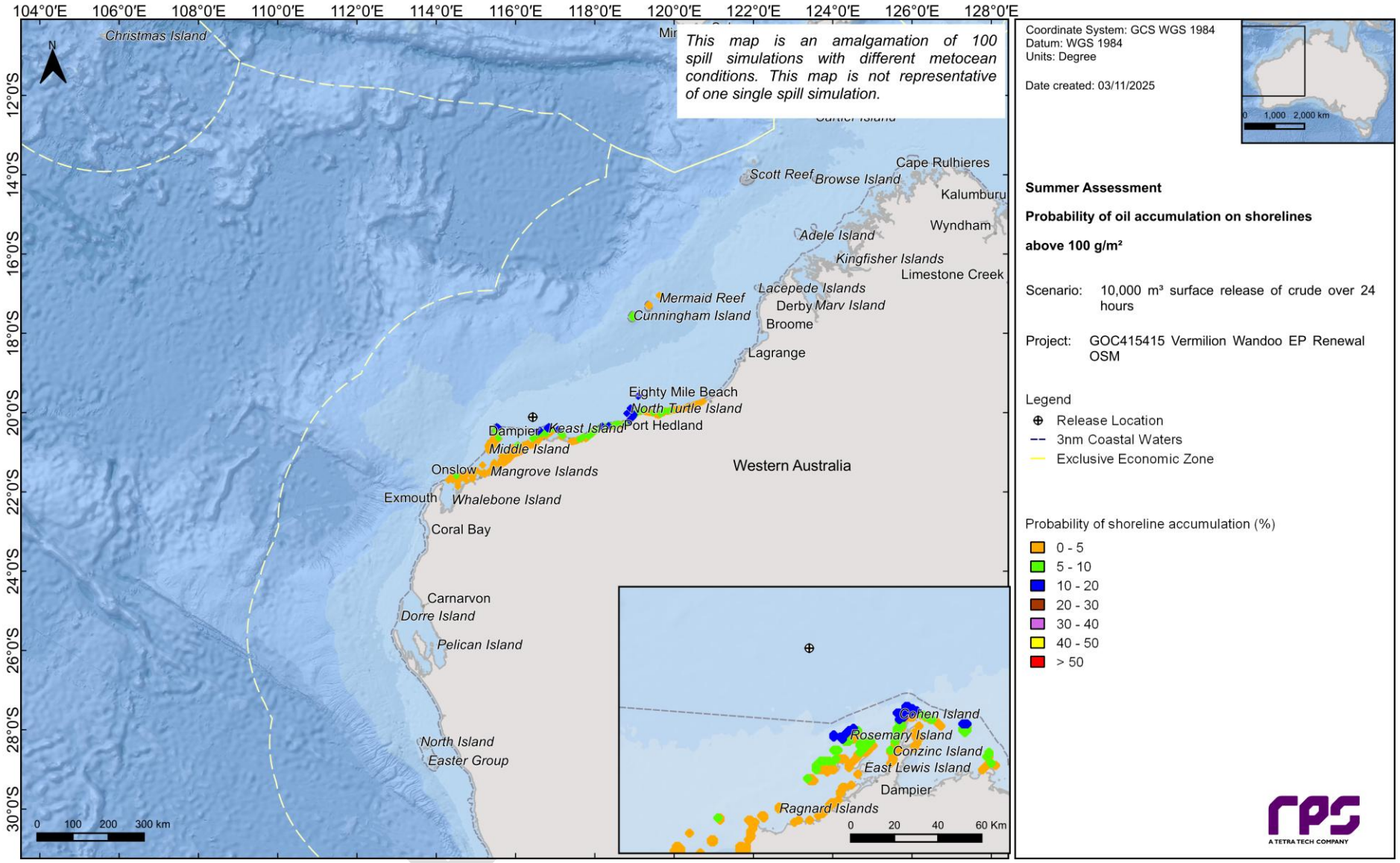


Figure 14.31 Predicted probability of shoreline oil accumulation at, or above, 100 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

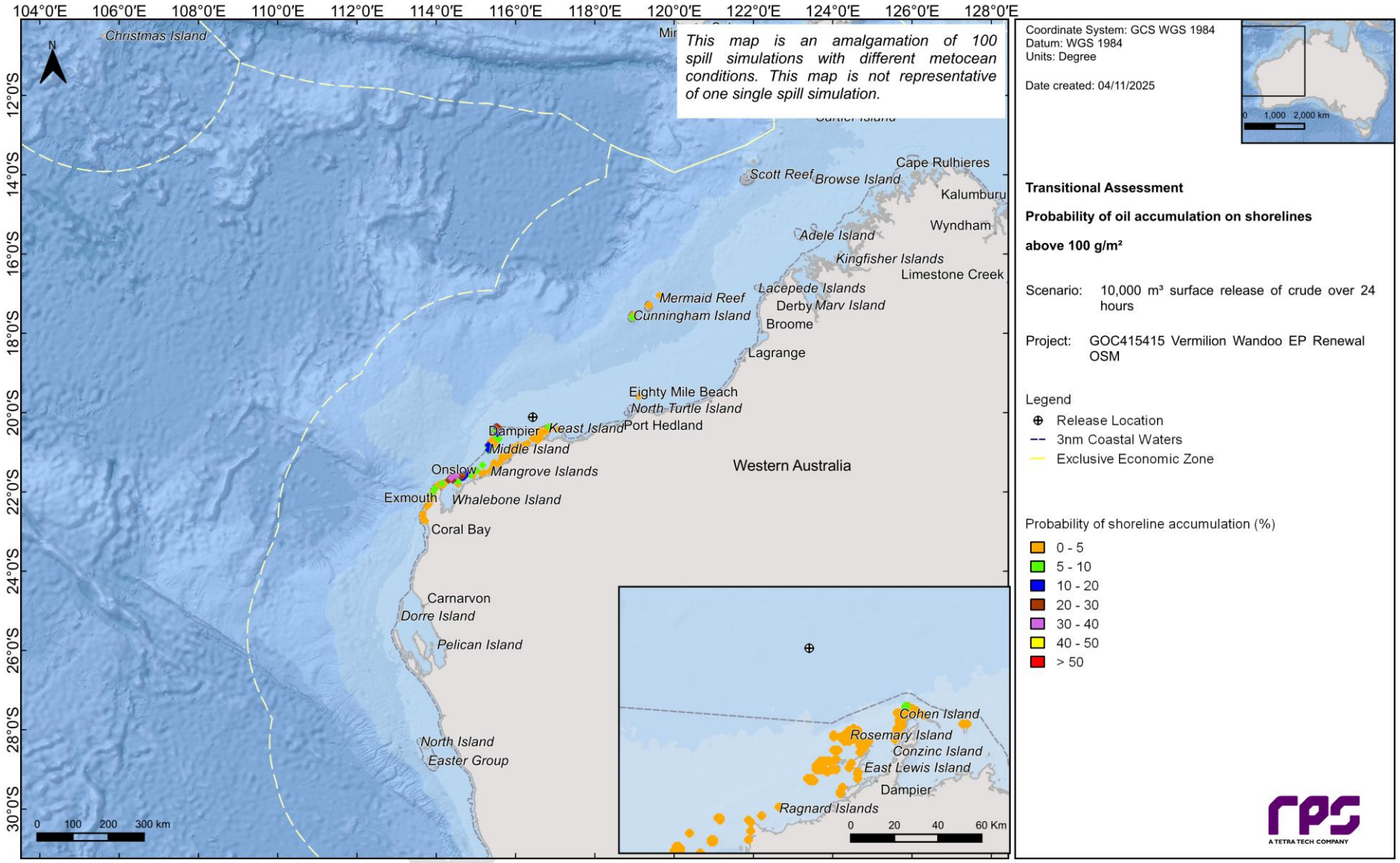


Figure 14.32 Predicted probability of shoreline oil accumulation at, or above, 100 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

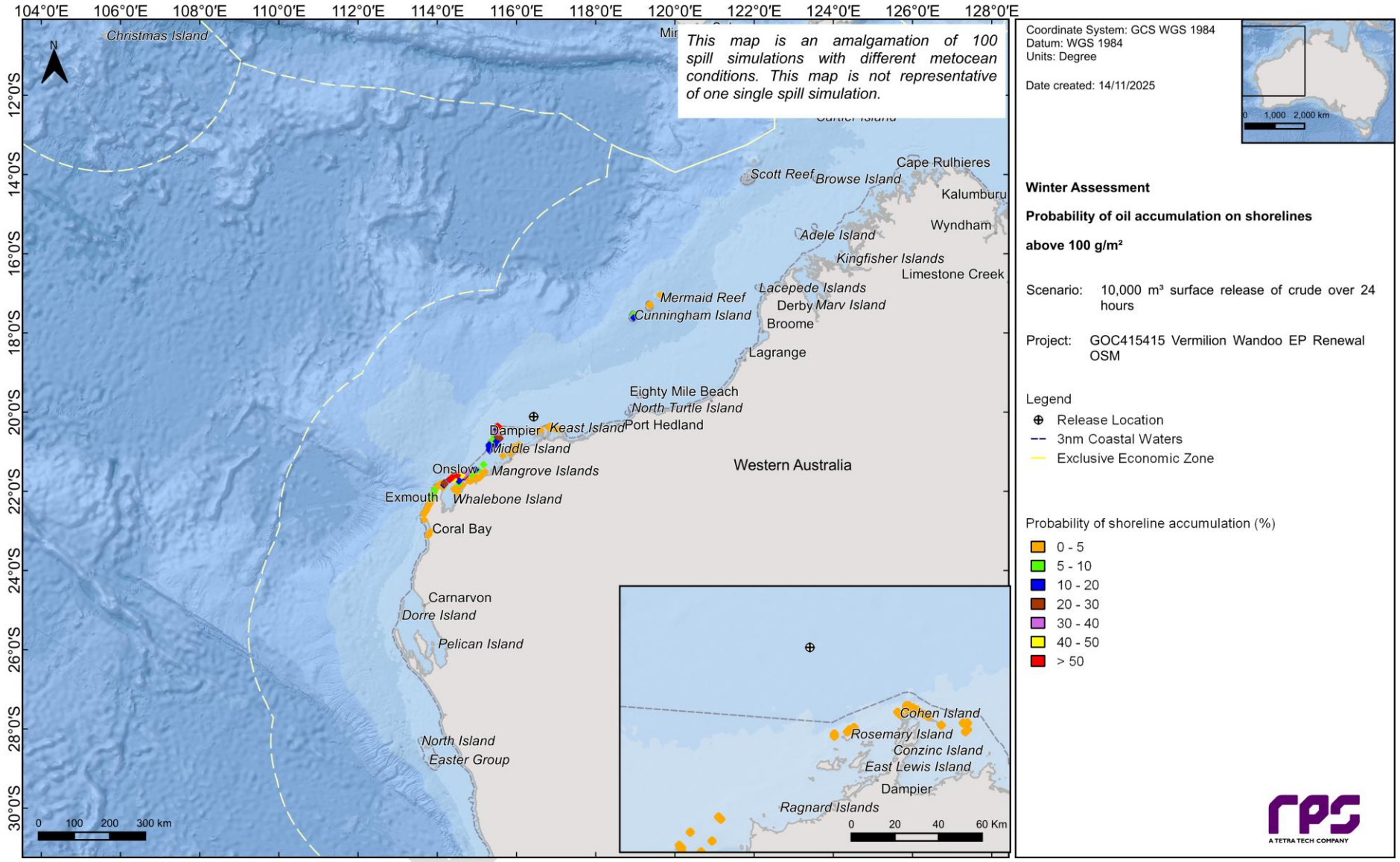


Figure 14.33 Predicted probability of shoreline oil accumulation at, or above, 100 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

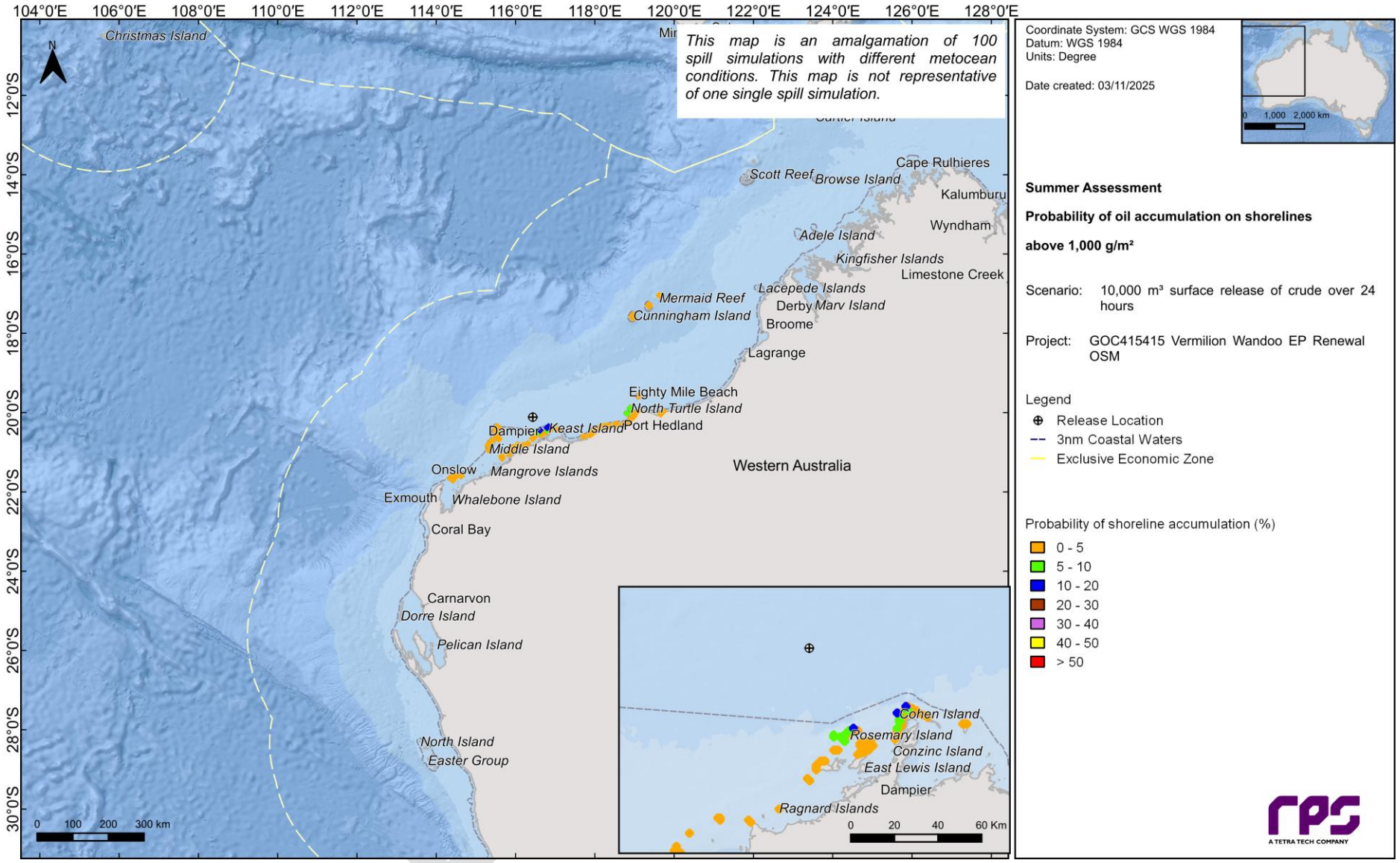


Figure 14.34 Predicted probability of shoreline oil accumulation at, or above, 1,000 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

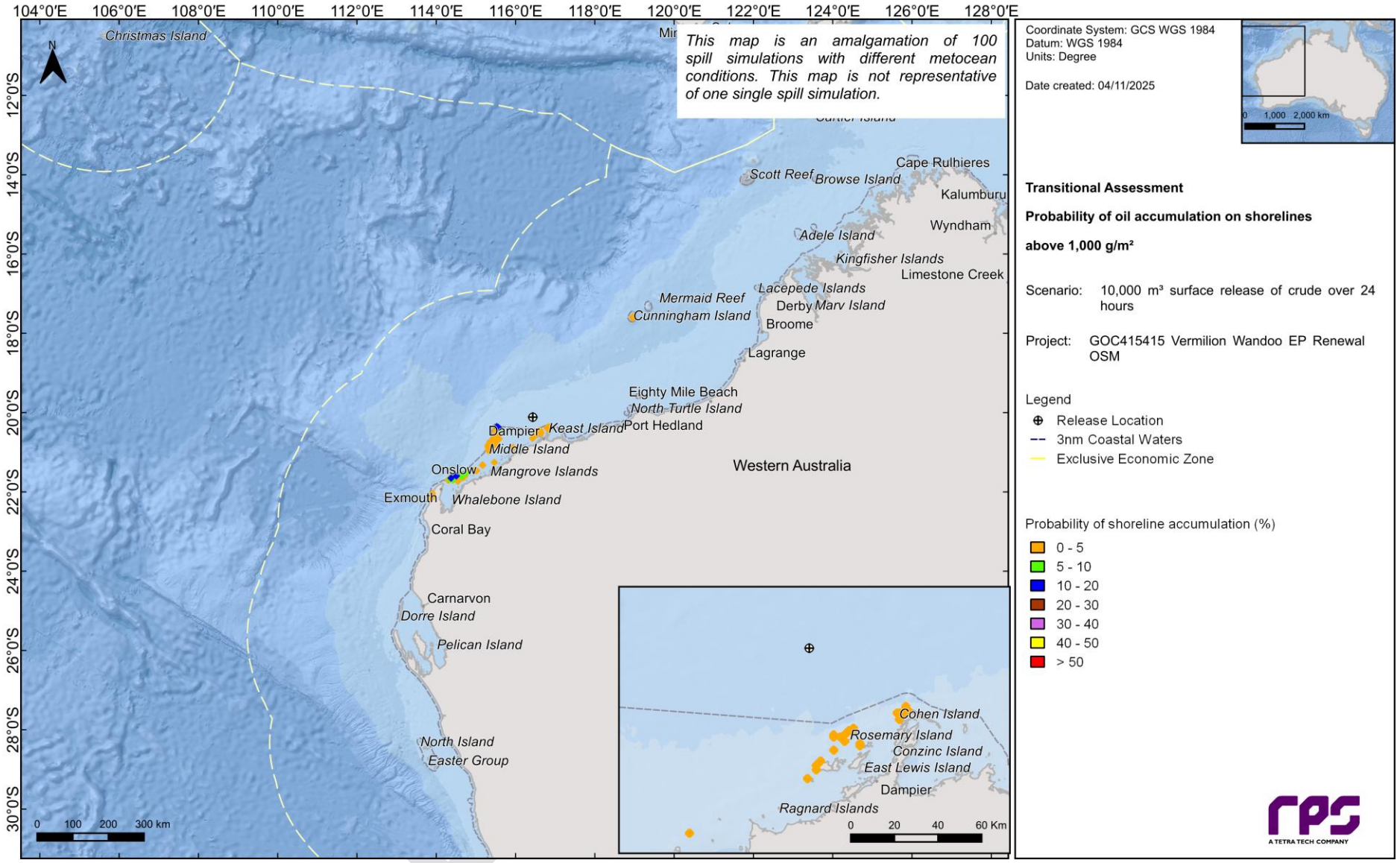


Figure 14.35 Predicted probability of shoreline oil accumulation at, or above, 1,000 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

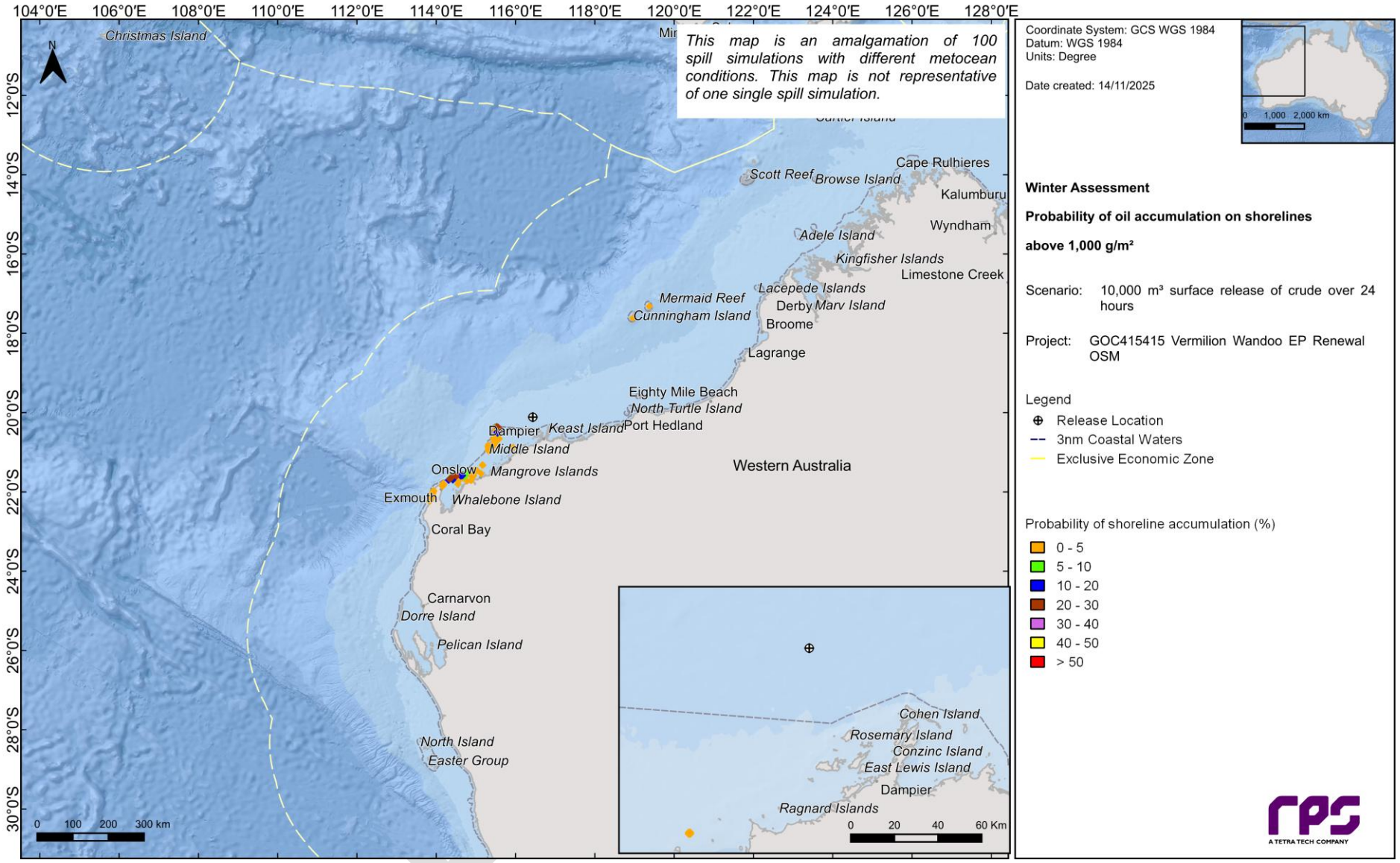


Figure 14.36 Predicted probability of shoreline oil accumulation at, or above, 1,000 g/m² following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

14.1.5 In-water exposure

14.1.5.1 Dissolved Hydrocarbons

Table 14-7 summarises the maximum distances from the release location to the dissolved hydrocarbon exposure thresholds for each season. Concentrations exceeding 10 ppb may potentially extend up to 1,043 km from the release location. As the threshold increases to above 50 ppb, the maximum distance decreases to 423 km. No exposure was predicted at, or above, 400 ppb.

Table 14-8 summarises the predicted dissolved hydrocarbon exposure to receptors (either at, or above, receptors in the water column).

The Montebello AMP recorded the highest probabilities of exposure at, or above, 10 ppb during summer (17%), transitional (36%) and winter (40%) conditions. The same receptor recorded the quickest time to exposure at, or above, 10 ppb at 23 hours following the commencement of a spill under summer conditions. The Montebello AMP also recorded the highest concentrations at 209 ppb during winter conditions.

Figure 14.37 to Figure 14.39 illustrate the dissolved hydrocarbon exposure zone for the three seasons, whilst Figure 14.40 to Figure 14.51 show the minimum times before exposure and probabilities of exposure at, or above, 10 ppb and 50 ppb.

Seasonal cross-sectional transects (north-south and east-west) of the maximum dissolved hydrocarbons in the vicinity of the release site are presented in Figure 14.52 to Figure 14.57.

Table 14-7 Maximum distances from the release location to dissolved hydrocarbon exposure thresholds following a surface release of crude from the tanker collision. Results were calculated from 100 spill simulations per season.

Season	Distance and direction travelled	Dissolved hydrocarbon exposure thresholds		
		10 ppb	50 ppb	400 ppb
Summer	Maximum distance (km) from release location	559	190	NC
	Direction	West	Southwest	NC
Transitional	Maximum distance (km) from release location	1,043	423	NC
	Direction	Southwest	Southwest	NC
Winter	Maximum distance (km) from release location	661	348	NC
	Direction	Southwest	Southwest	NC

NC: No contact to receptor predicted for specified threshold.

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Table 14-8 Receptors predicted to be exposed by dissolved hydrocarbons following a surface release of crude from the tanker collision. Results were calculated from100 spill simulations per season.

Category	Name	Summer								Transitional								Winter							
		Probability (%) of dissolved concentration			Minimum time before dissolved hydrocarbon exposure at			Maximum dissolved hydrocarbon concentration (ppb)		Probability (%) of dissolved concentration			Minimum time before dissolved hydrocarbon exposure at			Maximum dissolved hydrocarbon concentration (ppb)		Probability (%) of dissolved concentration			Minimum time before dissolved hydrocarbon exposure at			Maximum dissolved hydrocarbon concentration (ppb)	
		≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	averaged over all simulations	in the worst replicate	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	averaged over all simulations	in the worst replicate	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	≥ 10 ppb	≥ 50 ppb	≥ 400 ppb	averaged over all simulations	in the worst replicate
AMP	Abrolhos	NC	NC	NC	NC	NC	NC	<1	3	1	NC	NC	41 d, 21 hrs	NC	NC	<1	13	NC	NC	NC	NC	NC	NC	<1	6
	Dampier	2	NC	NC	9 d, 23 hrs	NC	NC	<1	49	NC	NC	NC	NC	NC	NC	<1	10	1	NC	NC	12 d, 15 hrs	NC	NC	<1	17
	Gascoyne	1	NC	NC	22 d, 21 hrs	NC	NC	<1	19	5	1	NC	14 d, 16 hrs	19 d, 21 hrs	NC	2	62	10	1	NC	11 d, 9 hrs	13 d, 22 hrs	NC	4	83
	Montebello	17	2	NC	23 hrs	1 d, 5 hrs	NC	5	138	36	5	NC	1 d, 6 hrs	1 d, 8 hrs	NC	10	130	40	9	NC	1 d, 2 hrs	1 d, 3 hrs	NC	13	209
KEF	Ancient coastline at 125 m depth contour	5	1	NC	6 d, 21 hrs	10 d, 18 hrs	NC	2	63	7	1	NC	8 d, 1 hrs	10 d, 15 hrs	NC	3	67	12	2	NC	8 d, 1 hrs	8 d, 15 hrs	NC	4	103
	Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	2	NC	NC	12 d, 4 hrs	NC	NC	<1	20	5	1	NC	13 d, 5 hrs	14 d, 8 hrs	NC	2	53	10	1	NC	8 d, 12 hrs	10 d, 2 hrs	NC	3	68
	Commonwealth waters adjacent to Ningaloo Reef	2	NC	NC	14 d, 4 hrs	NC	NC	<1	18	6	1	NC	14 d, 16 hrs	15 d, 2 hrs	NC	3	57	11	1	NC	11 d, 4 hrs	12 d, 16 hrs	NC	4	68
	Continental Slope Demersal Fish Communities	3	NC	NC	18 d, 10 hrs	NC	NC	<1	25	5	1	NC	11 d, 12 hrs	11 d, 20 hrs	NC	2	84	8	1	NC	11 d, 5 hrs	13 d, 9 hrs	NC	3	89
	Exmouth Plateau	1	NC	NC	49 d, 21 hrs	NC	NC	<1	12	1	NC	NC	26 d, 11 hrs	NC	NC	<1	14	2	NC	NC	21 d, 8 hrs	NC	NC	<1	25
	Glomar Shoals	11	1	NC	4 d, 19 hrs	6 d, 9 hrs	NC	4	89	12	2	NC	4 d, 10 hrs	4 d, 19 hrs	NC	4	144	6	1	NC	2 d, 23 hrs	3 d, 14 hrs	NC	2	63
	Western demersal slope and associated fish communities	NC	NC	NC	NC	NC	NC	<1	6	1	NC	NC	34 d, 22 hrs	NC	NC	<1	13	NC	NC	NC	NC	NC	NC	<1	7
MMA	Muiron Islands	2	NC	NC	27 d, 23 hrs	NC	NC	<1	17	5	NC	NC	13 d, 6 hrs	NC	NC	3	36	11	1	NC	8 d, 19 hrs	10 d, 23 hrs	NC	4	74
MP	Barrow Island	2	NC	NC	5 d, 8 hrs	NC	NC	<1	25	6	1	NC	5 d, 9 hrs	7 d, 18 hrs	NC	2	58	12	1	NC	4 d, 14 hrs	8 d, 23 hrs	NC	4	59
	Montebello Islands	4	1	NC	4 d, 10 hrs	4 d, 12 hrs	NC	2	66	11	1	NC	3 d, 23 hrs	7 d, 17 hrs	NC	4	69	24	2	NC	3 d, 4 hrs	3 d, 22 hrs	NC	7	86
	Ningaloo	2	NC	NC	14 d, 4 hrs	NC	NC	<1	18	6	1	NC	14 d, 16 hrs	15 d, 2 hrs	NC	3	57	11	1	NC	11 d, 4 hrs	12 d, 16 hrs	NC	4	68
	Shark Bay	NC	NC	NC	NC	NC	NC	<1	7	1	NC	NC	37 d, 13 hrs	NC	NC	<1	13	1	NC	NC	49 d, 7 hrs	NC	NC	<1	11
NR	Great Sandy Island	NC	NC	NC	NC	NC	NC	<1	3	NC	NC	NC	NC	NC	NC	<1	2	1	NC	NC	12 d, 12 hrs	NC	NC	<1	11
	Lowendal Islands	NC	NC	NC	NC	NC	NC	<1	7	1	NC	NC	6 d, 11 hrs	NC	NC	<1	33	1	NC	NC	17 d, 21 hrs	NC	NC	<1	12
RSB	Barrow Island Reefs and Shoals	NC	NC	NC	NC	NC	NC	<1	3	NC	NC	NC	NC	NC	NC	<1	5	2	NC	NC	12 d, 11 hrs	NC	NC	<1	32
	Dailey Shoal	NC	NC	NC	NC	NC	NC	<1	2	NC	NC	NC	NC	NC	NC	<1	8	1	NC	NC	13 d, 18 hrs	NC	NC	2	15
	Glomar Shoal	5	1	NC	7 d, 14 hrs	11 d, 14 hrs	NC	3	89	4	1	NC	6 d, 9 hrs	6 d, 10 hrs	NC	2	77	1	NC	NC	7 d, 10 hrs	NC	NC	<1	12
	Madeleine Shoals	2	NC	NC	9 d, 22 hrs	NC	NC	<1	34	NC	NC	NC	NC	NC	NC	<1	7	NC	NC	NC	NC	NC	NC	<1	7
	Montebello Shoals	1	NC	NC	33 d, 9 hrs	NC	NC	<1	12	2	NC	NC	5 d, 23 hrs	NC	NC	<1	19	10	NC	NC	4 d, 8 hrs	NC	NC	4	33
	Ningaloo Reef	1	NC	NC	27 d, 20 hrs	NC	NC	<1	12	3	NC	NC	19 d, 6 hrs	NC	NC	2	26	2	NC	NC	20 d, 14 hrs	NC	NC	2	31
	North West Reef	NC	NC	NC	NC	NC	NC	<1	2	NC	NC	NC	NC	NC	NC	<1	9	2	NC	NC	22 d, 14 hrs	NC	NC	2	24
	Outtrim Patches	NC	NC	NC	NC	NC	NC	<1	6	2	NC	NC	15 d, 20 hrs	NC	NC	2	13	7	NC	NC	10 d, 10 hrs	NC	NC	3	32
	Penguin Bank	NC	NC	NC	NC	NC	NC	<1	7	2	NC	NC	7 d, 9 hrs	NC	NC	2	18	5	NC	NC	7 d, 6 hrs	NC	NC	3	33
	Poivre Reef	NC	NC	NC	NC	NC	NC	<1	7	NC	NC	NC	NC	NC	NC	<1	8	3	NC	NC	6 d, 20 hrs	NC	NC	2	29

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	Rankin Bank	2	NC	NC	12 d, 3 hrs	NC	NC	<1	20	NC	NC	NC	NC	NC	NC	<1	10	1	NC	NC	17 d, 21 hrs	NC	NC	<1	15
	Ripple Shoals	NC	NC	NC	NC	NC	NC	<1	<1	NC	NC	NC	NC	NC	NC	<1	5	1	NC	NC	21 d, 20 hrs	NC	NC	<1	11
	Rosily Shoals	NC	NC	NC	NC	NC	NC	<1	6	3	NC	NC	9 d, 0 hrs	NC	NC	<1	21	5	NC	NC	8 d, 22 hrs	NC	NC	2	24
	Tryal Rocks	6	1	NC	6 d, 13 hrs	6 d, 17 hrs	NC	3	62	17	NC	NC	2 d, 20 hrs	NC	NC	5	38	21	3	NC	2 d, 12 hrs	2 d, 13 hrs	NC	7	64
State Waters	Western Australia	6	2	NC	1 d, 4 hrs	2 d, 2 hrs	NC	3	134	11	2	NC	1 d, 20 hrs	2 d, 5 hrs	NC	4	81	24	3	NC	2 d, 5 hrs	2 d, 8 hrs	NC	7	114

NC: No contact to receptor predicted for specified threshold.

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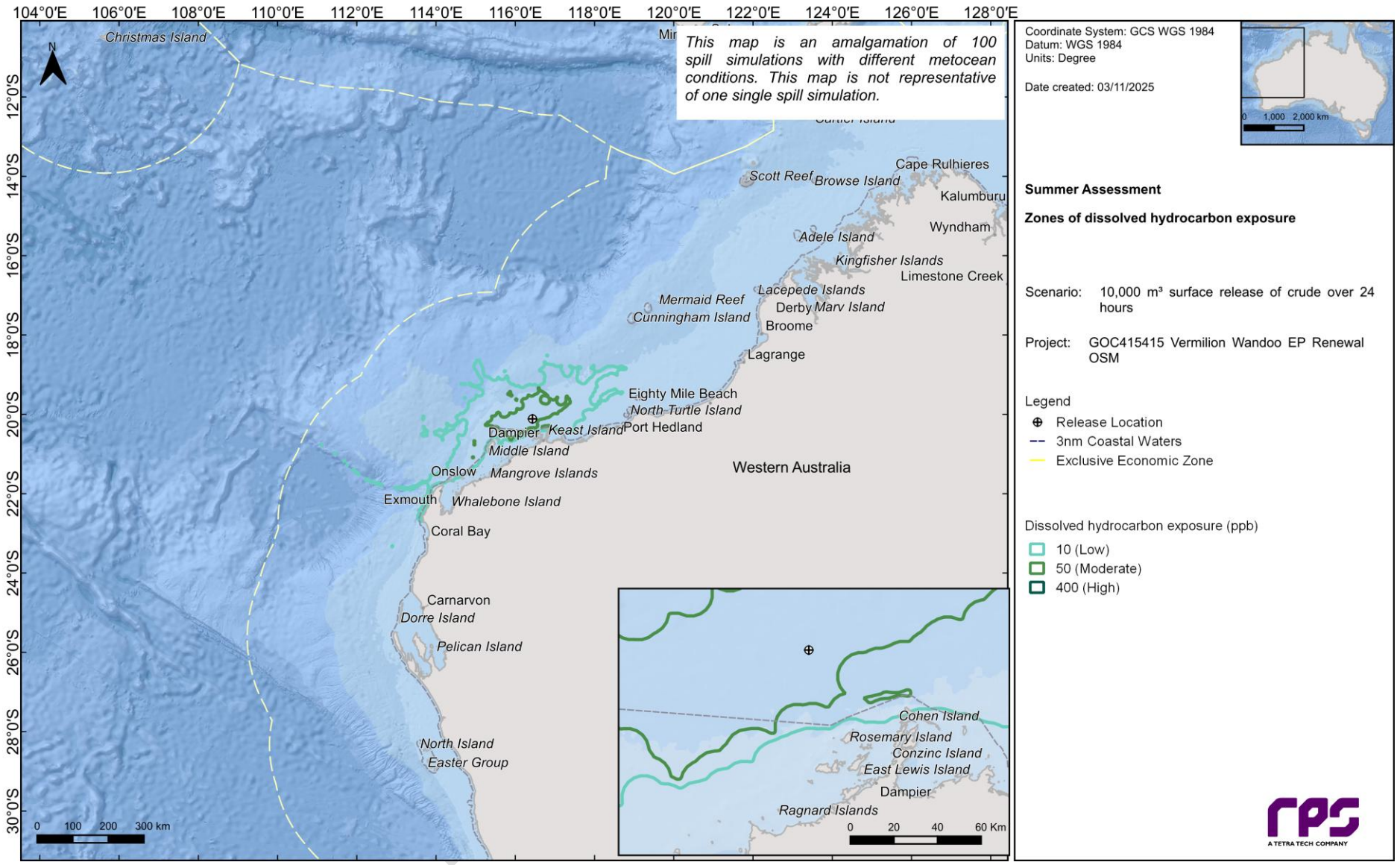


Figure 14.37 Predicted zones of dissolved hydrocarbon exposure following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

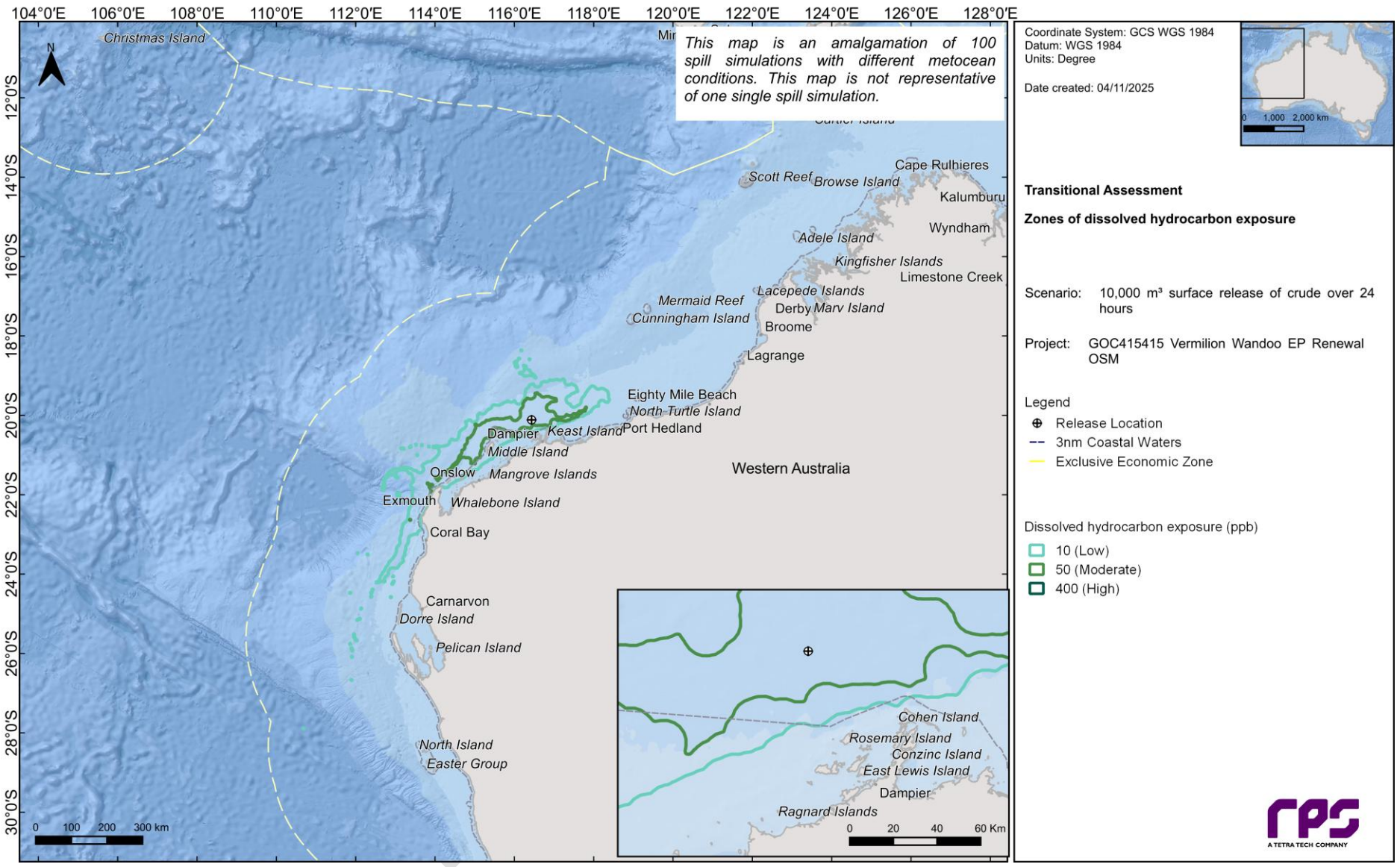


Figure 14.38 Predicted zones of dissolved hydrocarbon exposure following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

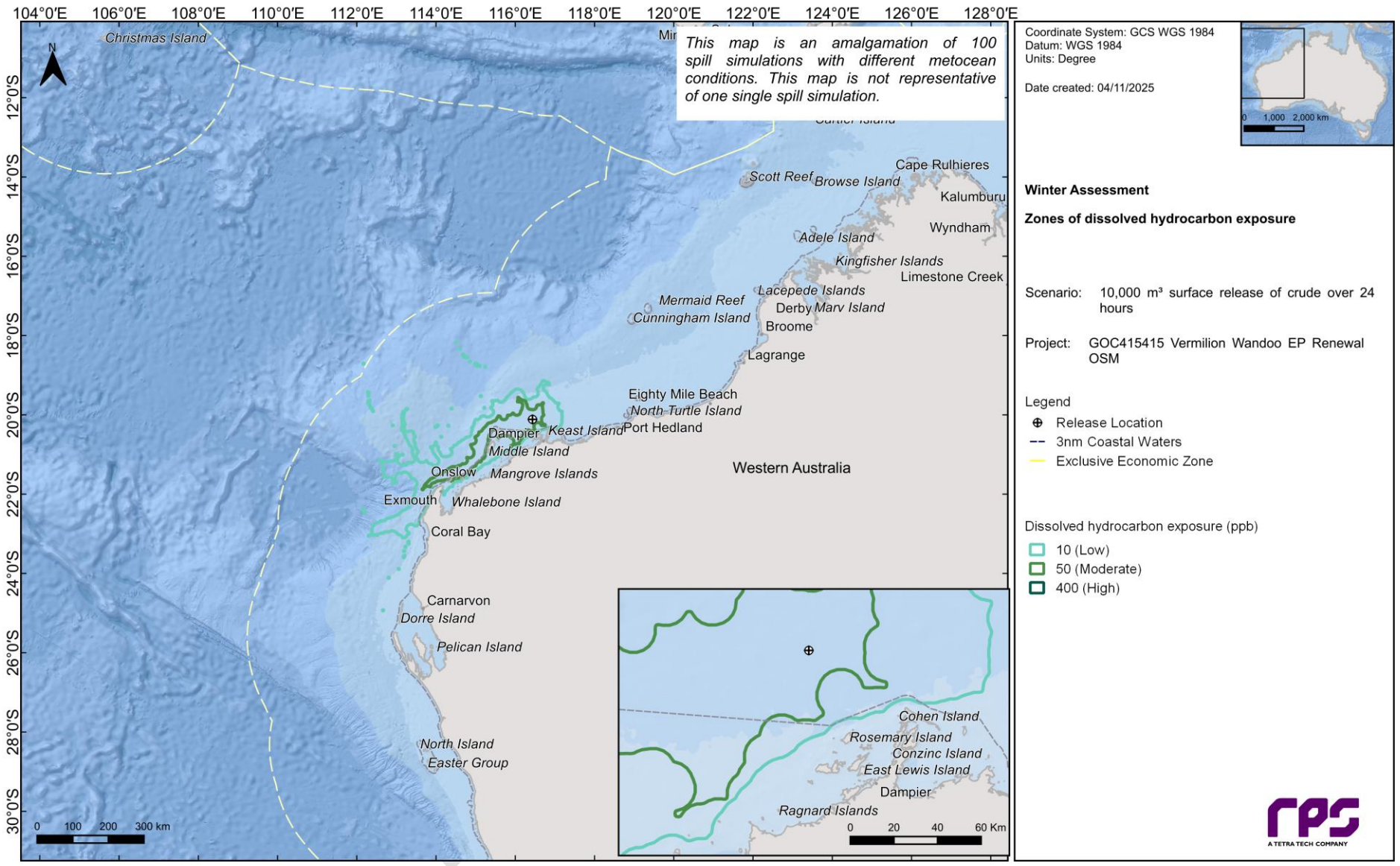


Figure 14.39 Predicted zones of dissolved hydrocarbon exposure following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

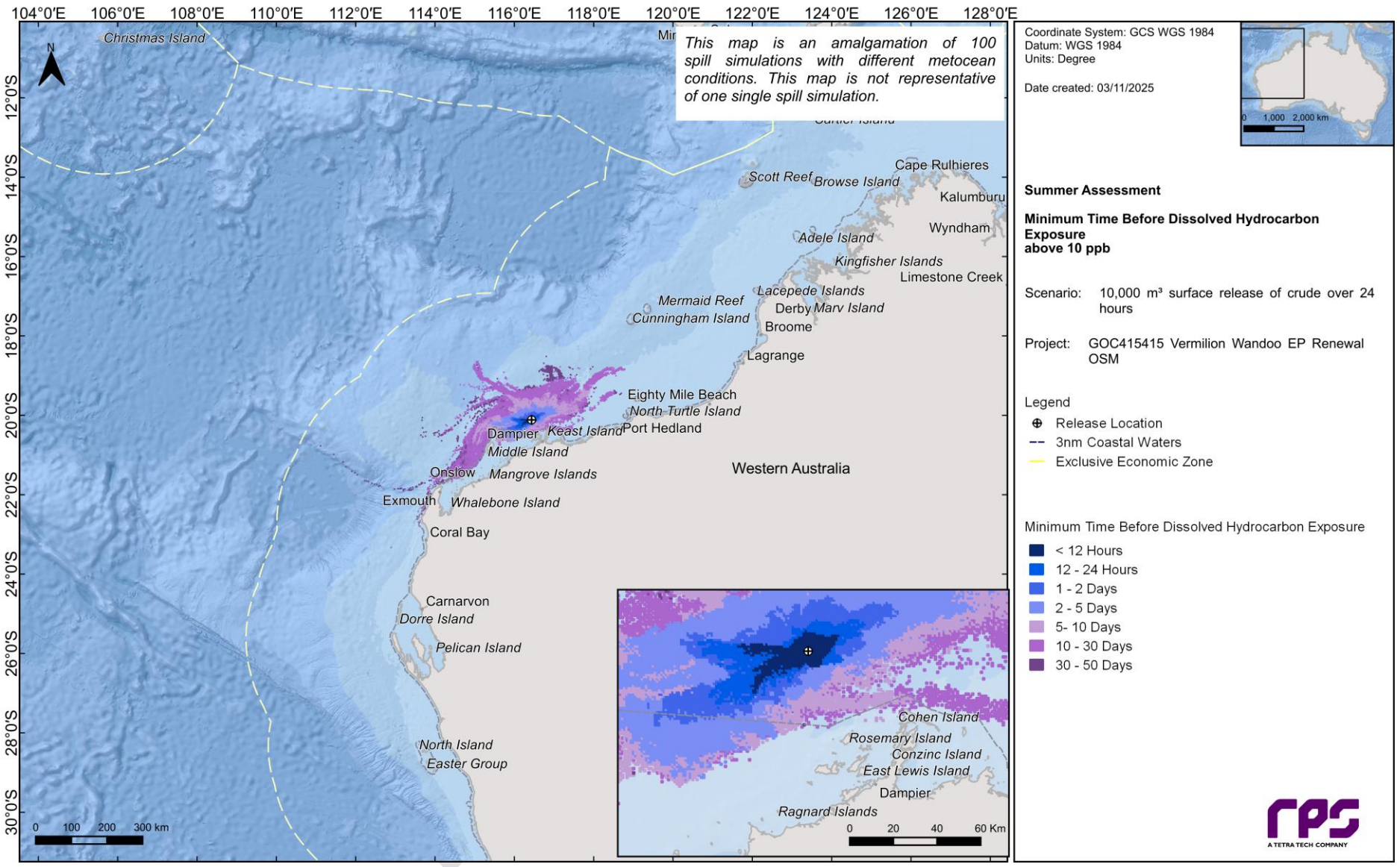


Figure 14.40 Minimum time before dissolved hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

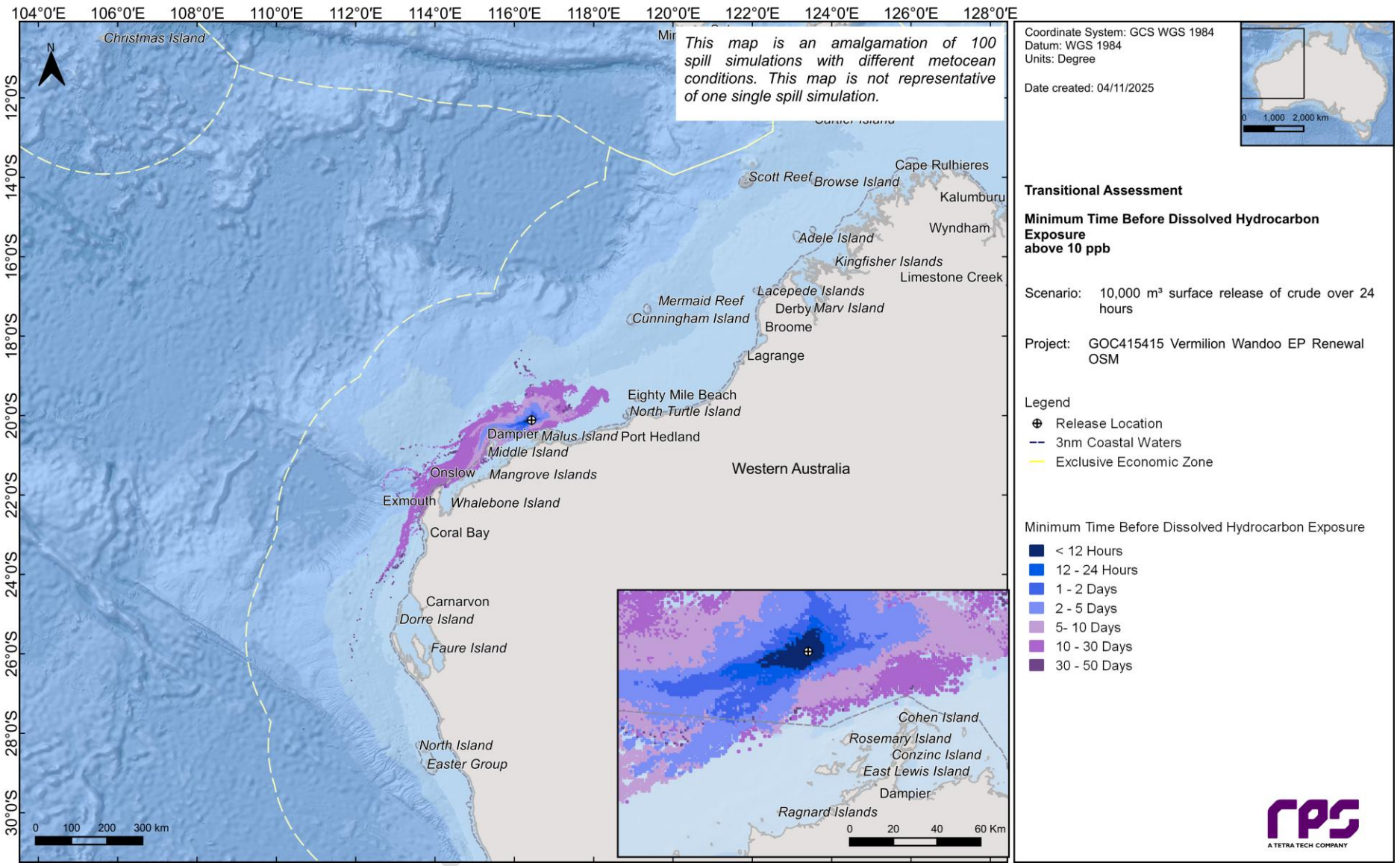


Figure 14.41 Minimum time before dissolved hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

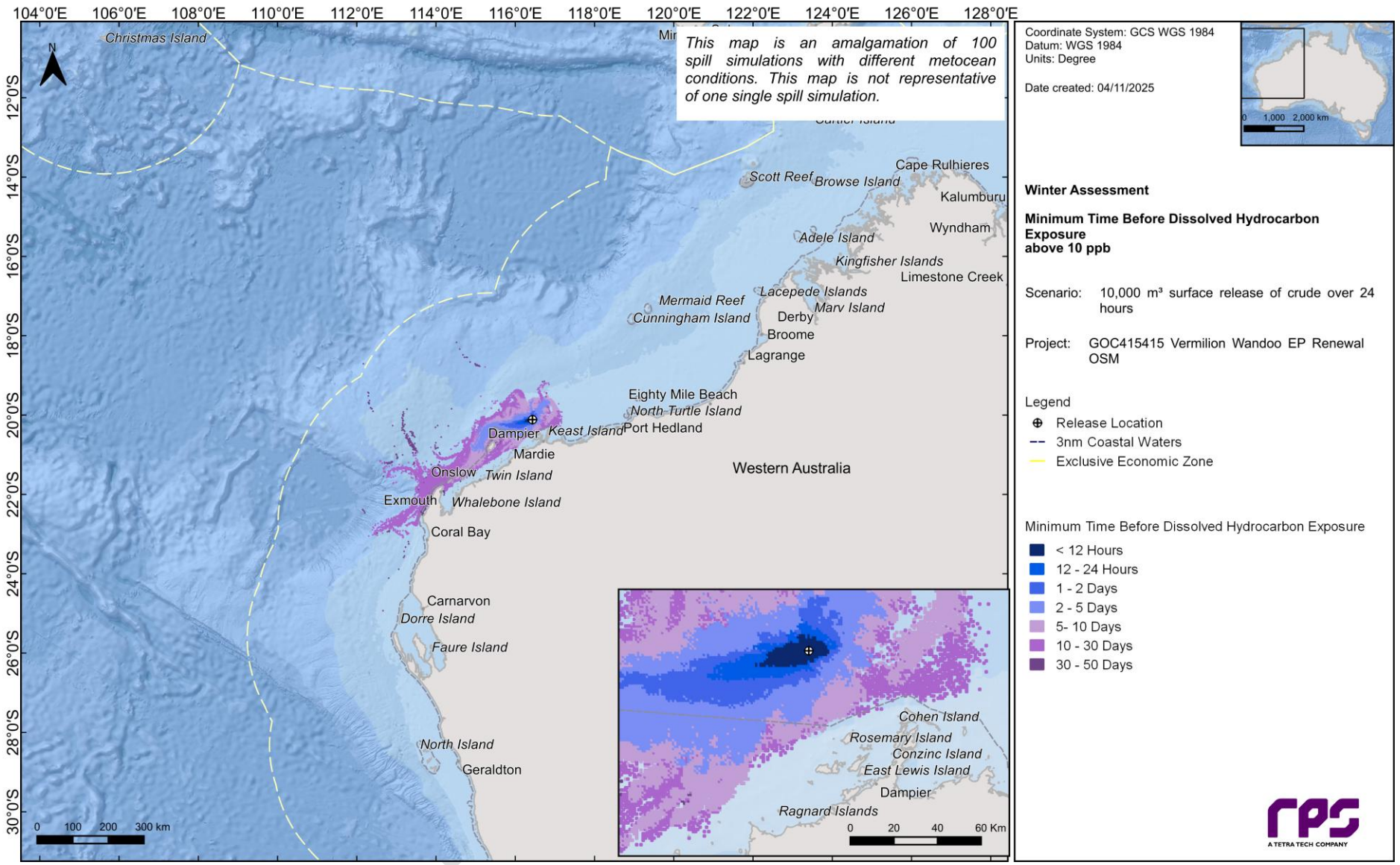


Figure 14.42 Minimum time before dissolved hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

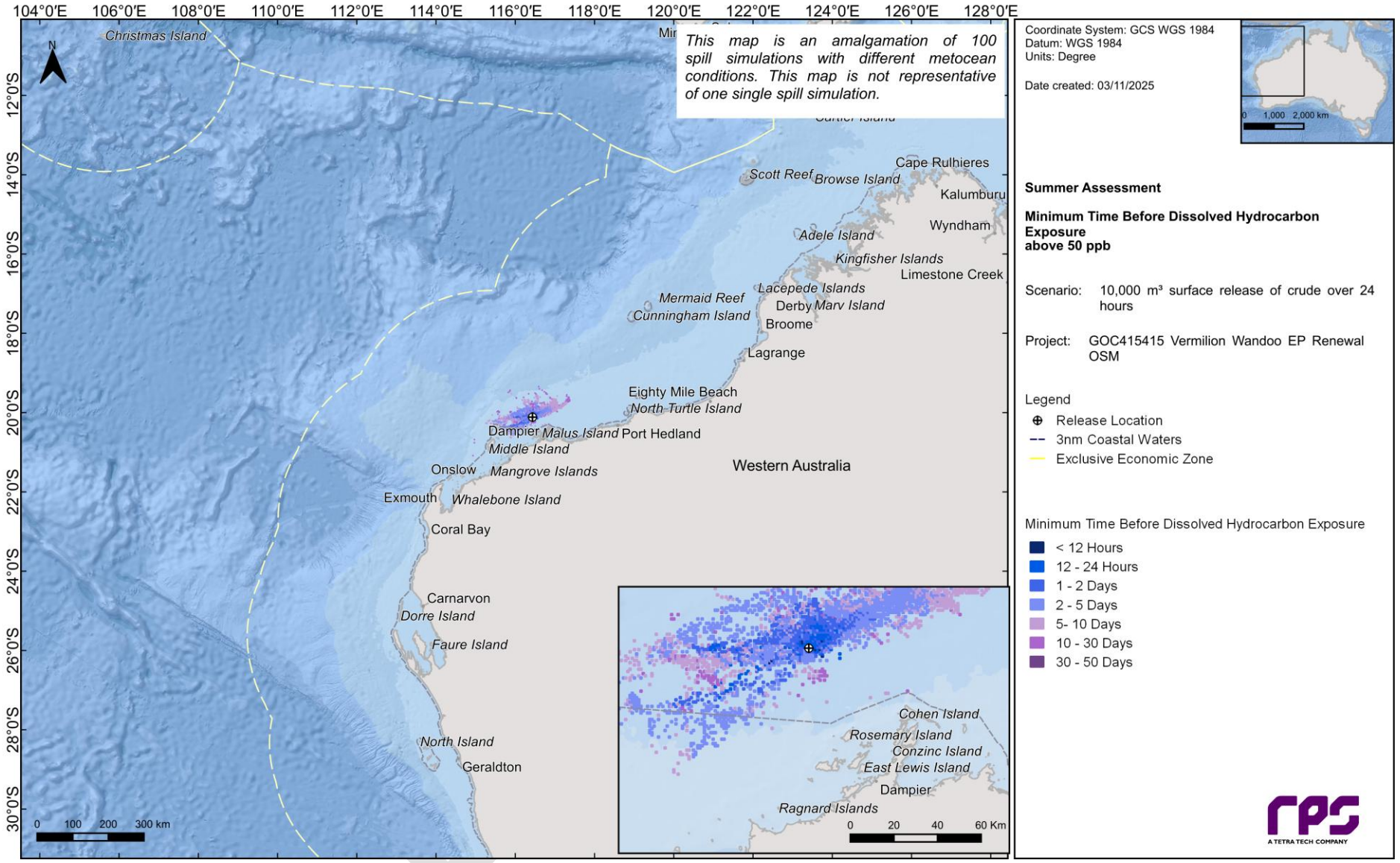


Figure 14.43 Minimum time before dissolved hydrocarbon exposure at, or above, 50 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

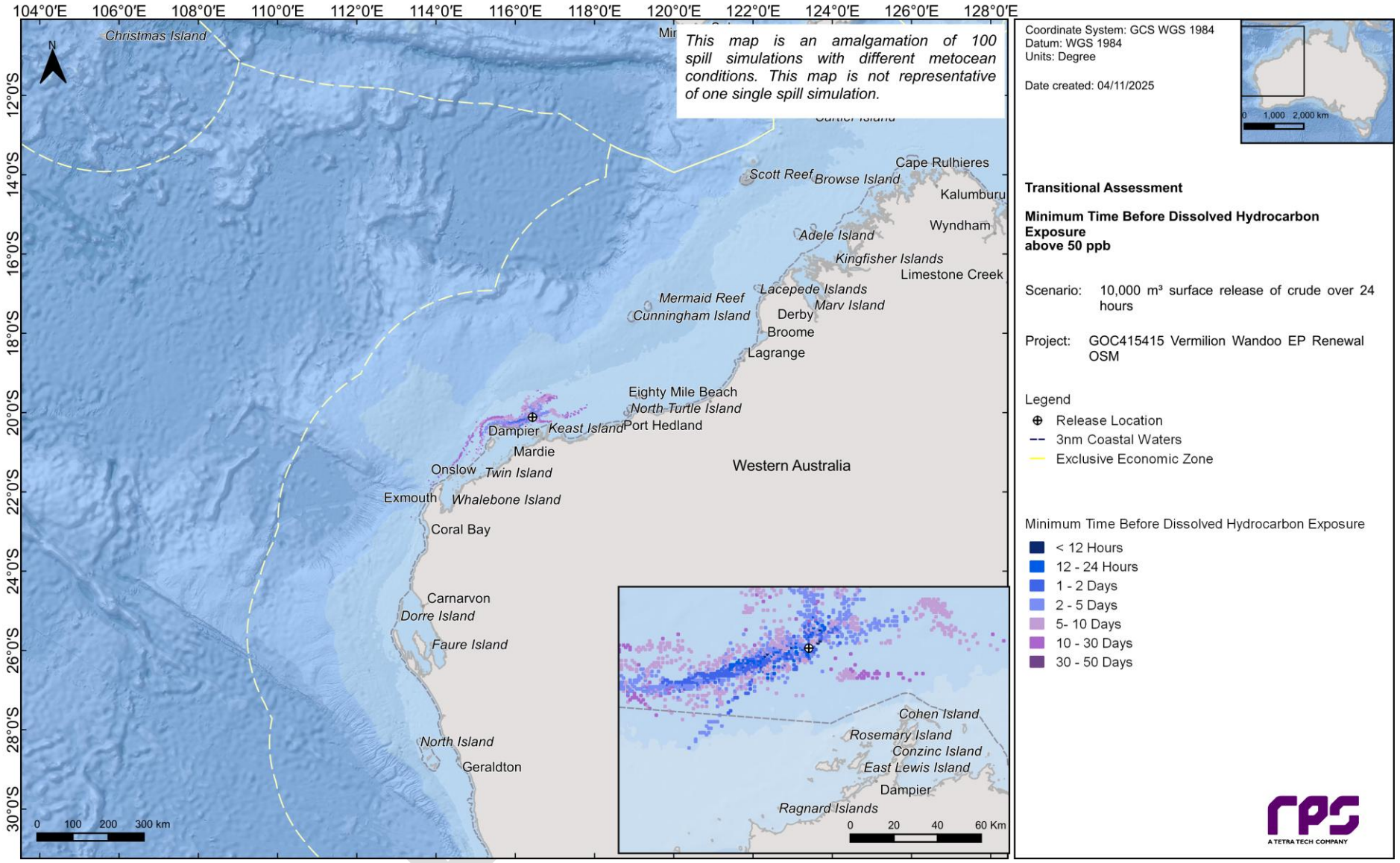


Figure 14.44 Minimum time before dissolved hydrocarbon exposure at, or above, 50 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

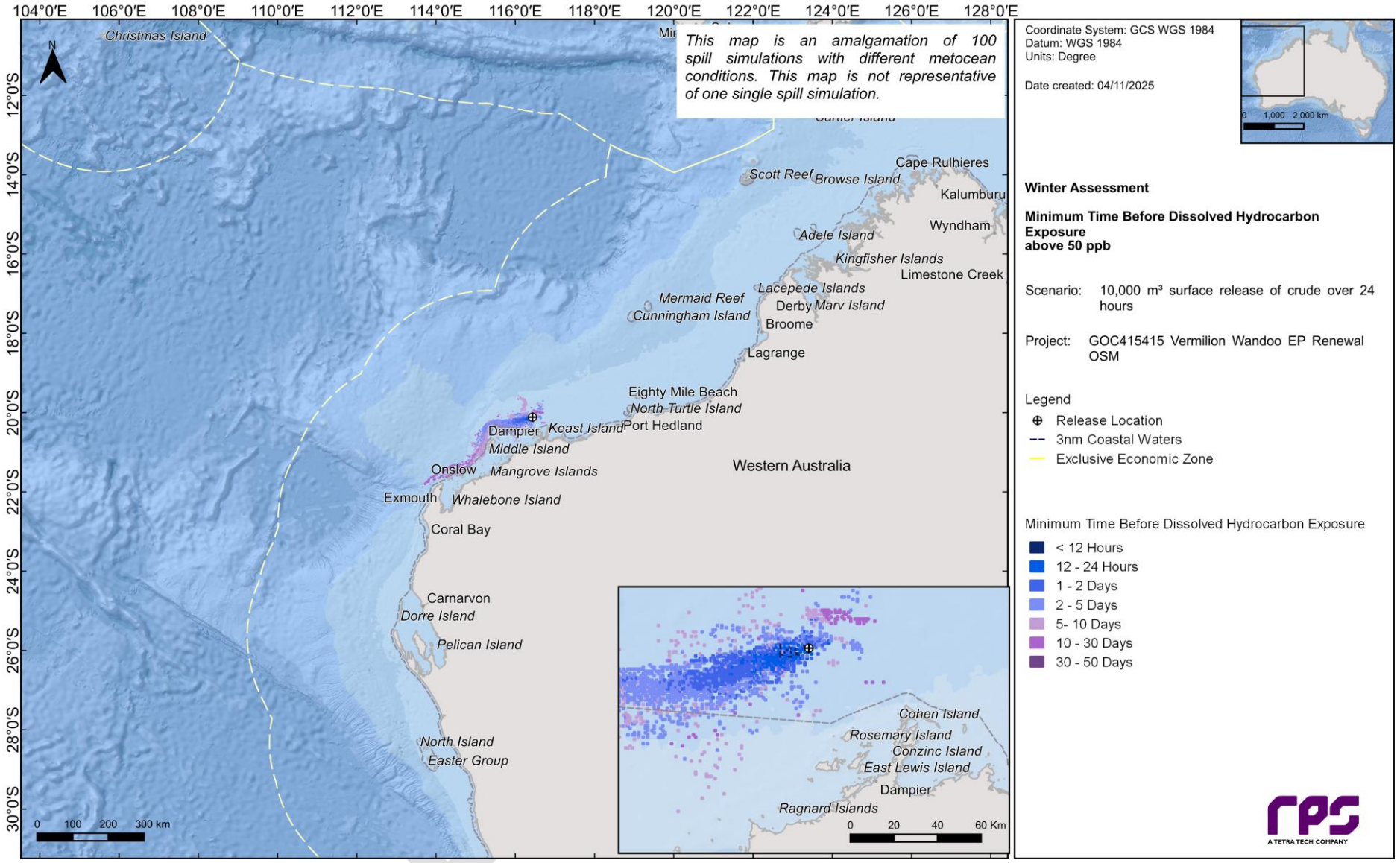


Figure 14.45 Minimum time before dissolved hydrocarbon exposure at, or above, 50 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

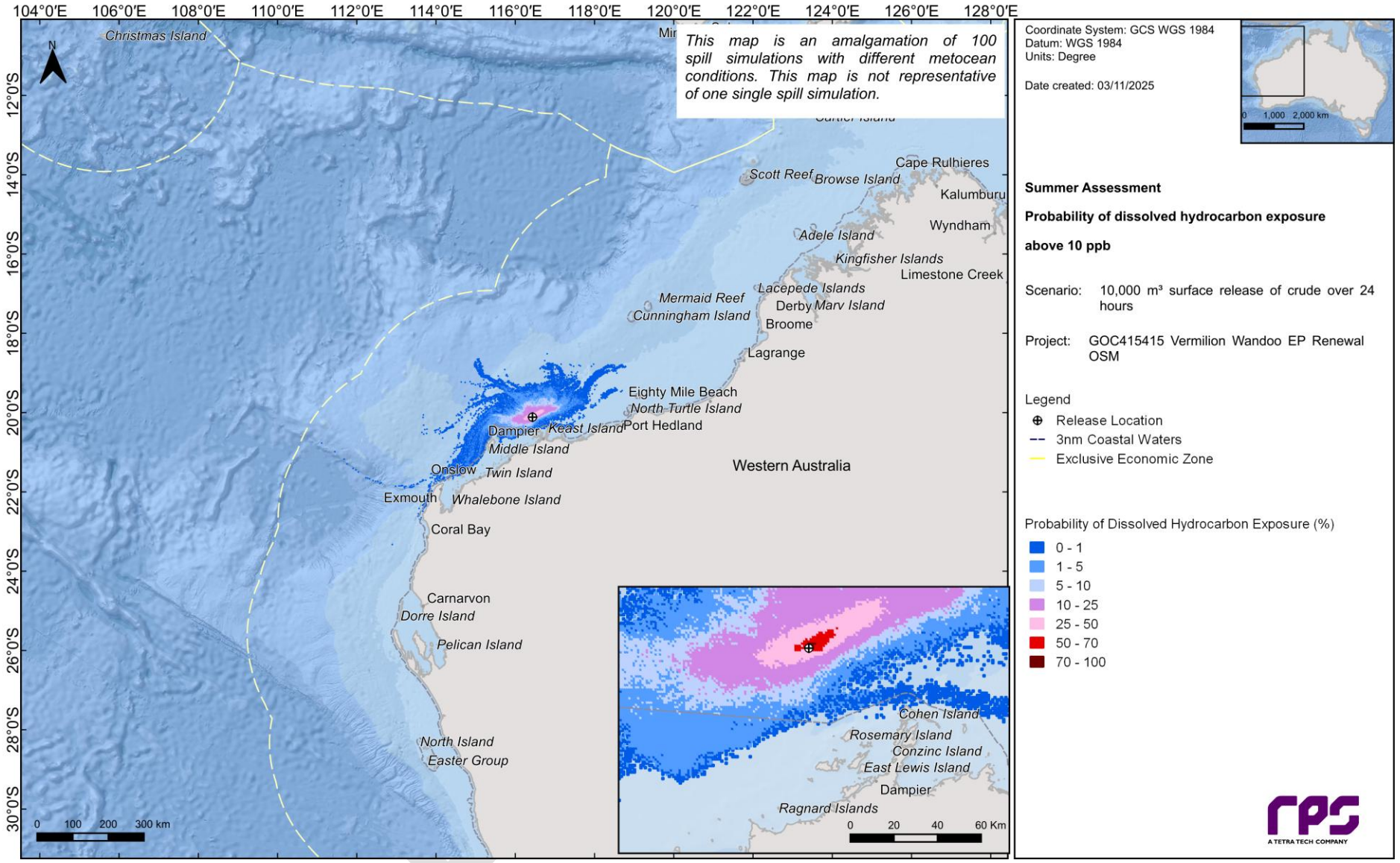


Figure 14.46 Probability of dissolved hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

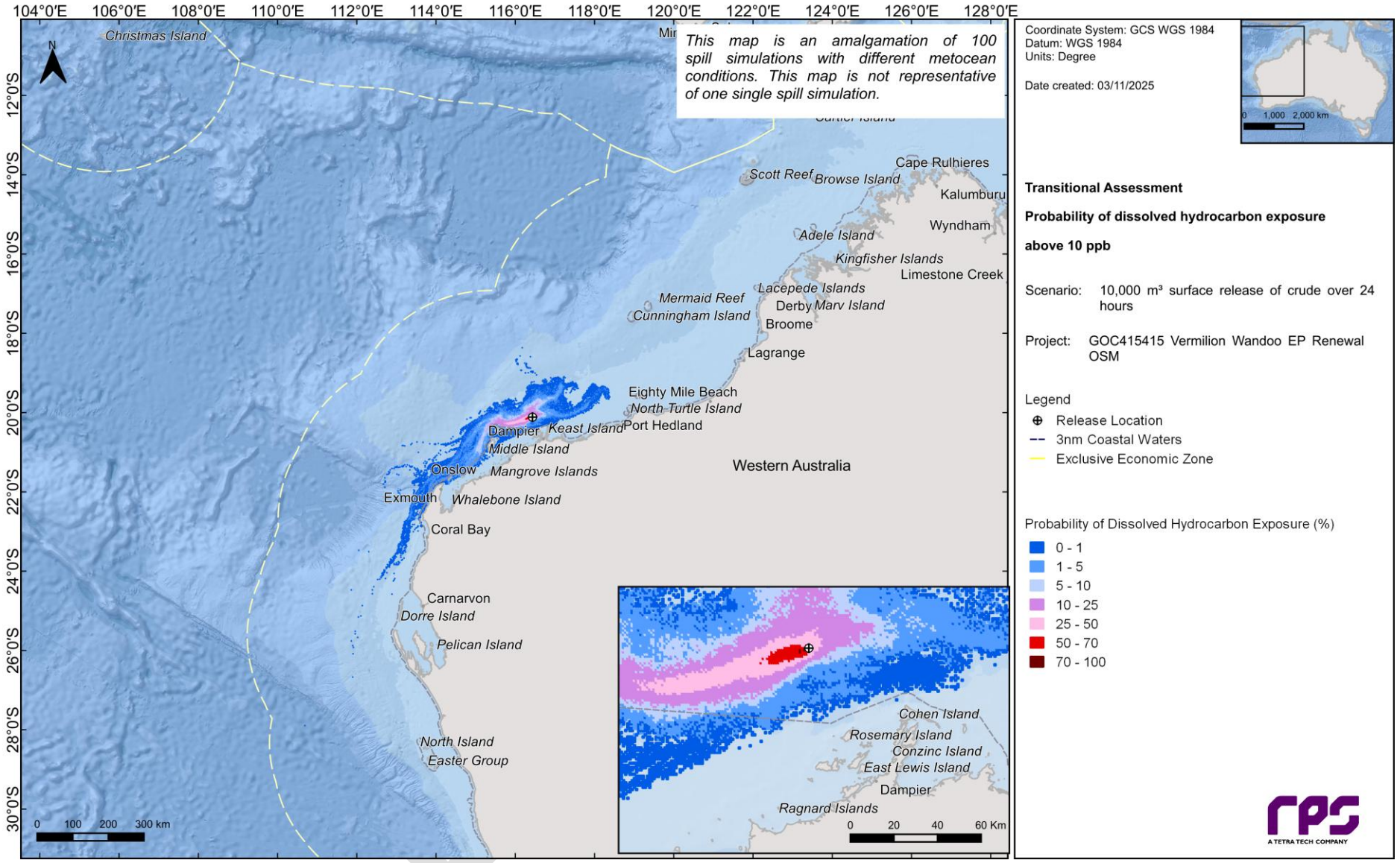


Figure 14.47 Probability of dissolved hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

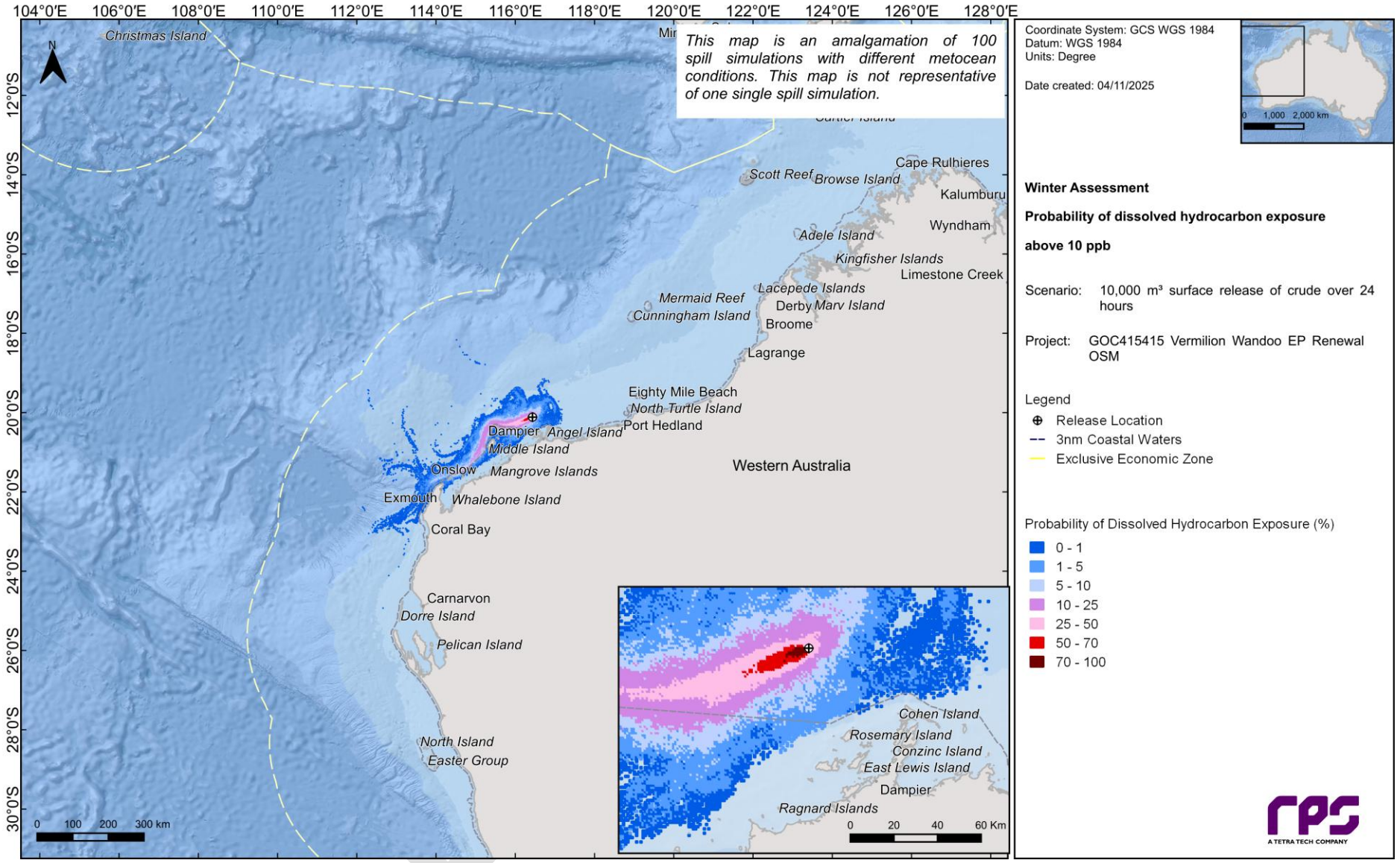


Figure 14.48 Probability of dissolved hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

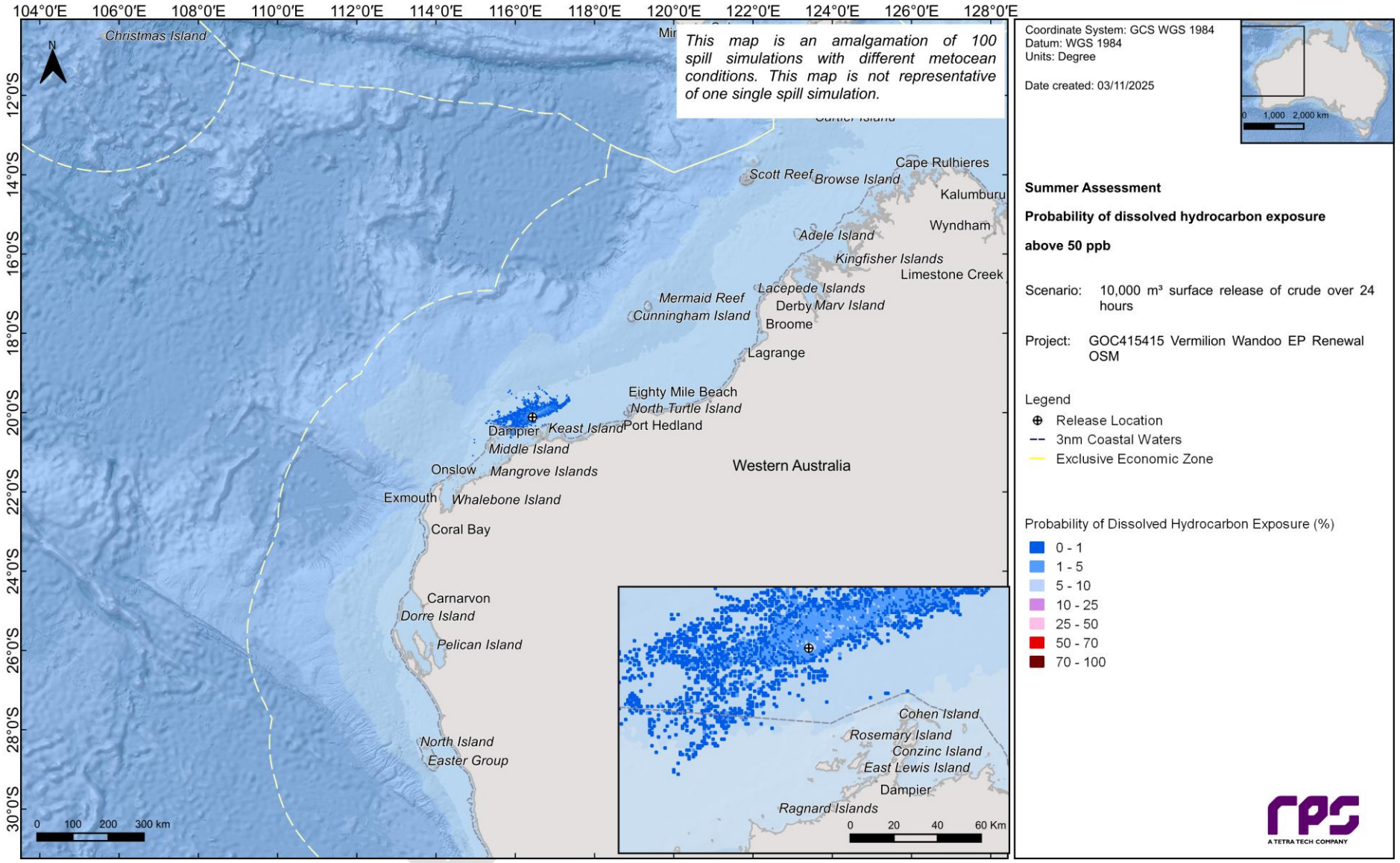


Figure 14.49 Probability of dissolved hydrocarbon exposure at, or above, 50 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

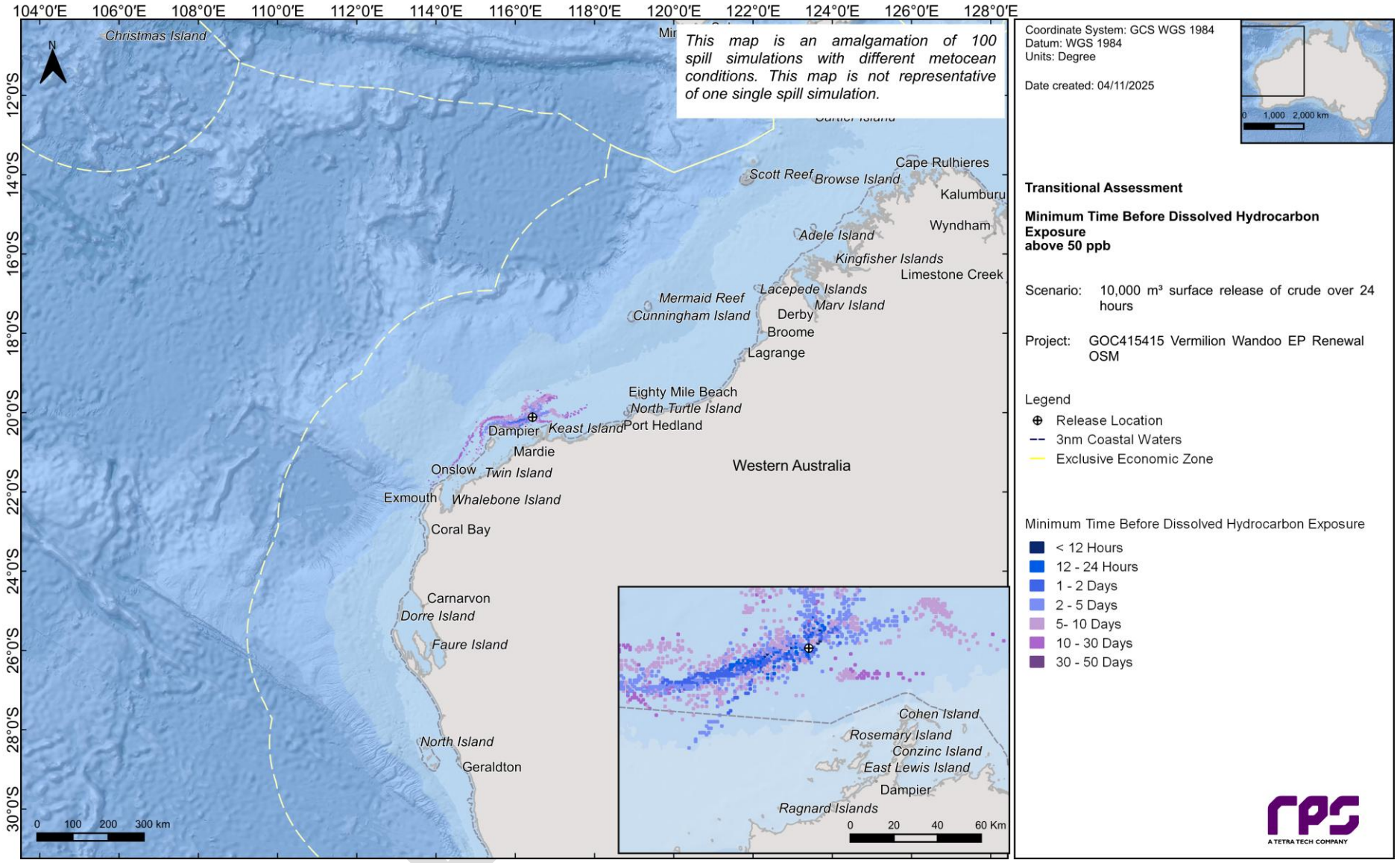


Figure 14.50 Probability of dissolved hydrocarbon exposure at, or above, 50 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

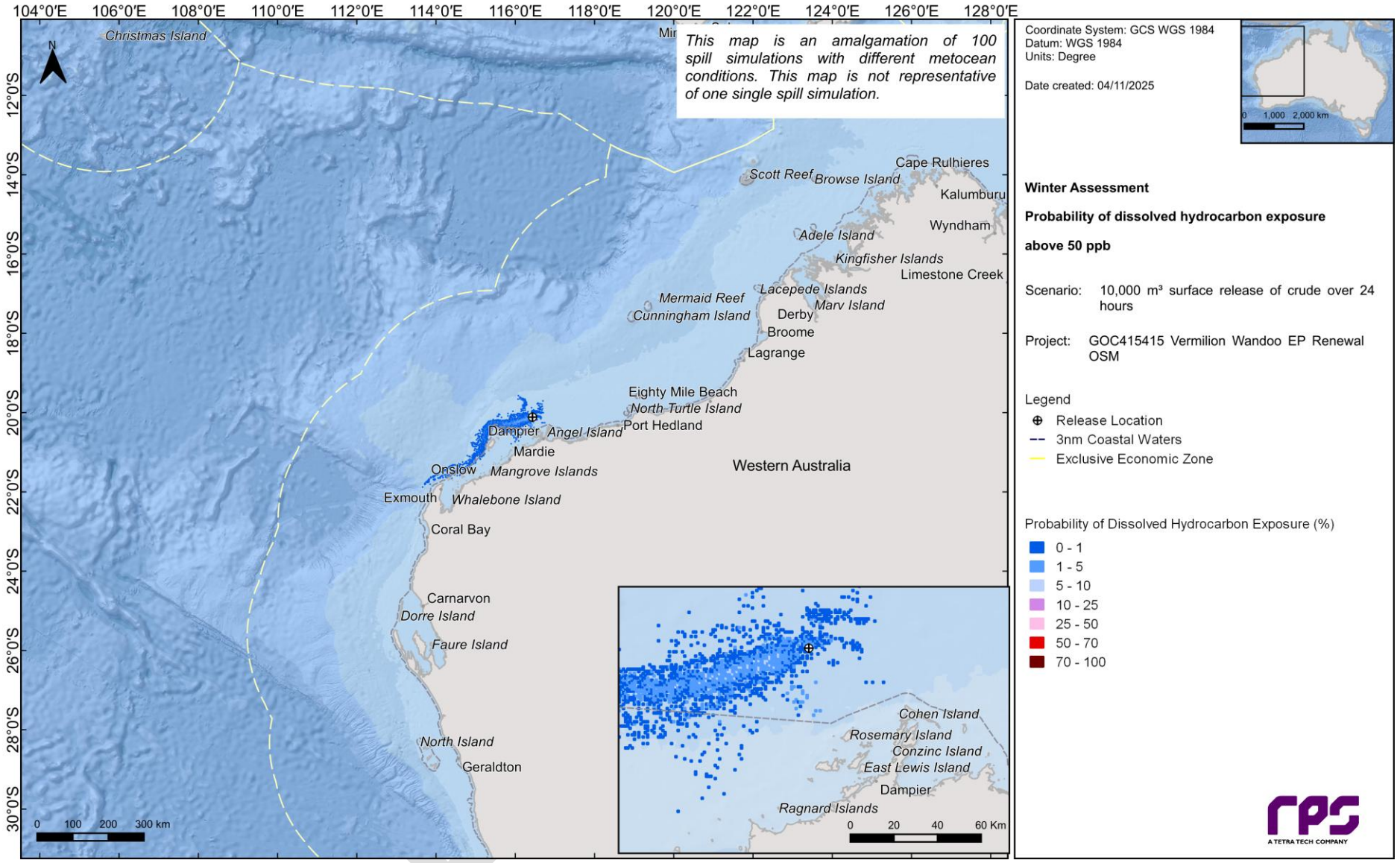


Figure 14.51 Probability of dissolved hydrocarbon exposure at, or above, 50 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

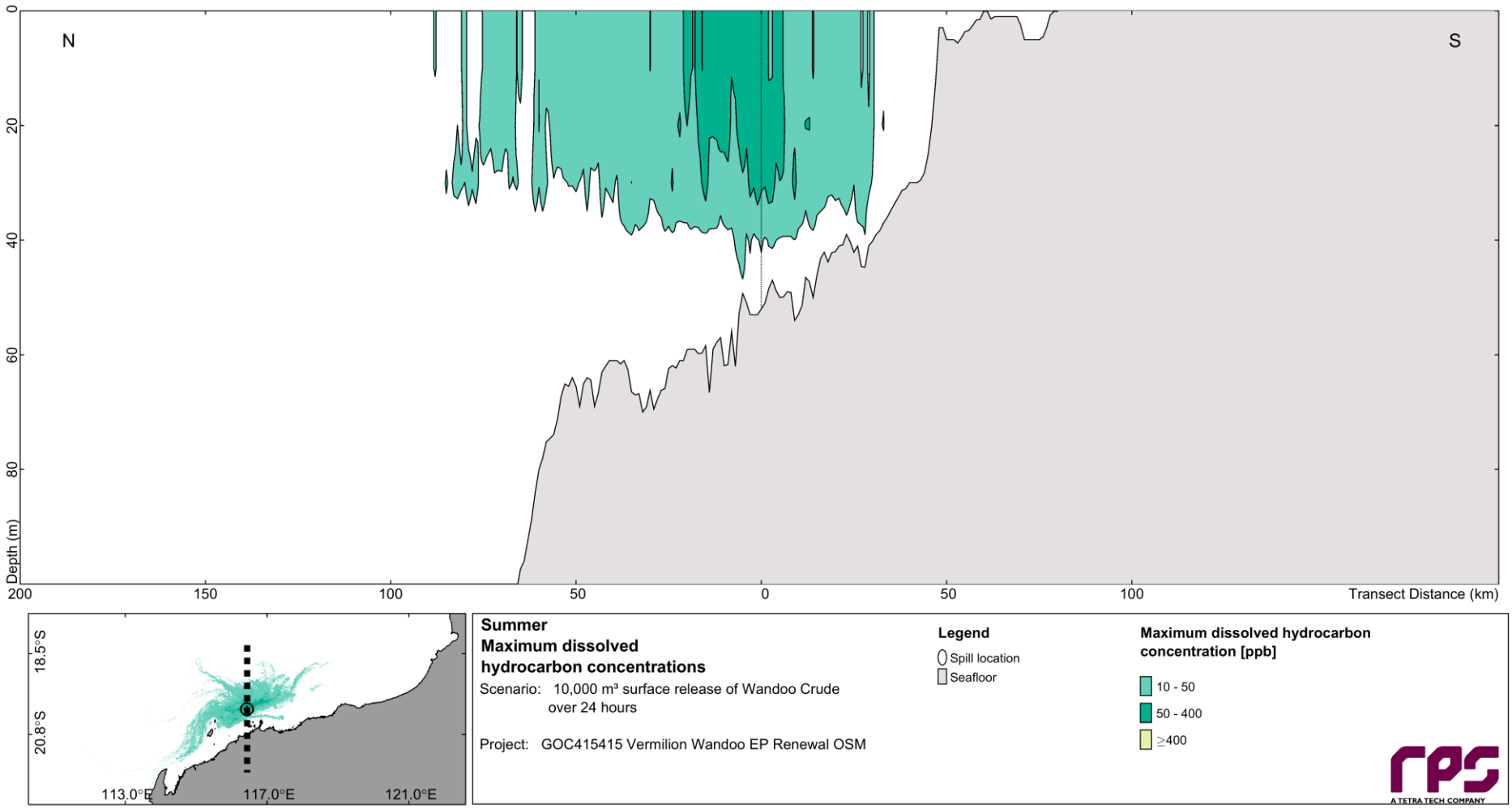


Figure 14.52 North-south cross-section transect of dissolved hydrocarbon concentrations exposure following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

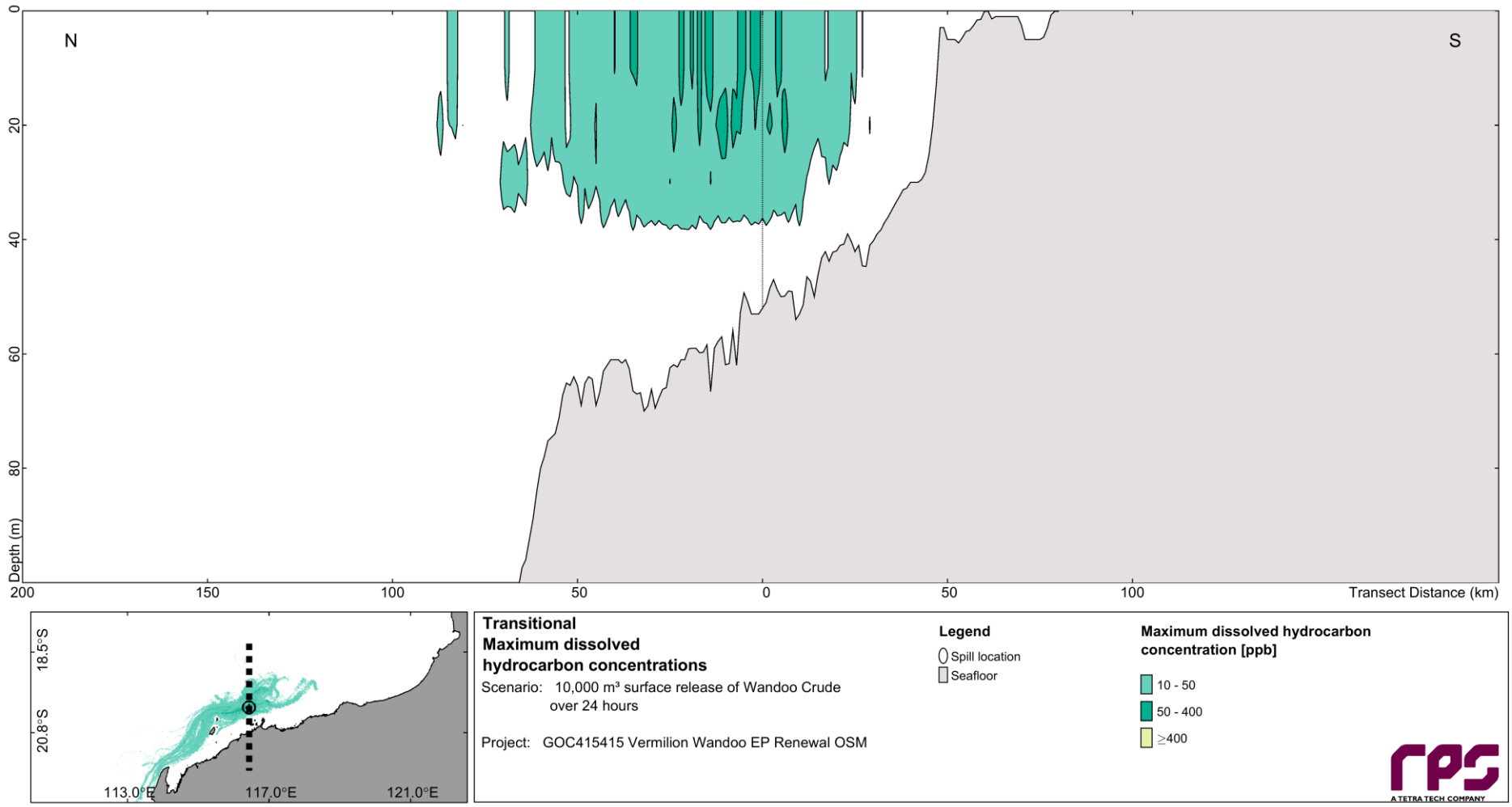


Figure 14.53 North-south cross-section transect of dissolved hydrocarbon concentrations exposure following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

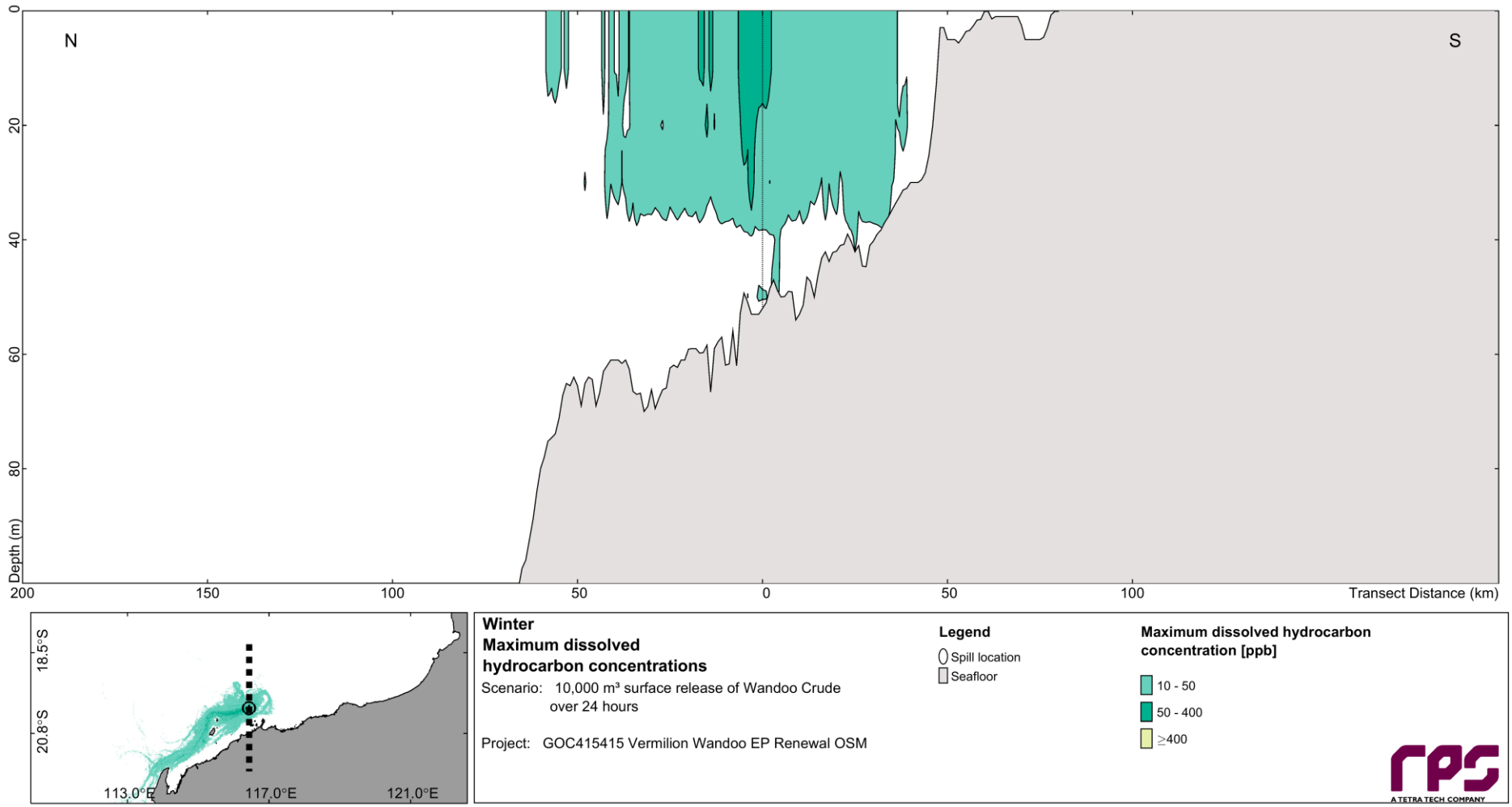


Figure 14.54 North-south cross-section transect of dissolved hydrocarbon concentrations exposure following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

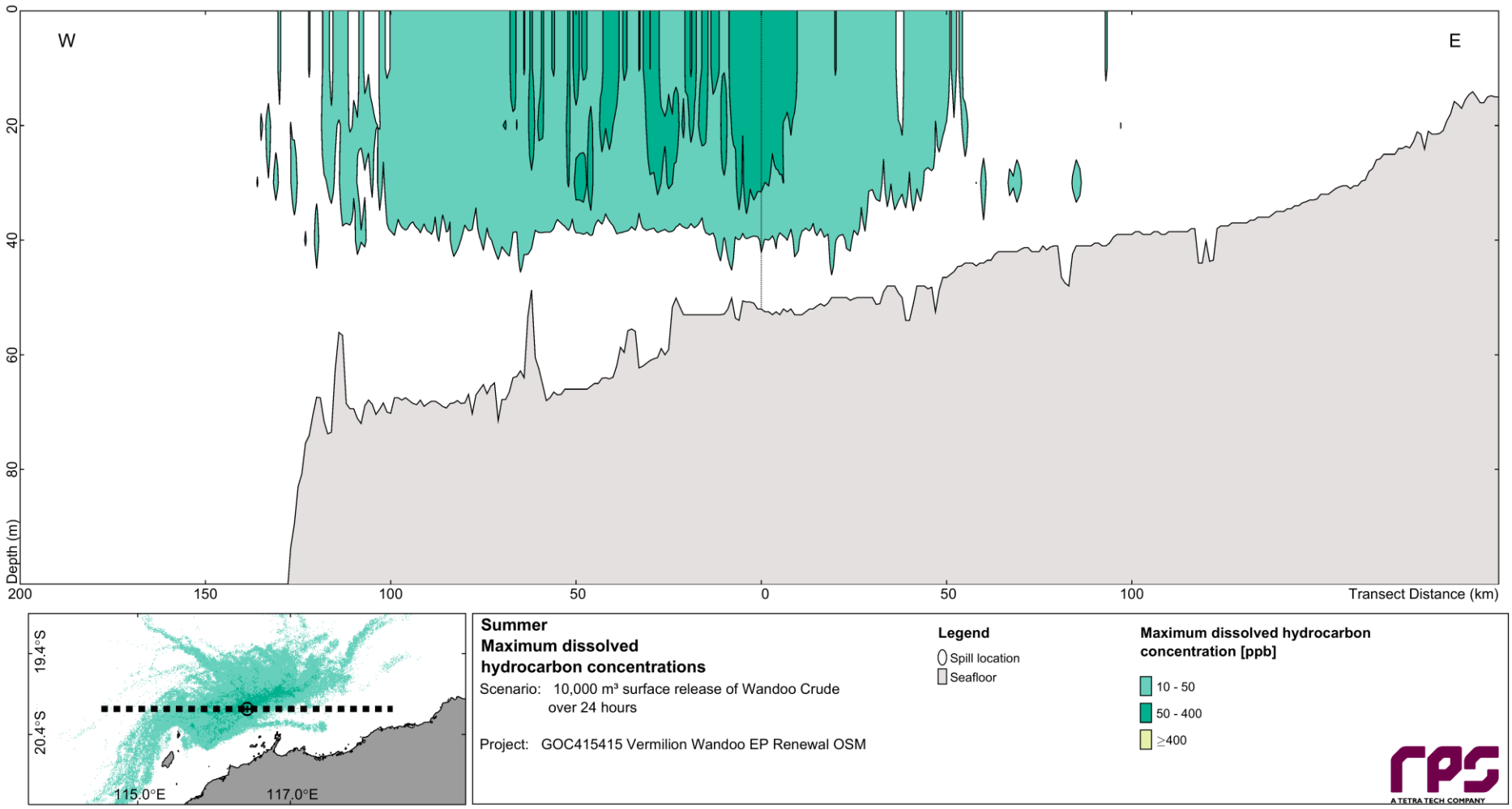


Figure 14.55 East-west cross-section transect of dissolved hydrocarbon concentrations exposure following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

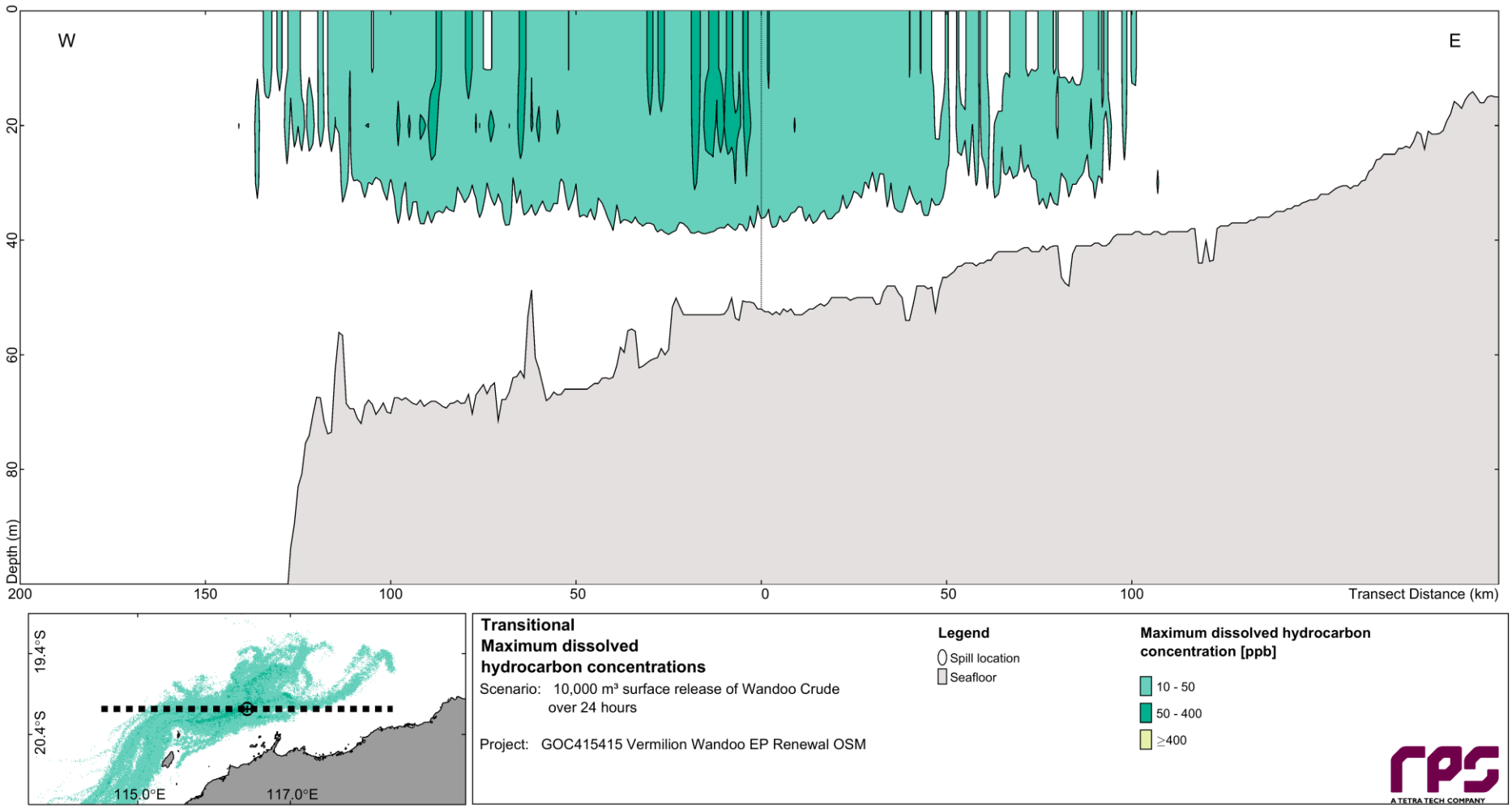


Figure 14.56 East-west cross-section transect of dissolved hydrocarbon concentrations exposure following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

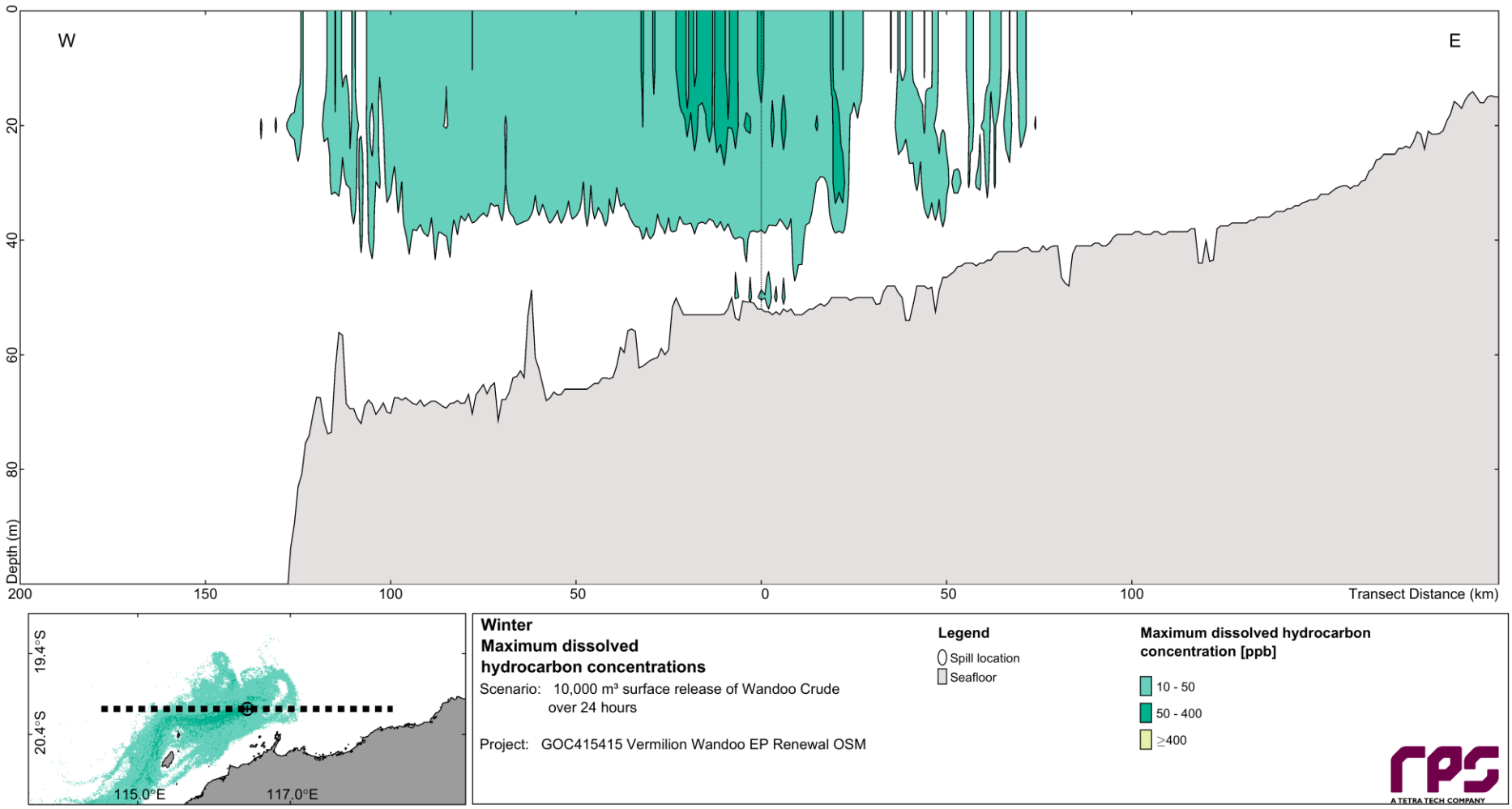


Figure 14.57 East-west cross-section transect of dissolved hydrocarbon concentrations exposure following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

14.1.5.2 Entrained Hydrocarbons

Table 14-9 summarises the maximum distances from the release location to entrained hydrocarbon thresholds for each season. Concentrations exceeding 10 ppb may potentially extend up to 1,319 km from the release location. As the threshold increases above 100 ppb and 1,000 ppb, the maximum distance decreases to 599 km and 399 km, respectively.

Table 14-10 summarises the receptors exposed to entrained hydrocarbons per season (either at, or above, receptors in the water column).

Montebello AMP recorded the overall highest probability of exposure to concentrations at, or above 10 ppb at 92% during winter conditions. During transitional conditions, the highest probability dropped to 76% for the same receptor. In summer, the highest probability was 72% for Glomar Shoals.

Montebello AMP also recorded the fastest time to exposure at, or above, 10 ppb at 21 hours during summer, 1 day during transitional conditions, and 23 hours during winter. The highest recorded concentration was 9,532 ppb at Montebello AMP during winter.

Figure 14.58 to Figure 14.60 illustrate the zones of exposure to entrained hydrocarbons for each season, whilst Figure 14.61 to Figure 14.78 display the minimum exposure times and the probability for each threshold and season.

Seasonal cross-sectional transects (north-south and east-west) of the maximum entrained hydrocarbons in the vicinity of the release site, are presented in Figure 14.79 to Figure 14.84.

Table 14-9 Maximum distances from the release location to entrained hydrocarbon exposure thresholds following a surface release of crude from the tanker collision. Results were calculated from 100 spill simulations per season.

Season	Distance and direction travelled	Entrained hydrocarbon exposure thresholds		
		10 ppb	100 ppb	1000 ppb
Summer	Maximum distance (km) from release location	1,081	520	201
	Direction	Southwest	Southwest	Northeast
Transitional	Maximum distance (km) from release location	1,319	562	351
	Direction	Southwest	Southwest	Southwest
Winter	Maximum distance (km) from release location	1,150	599	399
	Direction	Southwest	Southwest	Southwest

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Table 14-10 Receptors predicted to be exposed by entrained hydrocarbons following a surface release of crude from the tanker collision. Results were calculated from100 spill simulations per season.

Category	Name	Summer								Transitional								Winter							
		Probability (%) of entrained concentration			Minimum time before entrained hydrocarbon exposure at			Maximum entrained hydrocarbon concentration (ppb)		Probability (%) of entrained concentration			Minimum time before entrained hydrocarbon exposure at			Maximum entrained hydrocarbon concentration (ppb)		Probability (%) of dissolved concentration			Minimum time before entrained hydrocarbon exposure at			Maximum entrained hydrocarbon concentration (ppb)	
		≥ 10 ppb	≥ 100 ppb	≥ 1,000 ppb	≥ 10 ppb	≥ 100 ppb	≥ 1,000 ppb	averaged over all simulations	in the worst replicate	≥ 10 ppb	≥ 100 ppb	≥ 1,000 ppb	≥ 10 ppb	≥ 100 ppb	≥ 1,000 ppb	averaged over all simulations	in the worst replicate	≥ 10 ppb	≥ 100 ppb	≥ 1,000 ppb	≥ 10 ppb	≥ 100 ppb	≥ 1,000 ppb	averaged over all simulations	in the worst replicate
AMP	Abrolhos	1	NC	NC	38 d, 4 hrs	NC	NC	<1	16	8	NC	NC	35 d, 20 hrs	NC	NC	2	31	2	NC	NC	33 d, 20 hrs	NC	NC	<1	18
	Argo-Rowley Terrace	11	NC	NC	23 d, 0 hrs	NC	NC	3	63	16	NC	NC	20 d, 8 hrs	NC	NC	4	59	8	1	NC	15 d, 8 hrs	20 d, 6 hrs	NC	3	104
	Carnarvon Canyon	2	NC	NC	22 d, 19 hrs	NC	NC	<1	28	8	NC	NC	26 d, 8 hrs	NC	NC	2	30	4	NC	NC	31 d, 6 hrs	NC	NC	2	43
	Dampier	19	4	NC	5 d, 3 hrs	5 d, 4 hrs	NC	17	425	7	2	NC	8 d, 3 hrs	11 d, 5 hrs	NC	5	154	8	NC	NC	11 d, 15 hrs	NC	NC	3	73
	Gascoyne	14	2	NC	12 d, 23 hrs	14 d, 8 hrs	NC	6	240	58	16	NC	9 d, 15 hrs	11 d, 21 hrs	NC	57	788	65	30	7	9 d, 3 hrs	9 d, 22 hrs	10 d, 5 hrs	168	3,658
	Mermaid Reef	4	NC	NC	35 d, 13 hrs	NC	NC	<1	27	NC	NC	NC	NC	NC	NC	<1	6	1	NC	NC	39 d, 19 hrs	NC	NC	<1	12
	Montebello	48	27	8	21 hrs	21 hrs	23 hrs	191	4,355	76	58	32	1 d, 0 hrs	1 d, 2 hrs	1 d, 4 hrs	1,071	8,915	92	77	46	23 hrs	1 d, 0 hrs	1 d, 1 hrs	1,483	9,532
EEZ	Indonesia	NC	NC	NC	NC	NC	NC	<1	2	3	NC	NC	44 d, 20 hrs	NC	NC	<1	20	NC	NC	NC	NC	NC	NC	<1	9
IPA	Nyangumarta Warrarn	3	NC	NC	42 d, 6 hrs	NC	NC	<1	27	NC	NC	NC	NC	NC	NC	<1	3	NC	NC	NC	NC	NC	NC	NC	NC
KEF	Ancient coastline at 125 m depth contour	66	27	3	5 d, 8 hrs	6 d, 4 hrs	9 d, 9 hrs	105	1,224	60	29	1	4 d, 22 hrs	5 d, 12 hrs	9 d, 9 hrs	95	1,909	75	44	10	4 d, 9 hrs	4 d, 14 hrs	4 d, 20 hrs	287	3,866
	Canyons linking the Argo Abyssal Plain with the Scott Plateau	NC	NC	NC	NC	NC	NC	<1	4	6	NC	NC	40 d, 2 hrs	NC	NC	2	24	NC	NC	NC	NC	NC	NC	<1	8
	Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	18	5	NC	11 d, 11 hrs	13 d, 5 hrs	NC	11	229	58	18	NC	8 d, 14 hrs	8 d, 21 hrs	NC	60	970	72	41	8	7 d, 0 hrs	7 d, 8 hrs	7 d, 12 hrs	261	4,147
	Commonwealth waters adjacent to Ningaloo Reef	9	3	NC	13 d, 9 hrs	19 d, 13 hrs	NC	7	294	51	17	1	10 d, 1 hrs	11 d, 4 hrs	19 d, 2 hrs	61	1,385	67	37	7	9 d, 1 hrs	9 d, 9 hrs	10 d, 3 hrs	194	4,293
	Continental Slope Demersal Fish Communities	43	6	NC	7 d, 14 hrs	7 d, 18 hrs	NC	20	422	58	24	1	5 d, 22 hrs	6 d, 5 hrs	10 d, 1 hrs	71	1,509	72	33	7	4 d, 21 hrs	5 d, 23 hrs	7 d, 13 hrs	164	4,293
	Exmouth Plateau	14	NC	NC	17 d, 21 hrs	NC	NC	4	96	32	2	NC	12 d, 5 hrs	20 d, 17 hrs	NC	11	165	43	7	NC	13 d, 20 hrs	14 d, 20 hrs	NC	26	937
	Glomar Shoals	72	40	9	2 d, 3 hrs	2 d, 14 hrs	3 d, 2 hrs	245	4,034	45	31	10	2 d, 11 hrs	3 d, 2 hrs	3 d, 11 hrs	289	3,284	28	18	8	1 d, 22 hrs	2 d, 3 hrs	2 d, 12 hrs	263	5,263
	Mermaid Reef and Commonwealth waters surrounding Rowley Shoals	8	NC	NC	26 d, 13 hrs	NC	NC	3	69	6	NC	NC	20 d, 8 hrs	NC	NC	2	61	6	NC	NC	29 d, 0 hrs	NC	NC	2	33
	Perth Canyon and adjacent shelf break, and other	NC	NC	NC	NC	NC	NC	<1	10	1	NC	NC	38 d, 4 hrs	NC	NC	<1	14	1	NC	NC	36 d, 23 hrs	NC	NC	<1	12

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	west coast canyons																							
	Wallaby Saddle	NC	NC	NC	NC	NC	NC	<1	9	NC	NC	NC	NC	NC	NC	<1	6	2	NC	NC	46 d, 0 hrs	NC	NC	<1	16
	Western demersal slope and associated fish communities	3	NC	NC	33 d, 0 hrs	NC	NC	<1	22	12	NC	NC	27 d, 15 hrs	NC	NC	3	51	7	NC	NC	26 d, 22 hrs	NC	NC	2	31
MMA	Muiron Islands	9	4	NC	14 d, 0 hrs	18 d, 11 hrs	NC	13	394	45	15	2	9 d, 16 hrs	10 d, 0 hrs	17 d, 7 hrs	64	1,060	70	37	3	8 d, 8 hrs	8 d, 11 hrs	8 d, 19 hrs	149	1,172
MP	Barrow Island	20	2	NC	4 d, 12 hrs	4 d, 23 hrs	NC	8	250	39	13	1	4 d, 19 hrs	5 d, 0 hrs	6 d, 10 hrs	57	1,137	60	27	5	3 d, 15 hrs	4 d, 1 hrs	4 d, 16 hrs	171	2,336
	Eighty Mile Beach	17	NC	NC	16 d, 20 hrs	NC	NC	4	55	3	NC	NC	27 d, 7 hrs	NC	NC	<1	19	NC	NC	NC	NC	NC	NC	<1	3
	Montebello Islands	25	8	2	2 d, 19 hrs	3 d, 6 hrs	5 d, 6 hrs	36	1,425	44	25	6	2 d, 16 hrs	2 d, 21 hrs	3 d, 6 hrs	184	2,393	82	49	17	2 d, 13 hrs	2 d, 20 hrs	2 d, 22 hrs	430	6,691
	Ningaloo	9	3	NC	13 d, 9 hrs	19 d, 13 hrs	NC	7	294	51	17	1	10 d, 1 hrs	11 d, 4 hrs	19 d, 2 hrs	61	1,426	67	37	7	9 d, 1 hrs	9 d, 9 hrs	10 d, 3 hrs	194	4,293
	Rowley Shoals	7	NC	NC	27 d, 8 hrs	NC	NC	3	69	6	NC	NC	22 d, 6 hrs	NC	NC	2	48	6	NC	NC	29 d, 0 hrs	NC	NC	2	30
	Shark Bay	3	NC	NC	30 d, 14 hrs	NC	NC	<1	31	21	NC	NC	24 d, 16 hrs	NC	NC	5	39	8	1	NC	23 d, 23 hrs	40 d, 13 hrs	NC	3	102
NR	Barrow Island	1	NC	NC	25 d, 7 hrs	NC	NC	<1	29	4	1	NC	8 d, 0 hrs	8 d, 15 hrs	NC	5	318	14	3	NC	10 d, 12 hrs	12 d, 14 hrs	NC	10	242
	Great Sandy Island	3	NC	NC	10 d, 13 hrs	NC	NC	2	80	6	NC	NC	13 d, 15 hrs	NC	NC	3	59	10	4	NC	11 d, 7 hrs	12 d, 4 hrs	NC	9	338
	Lowendal Islands	8	1	NC	4 d, 22 hrs	22 d, 14 hrs	NC	6	150	10	1	1	5 d, 2 hrs	5 d, 12 hrs	6 d, 5 hrs	19	1,509	30	6	NC	4 d, 23 hrs	6 d, 22 hrs	NC	30	847
	Thevenard Island	4	NC	NC	23 d, 23 hrs	NC	NC	<1	25	9	1	NC	8 d, 11 hrs	9 d, 1 hrs	NC	5	194	27	3	NC	7 d, 7 hrs	7 d, 22 hrs	NC	13	152
RAMSAR	Eighty-mile Beach	3	NC	NC	36 d, 12 hrs	NC	NC	<1	30	NC	NC	NC	NC	NC	NC	<1	3	NC	NC	NC	NC	NC	NC	NC	NC
RSB	Ashworth Shoal	1	NC	NC	24 d, 5 hrs	NC	NC	<1	21	NC	NC	NC	NC	NC	NC	<1	3	1	NC	NC	18 d, 20 hrs	NC	NC	<1	12
	Australind Shoal	NC	NC	NC	NC	NC	NC	<1	9	4	NC	NC	9 d, 15 hrs	NC	NC	2	43	4	NC	NC	7 d, 20 hrs	NC	NC	3	60
	Barrow Island Reefs and Shoals	3	NC	NC	10 d, 11 hrs	NC	NC	2	88	7	NC	NC	13 d, 14 hrs	NC	NC	3	62	11	4	NC	10 d, 17 hrs	12 d, 8 hrs	NC	10	280
	Baylis Patches	NC	NC	NC	NC	NC	NC	<1	9	2	NC	NC	38 d, 14 hrs	NC	NC	<1	16	3	NC	NC	12 d, 15 hrs	NC	NC	2	40
	Bennett Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	<1	3	2	NC	NC	30 d, 14 hrs	NC	NC	2	39
	Beryl Reef	NC	NC	NC	NC	NC	NC	<1	8	4	NC	NC	25 d, 7 hrs	NC	NC	2	39	13	NC	NC	11 d, 10 hrs	NC	NC	4	22
	Brewis Reef	4	NC	NC	23 d, 22 hrs	NC	NC	<1	32	10	1	NC	8 d, 11 hrs	8 d, 13 hrs	NC	6	182	28	3	NC	7 d, 6 hrs	7 d, 8 hrs	NC	13	197
	Camplin Shoal	NC	NC	NC	NC	NC	NC	<1	<1	NC	NC	NC	NC	NC	NC	<1	2	2	NC	NC	29 d, 12 hrs	NC	NC	2	56
	Clerke Reef	3	NC	NC	32 d, 14 hrs	NC	NC	<1	43	NC	NC	NC	NC	NC	NC	<1	6	1	NC	NC	29 d, 4 hrs	NC	NC	<1	19
	Cod Bank	7	NC	NC	9 d, 19 hrs	NC	NC	3	66	2	NC	NC	26 d, 14 hrs	NC	NC	<1	36	2	NC	NC	44 d, 19 hrs	NC	NC	<1	15
	Combe Reef	2	NC	NC	25 d, 10 hrs	NC	NC	<1	30	16	2	NC	17 d, 18 hrs	25 d, 23 hrs	NC	9	141	33	3	NC	9 d, 20 hrs	13 d, 1 hrs	NC	16	173
	Cooper Shoal	NC	NC	NC	NC	NC	NC	<1	<1	NC	NC	NC	NC	NC	NC	<1	2	2	NC	NC	29 d, 2 hrs	NC	NC	2	64
	Courtenay Shoal	10	NC	NC	5 d, 3 hrs	NC	NC	5	54	3	1	NC	19 d, 7 hrs	22 d, 22 hrs	NC	2	115	NC	NC	NC	NC	NC	NC	<1	4
	Dailey Shoal	7	1	NC	16 d, 15 hrs	29 d, 12 hrs	NC	6	170	35	8	NC	11 d, 20 hrs	12 d, 5 hrs	NC	27	378	57	19	NC	8 d, 18 hrs	8 d, 19 hrs	NC	60	520
	Dockrell Reef	2	NC	NC	28 d, 4 hrs	NC	NC	<1	23	1	NC	NC	30 d, 0 hrs	NC	NC	<1	18	NC	NC	NC	NC	NC	NC	NC	NC
	Eliassen Rocks	1	NC	NC	23 d, 7 hrs	NC	NC	<1	27	NC	NC	NC	NC	NC	NC	<1	5	NC	NC	NC	NC	NC	NC	<1	8
	Exmouth Reef	1	NC	NC	43 d, 13 hrs	NC	NC	<1	11	7	NC	NC	19 d, 6 hrs	NC	NC	3	45	23	NC	NC	10 d, 22 hrs	NC	NC	7	62
	Fairway Reef	4	NC	NC	27 d, 13 hrs	NC	NC	<1	31	17	NC	NC	15 d, 14 hrs	NC	NC	7	56	39	2	NC	8 d, 21 hrs	11 d, 0 hrs	NC	16	290

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Flinders Shoal	1	NC	NC	25 d, 0 hrs	NC	NC	<1	18	2	NC	NC	28 d, 7 hrs	NC	NC	<1	22	5	NC	NC	17 d, 1 hrs	NC	NC	2	23
Fortescue Reef	1	NC	NC	23 d, 5 hrs	NC	NC	<1	38	NC	NC	NC	NC	NC	NC	<1	5	1	1	NC	10 d, 15 hrs	11 d, 15 hrs	NC	2	177
Glennie Patches	1	NC	NC	49 d, 18 hrs	NC	NC	<1	12	2	NC	NC	30 d, 12 hrs	NC	NC	<1	29	4	NC	NC	12 d, 21 hrs	NC	NC	2	77
Glomar Shoal	65	31	4	5 d, 2 hrs	5 d, 4 hrs	8 d, 1 hrs	115	1,788	33	19	1	4 d, 7 hrs	5 d, 11 hrs	5 d, 22 hrs	70	1,593	23	9	NC	3 d, 20 hrs	4 d, 3 hrs	NC	39	652
Gorgon Patch	NC	NC	NC	NC	NC	NC	<1	6	NC	NC	NC	NC	NC	NC	<1	5	1	NC	NC	16 d, 4 hrs	NC	NC	2	82
Hammersley Shoal	13	6	NC	5 d, 1 hrs	5 d, 23 hrs	NC	14	296	3	NC	NC	16 d, 4 hrs	NC	NC	2	96	NC	NC	NC	NC	NC	NC	<1	8
Hastings Shoal	NC	NC	NC	NC	NC	NC	<1	7	NC	NC	NC	NC	NC	NC	<1	4	1	NC	NC	16 d, 5 hrs	NC	NC	<1	56
Hayman Rock	NC	NC	NC	NC	NC	NC	<1	9	3	NC	NC	29 d, 18 hrs	NC	NC	2	17	7	NC	NC	12 d, 14 hrs	NC	NC	4	63
Herald Reef	NC	NC	NC	NC	NC	NC	<1	5	NC	NC	NC	NC	NC	NC	<1	6	1	NC	NC	16 d, 10 hrs	NC	NC	2	86
Hood Reef	6	NC	NC	20 d, 6 hrs	NC	NC	3	82	25	5	NC	11 d, 18 hrs	15 d, 15 hrs	NC	14	122	50	5	NC	8 d, 19 hrs	10 d, 19 hrs	NC	27	393
Imperieuse Reef	7	NC	NC	27 d, 9 hrs	NC	NC	3	69	6	NC	NC	22 d, 13 hrs	NC	NC	2	42	4	NC	NC	29 d, 0 hrs	NC	NC	2	30
Inner Northwest Patch	NC	NC	NC	NC	NC	NC	<1	9	1	NC	NC	30 d, 12 hrs	NC	NC	<1	19	3	NC	NC	12 d, 21 hrs	NC	NC	2	65
Koolinda Patch	NC	NC	NC	NC	NC	NC	<1	5	NC	NC	NC	NC	NC	NC	<1	3	2	NC	NC	16 d, 4 hrs	NC	NC	2	85
Lightfoot Reef	1	NC	NC	25 d, 1 hrs	NC	NC	<1	18	1	NC	NC	48 d, 23 hrs	NC	NC	<1	21	2	NC	NC	37 d, 2 hrs	NC	NC	<1	18
Little Shoals	NC	NC	NC	NC	NC	NC	<1	9	NC	NC	NC	NC	NC	NC	<1	9	1	1	NC	16 d, 4 hrs	16 d, 15 hrs	NC	2	111
Locker Reef	NC	NC	NC	NC	NC	NC	<1	8	3	NC	NC	29 d, 18 hrs	NC	NC	2	20	8	NC	NC	12 d, 15 hrs	NC	NC	4	80
Madeleine Shoals	19	6	NC	5 d, 2 hrs	5 d, 4 hrs	NC	17	416	6	2	NC	8 d, 4 hrs	11 d, 5 hrs	NC	5	171	8	NC	NC	11 d, 15 hrs	NC	NC	2	30
Manicom Bank	NC	NC	NC	NC	NC	NC	<1	5	NC	NC	NC	NC	NC	NC	<1	7	1	NC	NC	16 d, 11 hrs	NC	NC	<1	25
Mardie Rock	1	NC	NC	24 d, 7 hrs	NC	NC	<1	23	NC	NC	NC	NC	NC	NC	<1	3	1	NC	NC	17 d, 9 hrs	NC	NC	<1	14
McLennan Bank	5	NC	NC	10 d, 7 hrs	NC	NC	3	99	2	NC	NC	31 d, 12 hrs	NC	NC	<1	38	3	1	NC	5 d, 23 hrs	7 d, 11 hrs	NC	3	143
Meda Reef	2	NC	NC	23 d, 7 hrs	NC	NC	<1	66	2	NC	NC	41 d, 15 hrs	NC	NC	<1	21	1	NC	NC	17 d, 21 hrs	NC	NC	<1	29
Mermaid Reef	2	NC	NC	35 d, 13 hrs	NC	NC	<1	24	NC	NC	NC	NC	NC	NC	<1	5	NC	NC	NC	NC	NC	NC	<1	8
Miles Shoal	NC	NC	NC	NC	NC	NC	<1	7	2	NC	NC	31 d, 11 hrs	NC	NC	<1	24	3	NC	NC	16 d, 9 hrs	NC	NC	2	35
Montebello Shoals	19	3	NC	4 d, 4 hrs	6 d, 5 hrs	NC	16	389	30	15	1	4 d, 0 hrs	4 d, 5 hrs	8 d, 10 hrs	66	1,035	62	34	7	3 d, 4 hrs	3 d, 10 hrs	3 d, 20 hrs	230	2,433
Moresby Shoals	NC	NC	NC	NC	NC	NC	<1	7	NC	NC	NC	NC	NC	NC	<1	7	1	1	NC	16 d, 10 hrs	17 d, 2 hrs	NC	2	105
Nares Rock	NC	NC	NC	NC	NC	NC	<1	6	NC	NC	NC	NC	NC	NC	<1	7	1	NC	NC	16 d, 13 hrs	NC	NC	<1	34
Ningaloo Reef	5	NC	NC	16 d, 23 hrs	NC	NC	2	74	32	6	1	13 d, 10 hrs	16 d, 21 hrs	21 d, 3 hrs	31	1,165	44	10	NC	10 d, 16 hrs	12 d, 3 hrs	NC	34	459
North West Reef	6	NC	NC	8 d, 18 hrs	NC	NC	3	82	25	3	NC	13 d, 6 hrs	24 d, 6 hrs	NC	14	164	40	4	NC	10 d, 1 hrs	11 d, 11 hrs	NC	22	240
O'Grady Shoal	2	NC	NC	22 d, 4 hrs	NC	NC	<1	57	NC	NC	NC	NC	NC	NC	<1	7	2	1	NC	15 d, 5 hrs	17 d, 20 hrs	NC	2	140
Otway Reef	2	NC	NC	25 d, 4 hrs	NC	NC	2	39	23	3	NC	12 d, 19 hrs	26 d, 0 hrs	NC	14	235	47	6	NC	8 d, 22 hrs	11 d, 11 hrs	NC	29	334
Outtrim Patches	8	3	NC	15 d, 1 hrs	19 d, 5 hrs	NC	11	347	41	11	NC	10 d, 16 hrs	10 d, 19 hrs	NC	49	658	64	28	NC	8 d, 12 hrs	8 d, 18 hrs	NC	115	752
Paroo Shoal	NC	NC	NC	NC	NC	NC	<1	6	1	NC	NC	32 d, 12 hrs	NC	NC	<1	14	3	NC	NC	16 d, 10 hrs	NC	NC	<1	22
Pearl Reef	NC	NC	NC	NC	NC	NC	<1	6	3	NC	NC	39 d, 23 hrs	NC	NC	2	32	8	NC	NC	11 d, 11 hrs	NC	NC	3	21
Penguin Bank	10	2	NC	16 d, 13 hrs	18 d, 14 hrs	NC	7	213	33	11	NC	5 d, 20 hrs	5 d, 22 hrs	NC	43	741	65	26	3	6 d, 5 hrs	6 d, 5 hrs	7 d, 5 hrs	118	1,798
Poivre Reef	8	1	NC	16 d, 10 hrs	24 d, 18 hrs	NC	4	120	22	6	NC	5 d, 22 hrs	9 d, 16 hrs	NC	19	525	40	14	2	5 d, 18 hrs	5 d, 19 hrs	6 d, 21 hrs	77	1,271

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	Rankin Bank	39	6	NC	7 d, 7 hrs	11 d, 15 hrs	NC	25	299	46	22	NC	6 d, 18 hrs	9 d, 23 hrs	NC	50	380	48	20	1	6 d, 20 hrs	7 d, 5 hrs	17 d, 6 hrs	60	1,061
	Ripple Shoals	3	NC	NC	25 d, 12 hrs	NC	NC	2	41	8	NC	NC	9 d, 14 hrs	NC	NC	3	63	14	4	NC	10 d, 22 hrs	13 d, 14 hrs	NC	11	201
	Roller Shoal	NC	NC	NC	NC	NC	NC	<1	6	NC	NC	NC	NC	NC	NC	<1	5	1	NC	NC	16 d, 12 hrs	NC	NC	<1	23
	Rosily Shoals	6	1	NC	18 d, 23 hrs	34 d, 6 hrs	NC	5	115	30	8	NC	6 d, 20 hrs	7 d, 9 hrs	NC	28	436	57	20	NC	6 d, 10 hrs	6 d, 17 hrs	NC	66	726
	Saladin Shoal	NC	NC	NC	NC	NC	NC	<1	6	NC	NC	NC	NC	NC	NC	<1	5	1	NC	NC	16 d, 6 hrs	NC	NC	<1	22
	Santo Rock	1	NC	NC	49 d, 5 hrs	NC	NC	<1	33	6	NC	NC	21 d, 19 hrs	NC	NC	3	54	12	2	NC	13 d, 2 hrs	13 d, 23 hrs	NC	6	158
	South East Reef	3	NC	NC	27 d, 17 hrs	NC	NC	<1	29	1	NC	NC	29 d, 23 hrs	NC	NC	<1	15	NC	NC	NC	NC	NC	NC	<1	<1
	South West Reef	4	NC	NC	16 d, 19 hrs	NC	NC	2	29	NC	NC	NC	NC	NC	NC	<1	10	NC	NC	NC	NC	NC	NC	<1	<1
	Southwest Patch	NC	NC	NC	NC	NC	NC	<1	5	NC	NC	NC	NC	NC	NC	<1	4	1	NC	NC	16 d, 11 hrs	NC	NC	<1	20
	Spider Reef	1	NC	NC	30 d, 12 hrs	NC	NC	<1	20	9	NC	NC	16 d, 3 hrs	NC	NC	3	35	24	1	NC	10 d, 23 hrs	12 d, 23 hrs	NC	8	128
	Stewart Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	<1	2	1	NC	NC	39 d, 10 hrs	NC	NC	<1	27
	Sultan Reef	1	NC	NC	39 d, 9 hrs	NC	NC	<1	13	4	NC	NC	8 d, 14 hrs	NC	NC	3	98	9	NC	NC	7 d, 20 hrs	NC	NC	5	99
	Taunton Reef	2	NC	NC	28 d, 8 hrs	NC	NC	<1	20	6	NC	NC	9 d, 2 hrs	NC	NC	2	37	13	1	NC	8 d, 10 hrs	16 d, 9 hrs	NC	8	240
	Tongue Shoals	1	NC	NC	49 d, 17 hrs	NC	NC	<1	15	2	NC	NC	30 d, 11 hrs	NC	NC	<1	32	5	NC	NC	12 d, 21 hrs	NC	NC	2	71
	Trap Reef	4	NC	NC	23 d, 21 hrs	NC	NC	2	32	16	1	NC	8 d, 1 hrs	8 d, 12 hrs	NC	6	137	36	4	NC	6 d, 20 hrs	7 d, 8 hrs	NC	20	221
	Tryal Rocks	29	7	NC	6 d, 8 hrs	6 d, 11 hrs	NC	36	866	59	33	6	2 d, 11 hrs	2 d, 15 hrs	2 d, 21 hrs	202	2,896	90	60	17	2 d, 2 hrs	2 d, 4 hrs	2 d, 8 hrs	486	2,841
	Wapet Shoal	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	<1	<1	1	NC	NC	45 d, 15 hrs	NC	NC	<1	16
	Ward Reef	NC	NC	NC	NC	NC	NC	<1	5	NC	NC	NC	NC	NC	NC	<1	2	1	NC	NC	16 d, 5 hrs	NC	NC	<1	27
	Web Reef	1	NC	NC	32 d, 2 hrs	NC	NC	<1	14	5	NC	NC	22 d, 21 hrs	NC	NC	3	34	20	1	NC	11 d, 11 hrs	14 d, 0 hrs	NC	8	103
	Weeks Shoal	NC	NC	NC	NC	NC	NC	<1	6	NC	NC	NC	NC	NC	NC	<1	7	2	NC	NC	16 d, 4 hrs	NC	NC	2	88
	West Reef	NC	NC	NC	NC	NC	NC	<1	8	NC	NC	NC	NC	NC	NC	<1	9	1	NC	NC	16 d, 13 hrs	NC	NC	<1	18
State Waters	Western Australia	25	10	5	1 d, 1 hrs	1 d, 2 hrs	1 d, 4 hrs	124	5,645	45	25	7	1 d, 18 hrs	1 d, 19 hrs	2 d, 5 hrs	184	4,100	82	49	18	2 d, 1 hrs	2 d, 2 hrs	2 d, 3 hrs	499	6,691

NC: No contact to receptor predicted for specified threshold.

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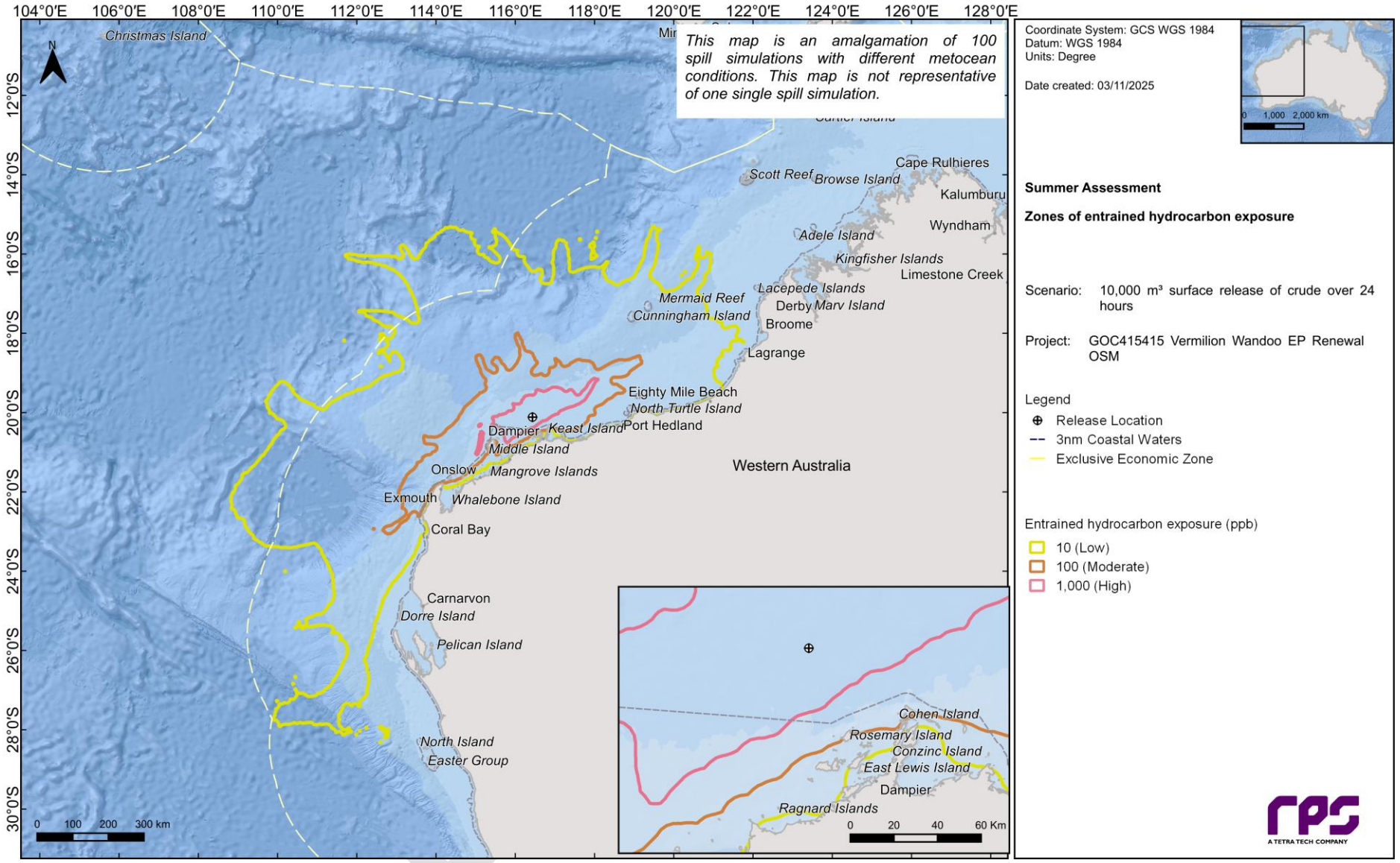


Figure 14.58 Predicted zones of entrained hydrocarbon exposure following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

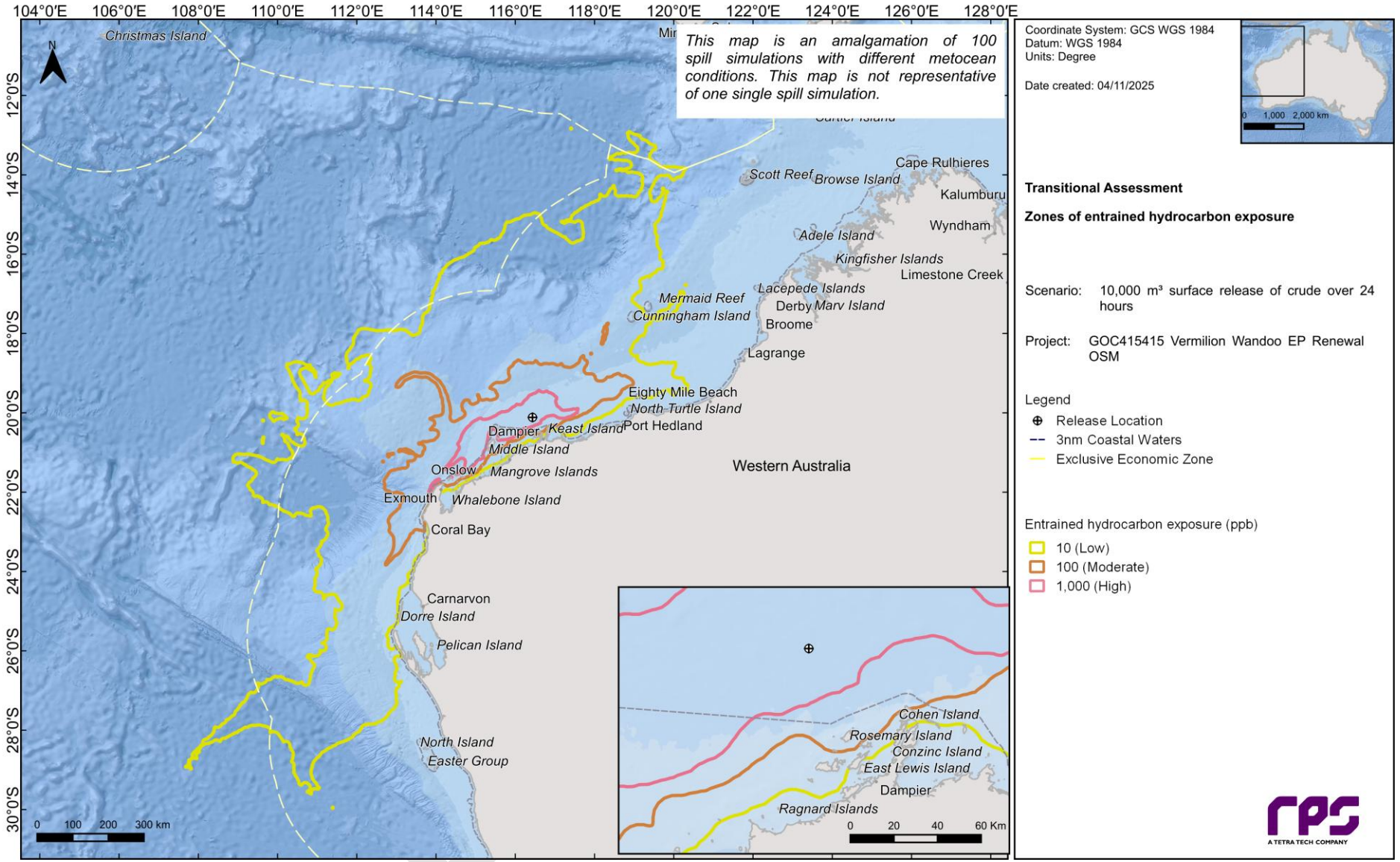


Figure 14.59 Predicted zones of entrained hydrocarbon exposure following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

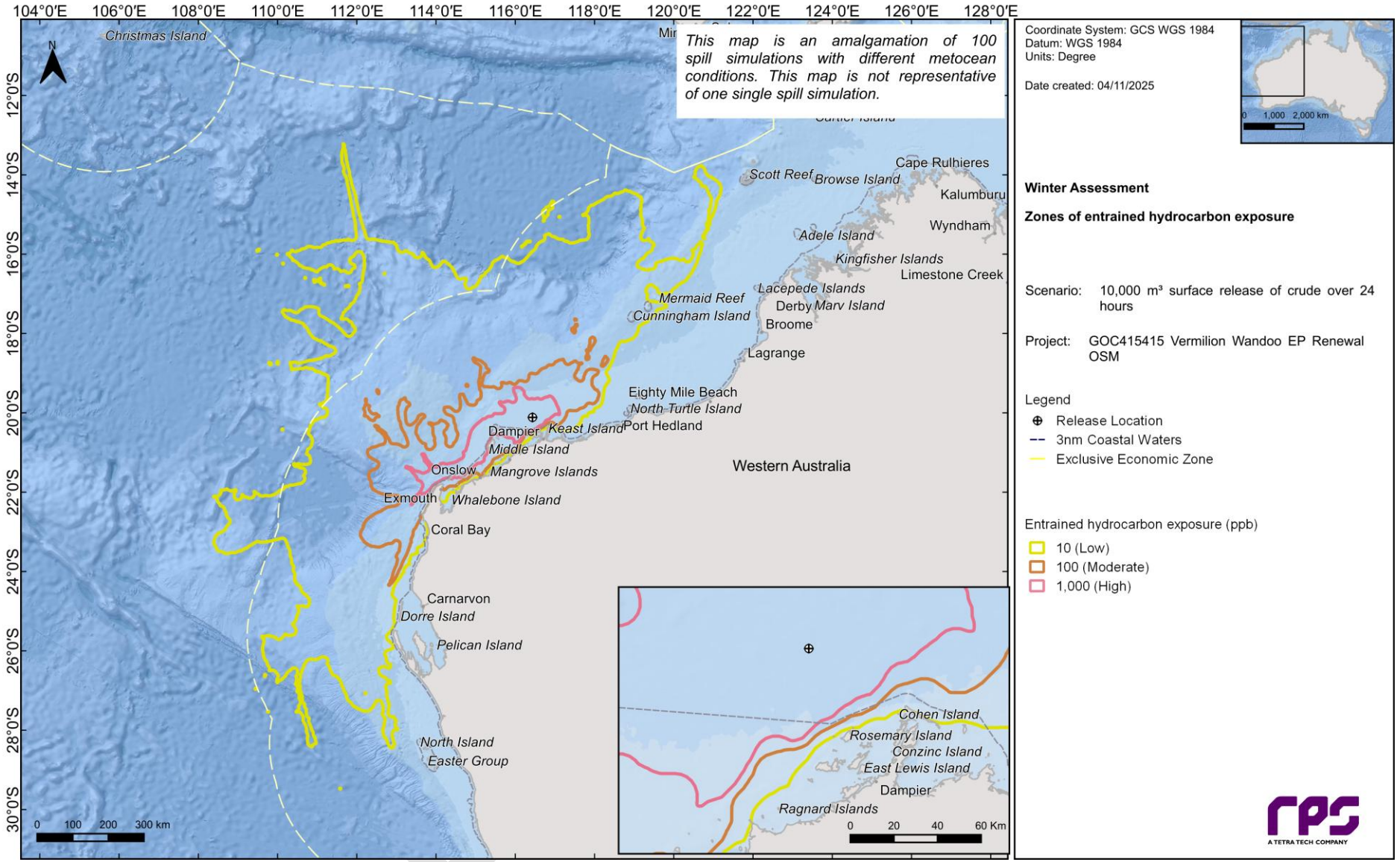


Figure 14.60 Predicted zones of entrained hydrocarbon exposure following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

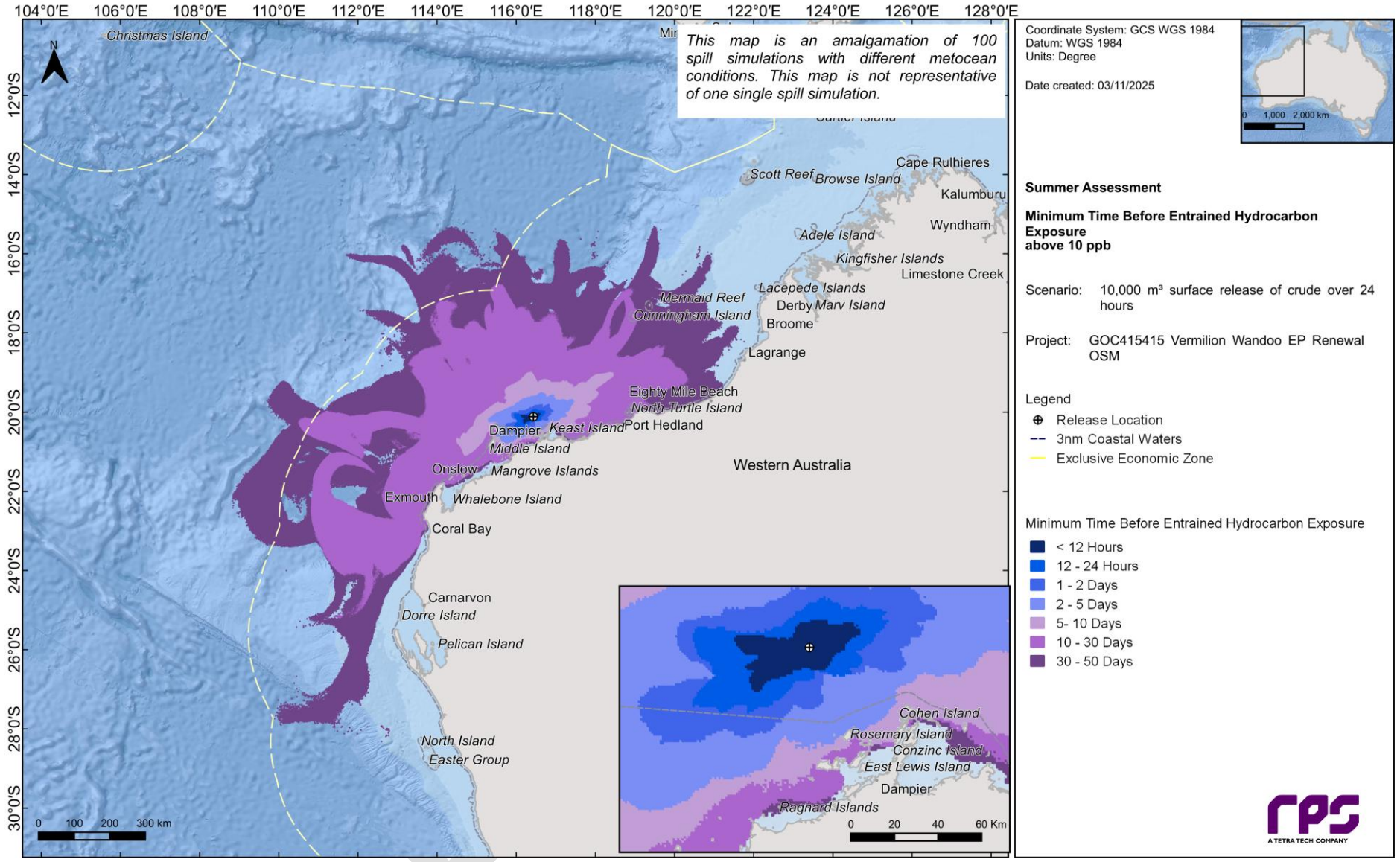


Figure 14.61 Minimum time before entrained hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

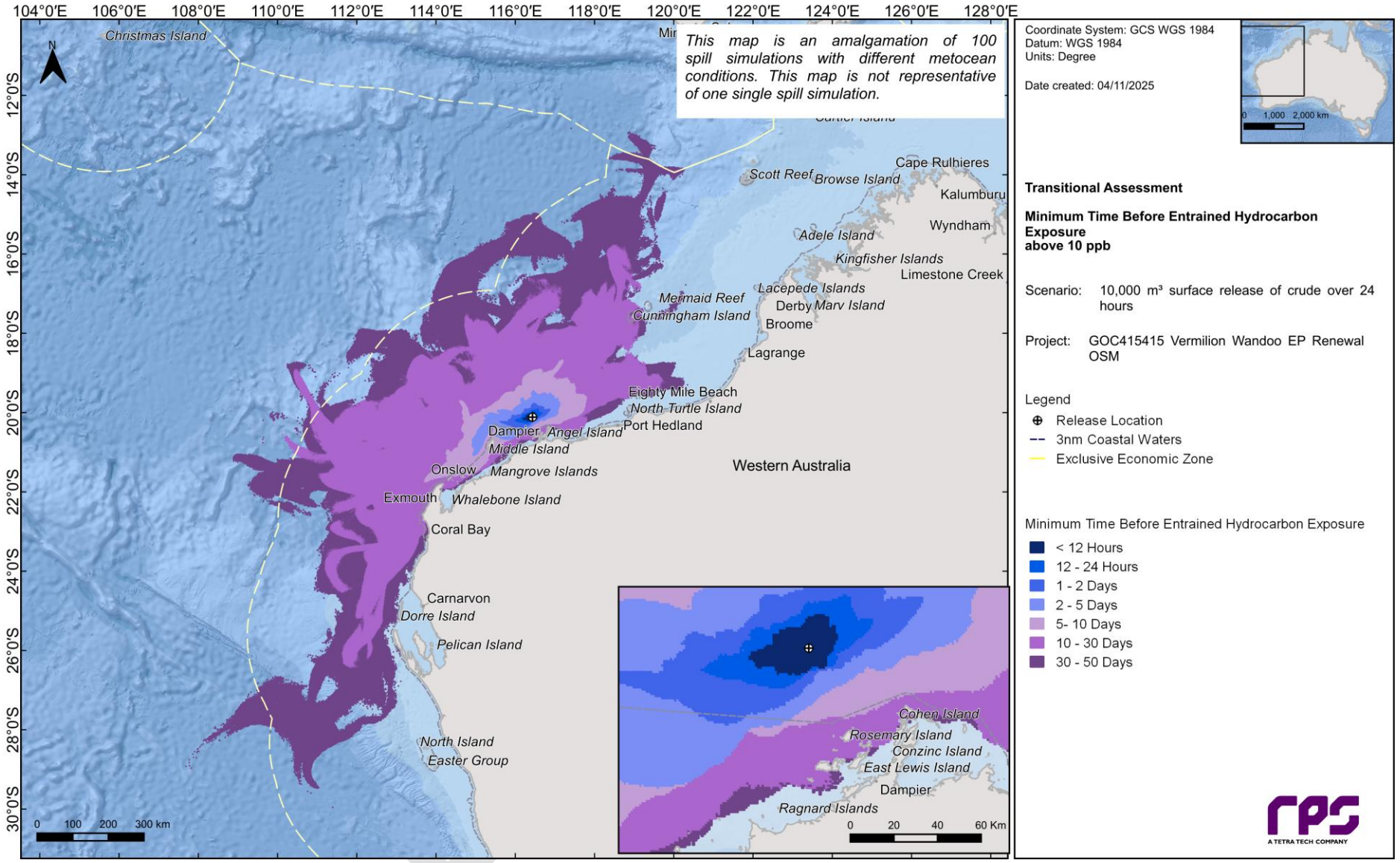


Figure 14.62 Minimum time before entrained hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

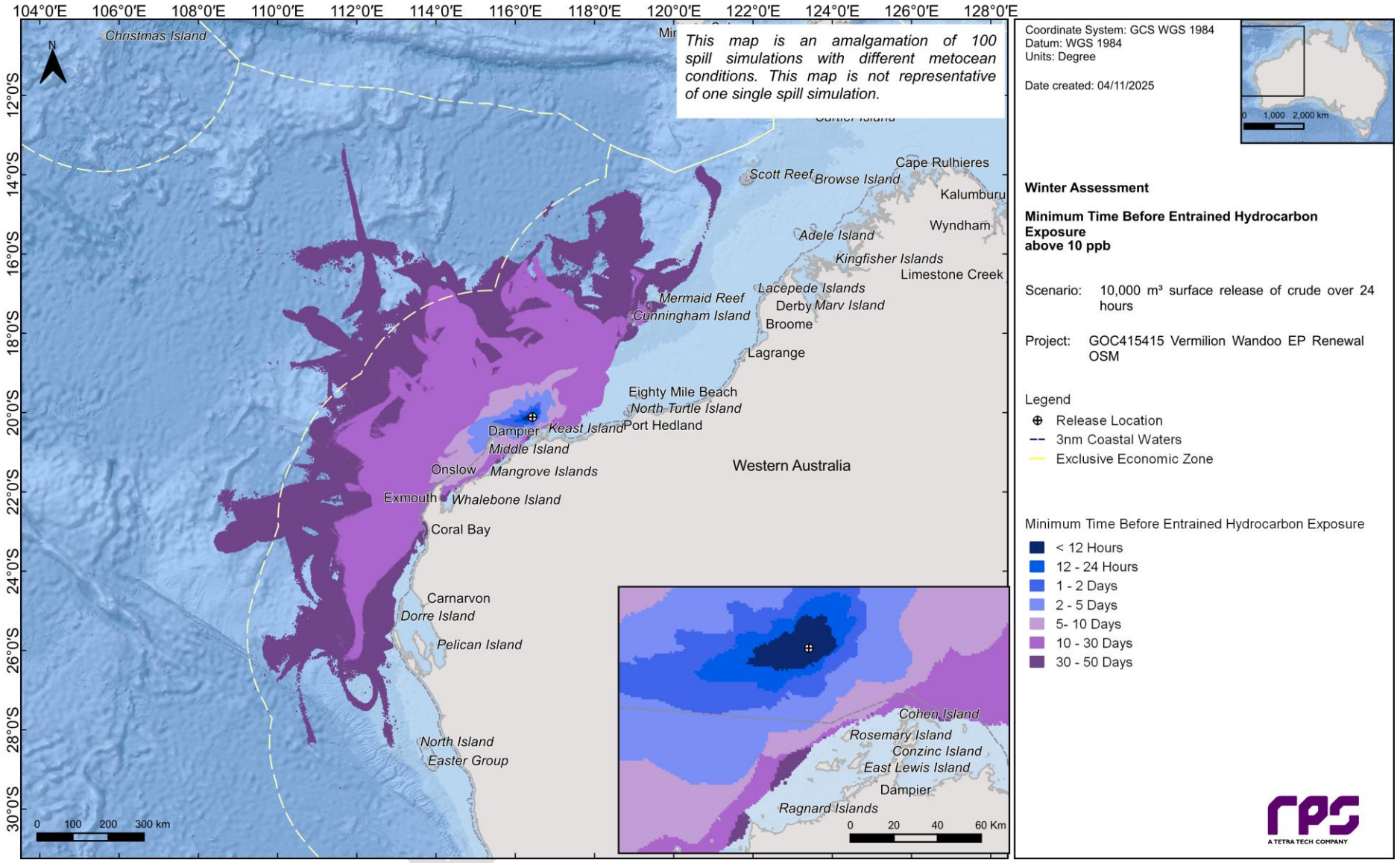


Figure 14.63 Minimum time before entrained hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

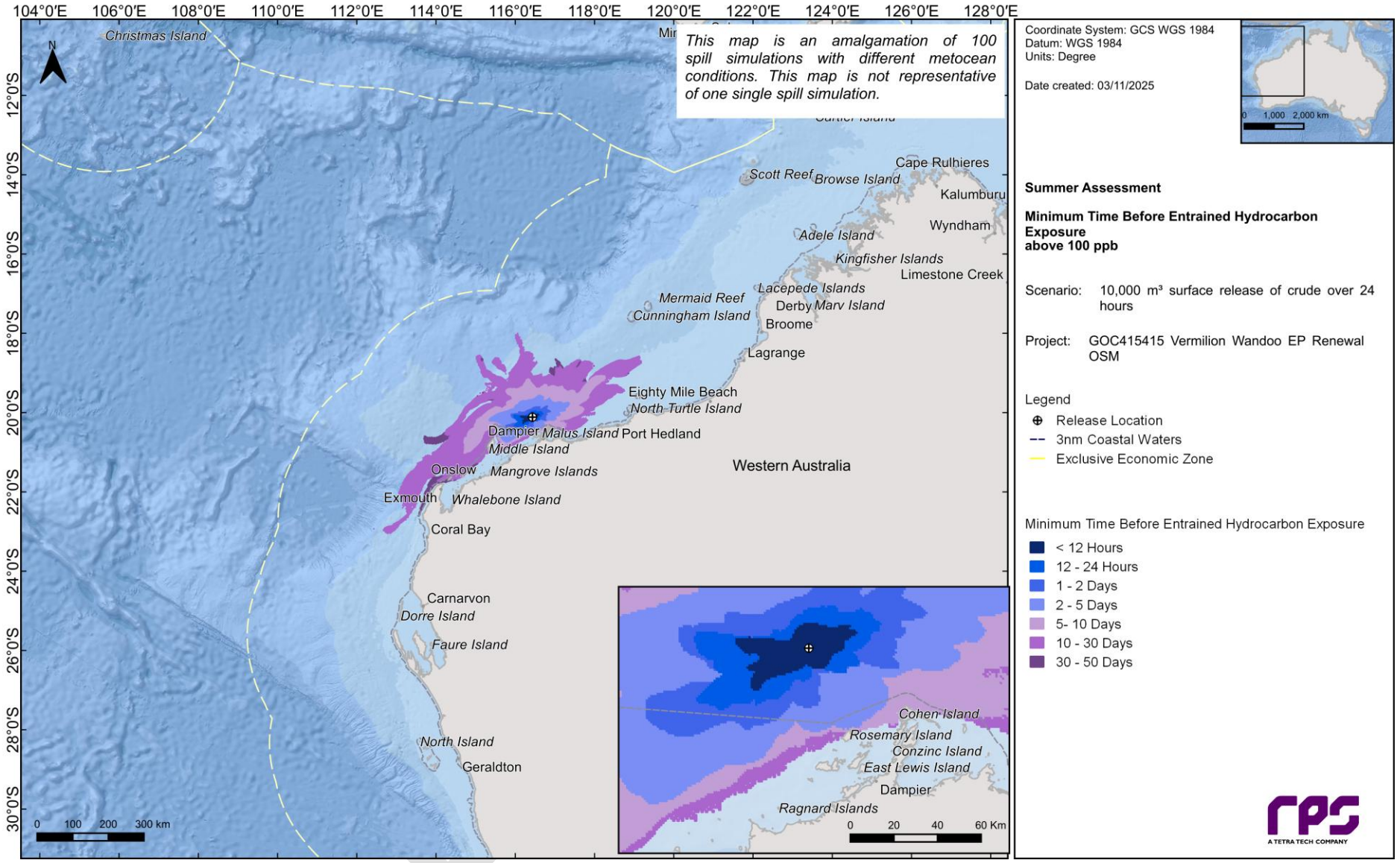


Figure 14.64 Minimum time before entrained hydrocarbon exposure at, or above, 100 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

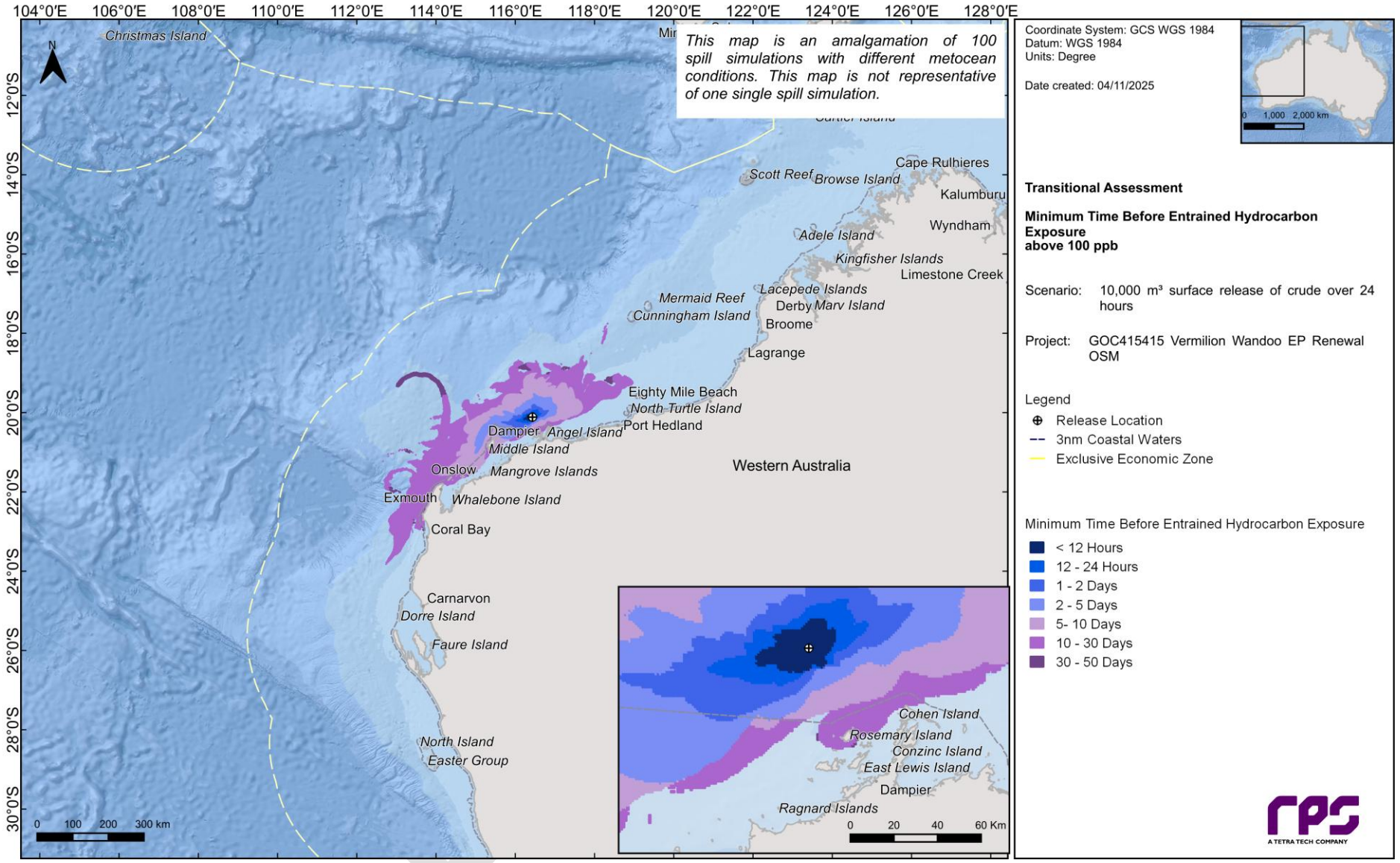


Figure 14.65 Minimum time before entrained hydrocarbon exposure at, or above, 100 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

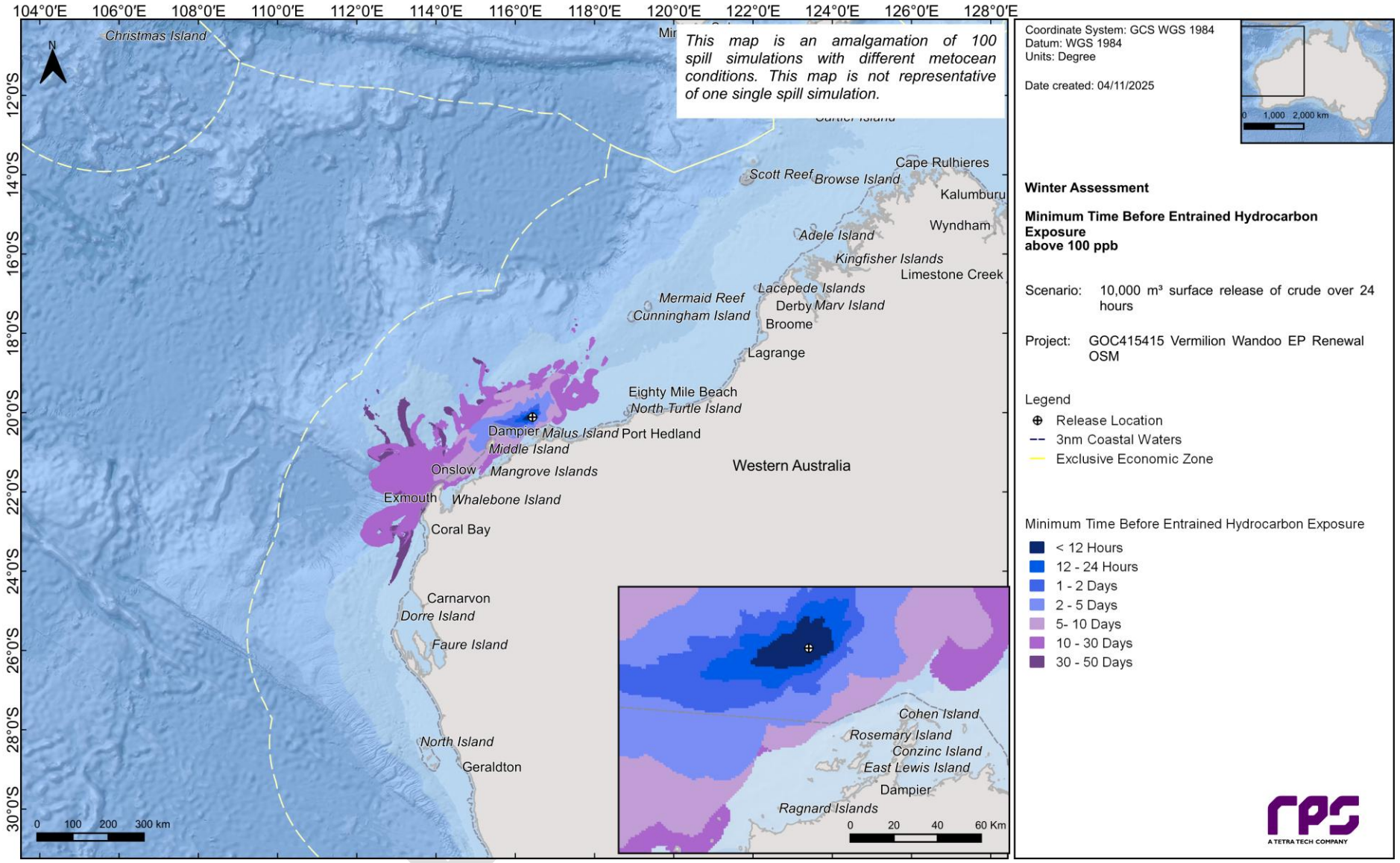


Figure 14.66 Minimum time before entrained hydrocarbon exposure at, or above, 100 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

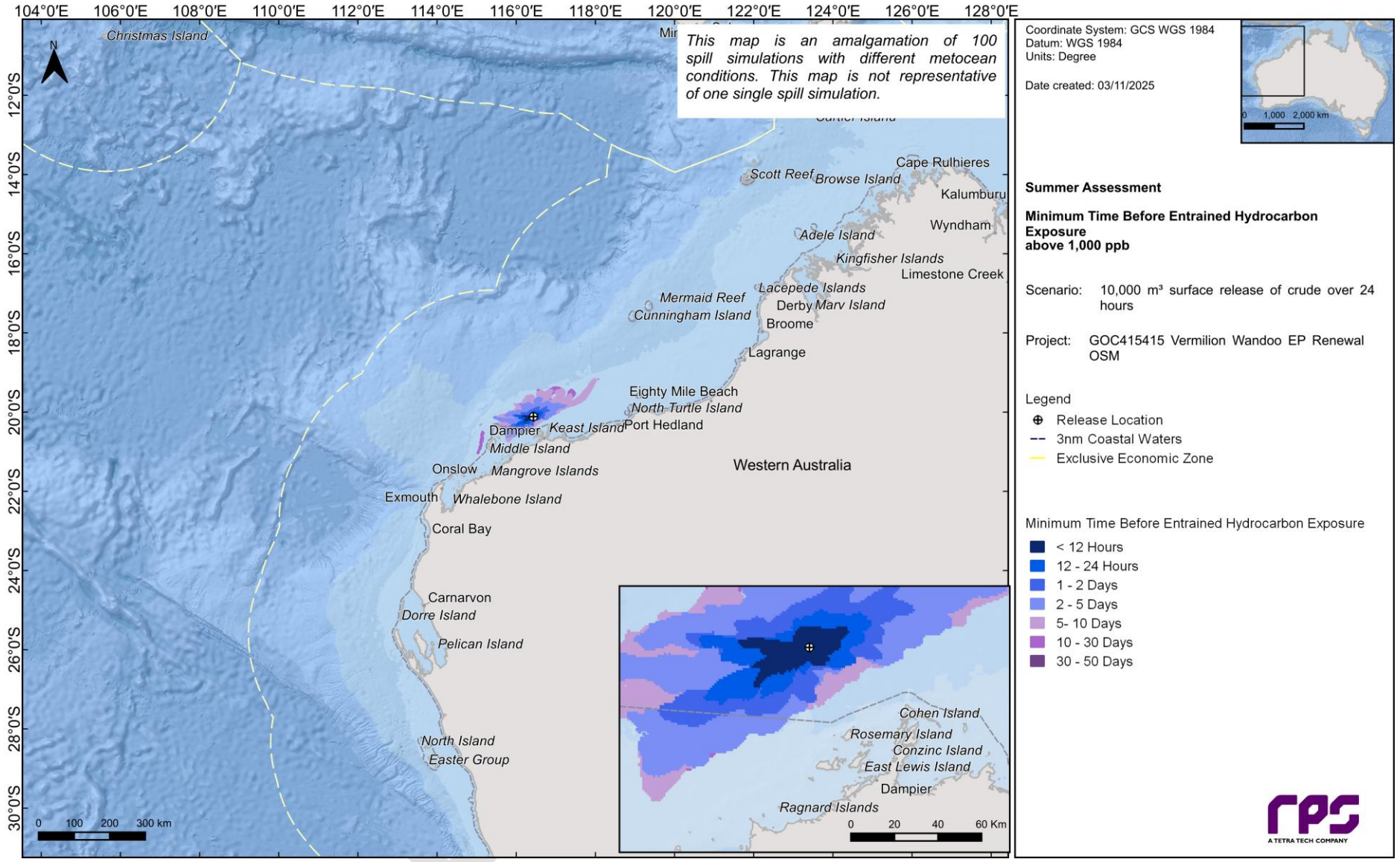


Figure 14.67 Minimum time before entrained hydrocarbon exposure at, or above, 1,000 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

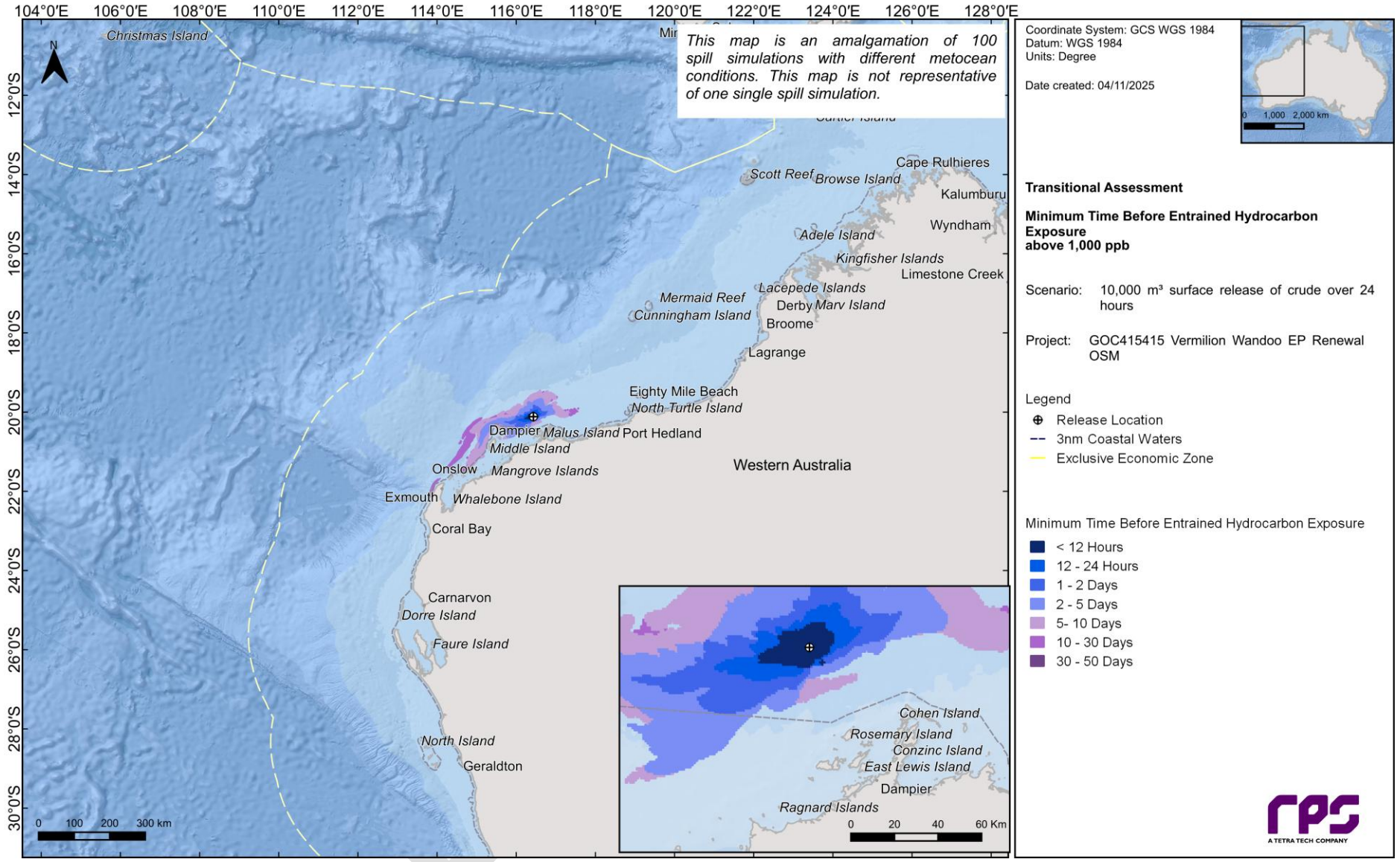


Figure 14.68 Minimum time before entrained hydrocarbon exposure at, or above, 1,000 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

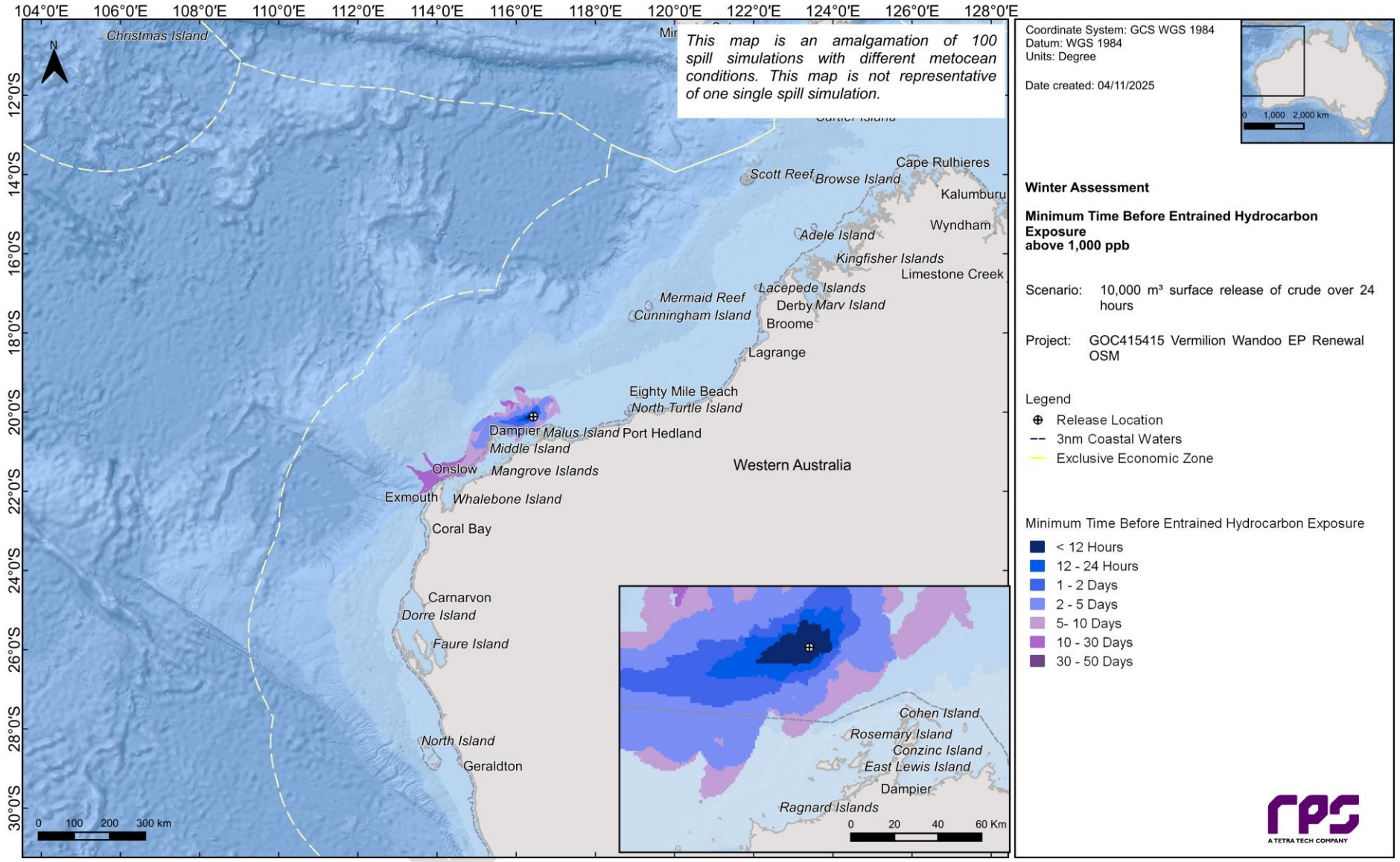


Figure 14.69 Minimum time before entrained hydrocarbon exposure at, or above, 1,000 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

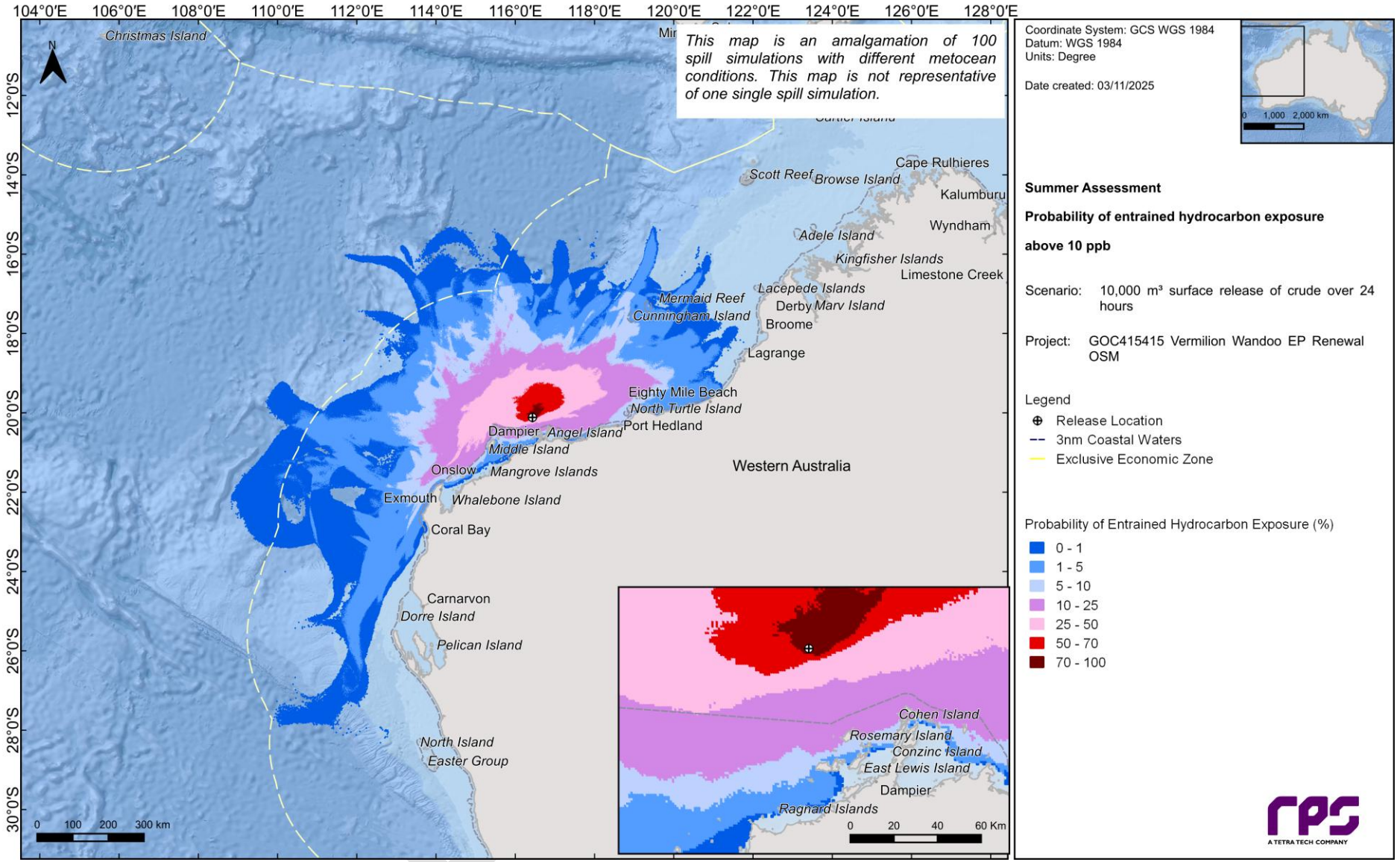


Figure 14.70 Probability of entrained hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

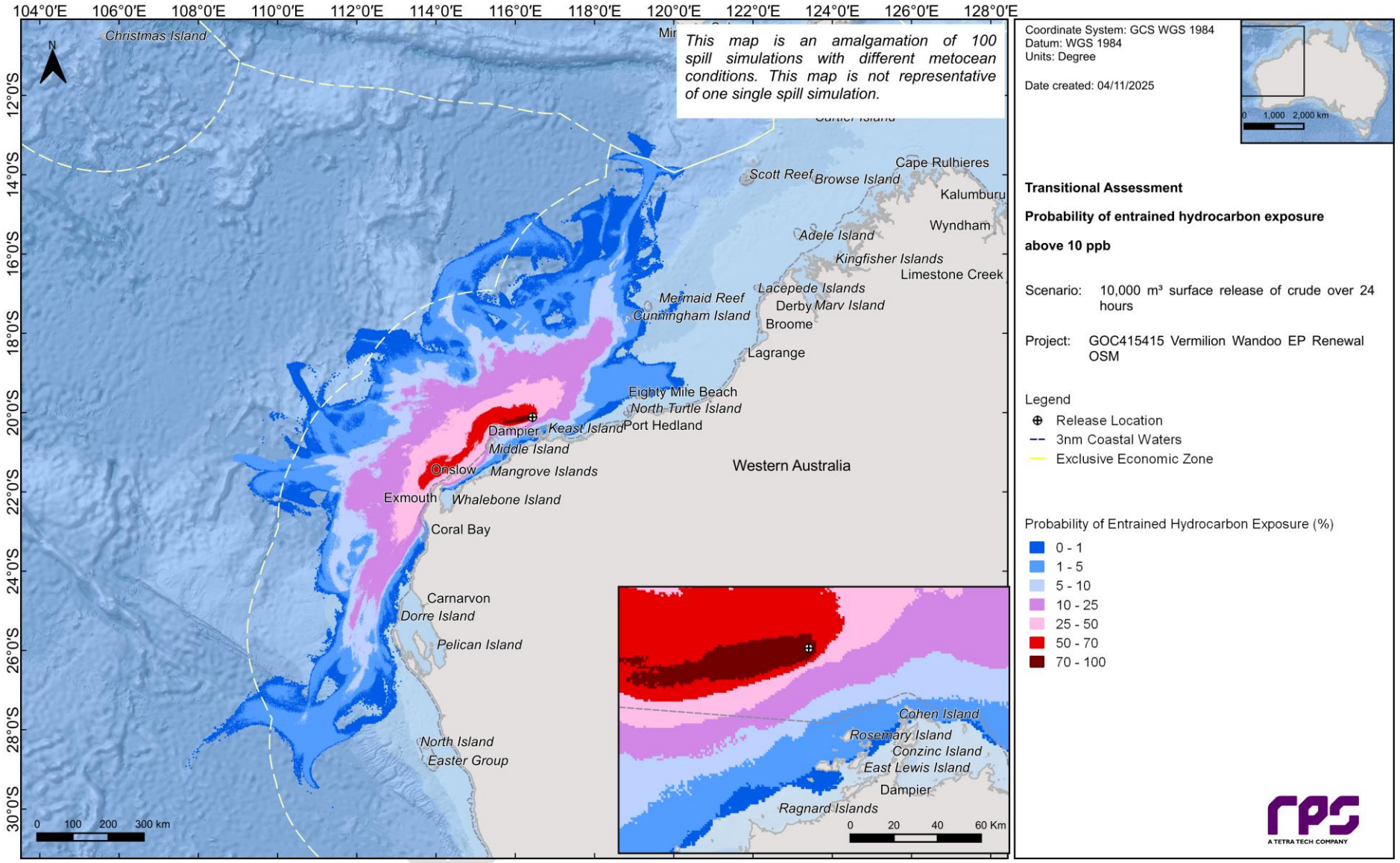


Figure 14.71 Probability of entrained hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

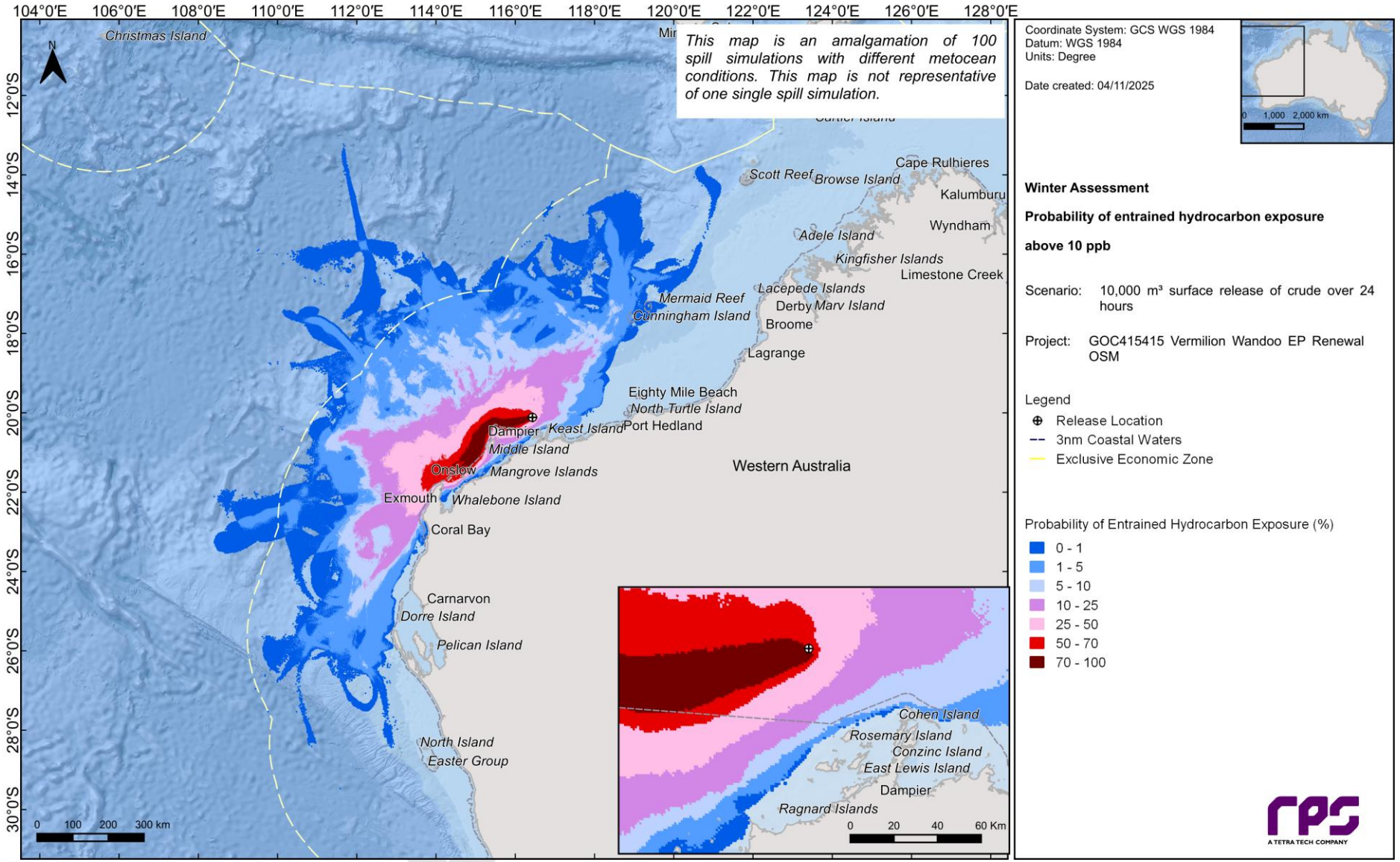


Figure 14.72 Probability of entrained hydrocarbon exposure at, or above, 10 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

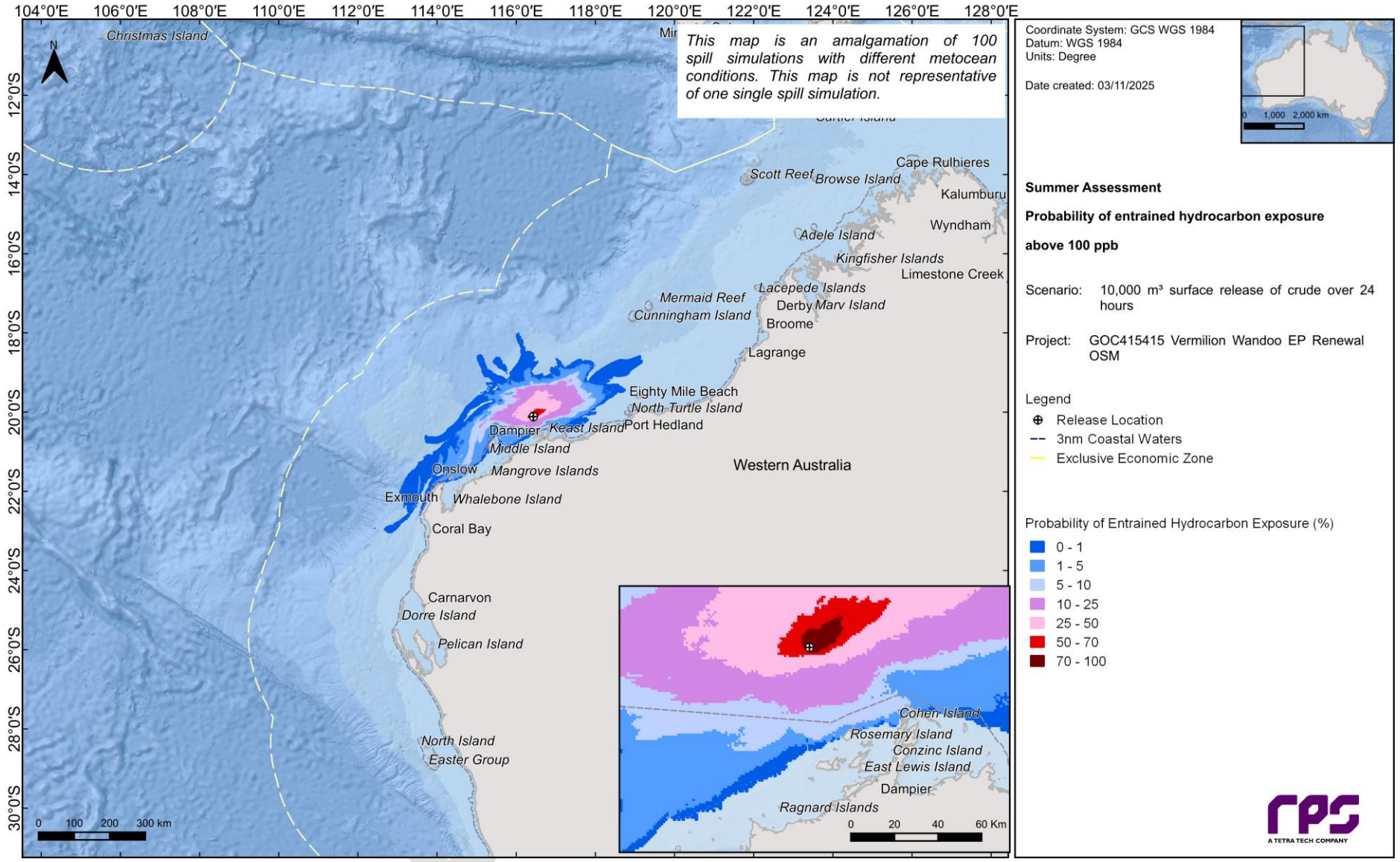


Figure 14.73 Probability of entrained hydrocarbon exposure at, or above, 100 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

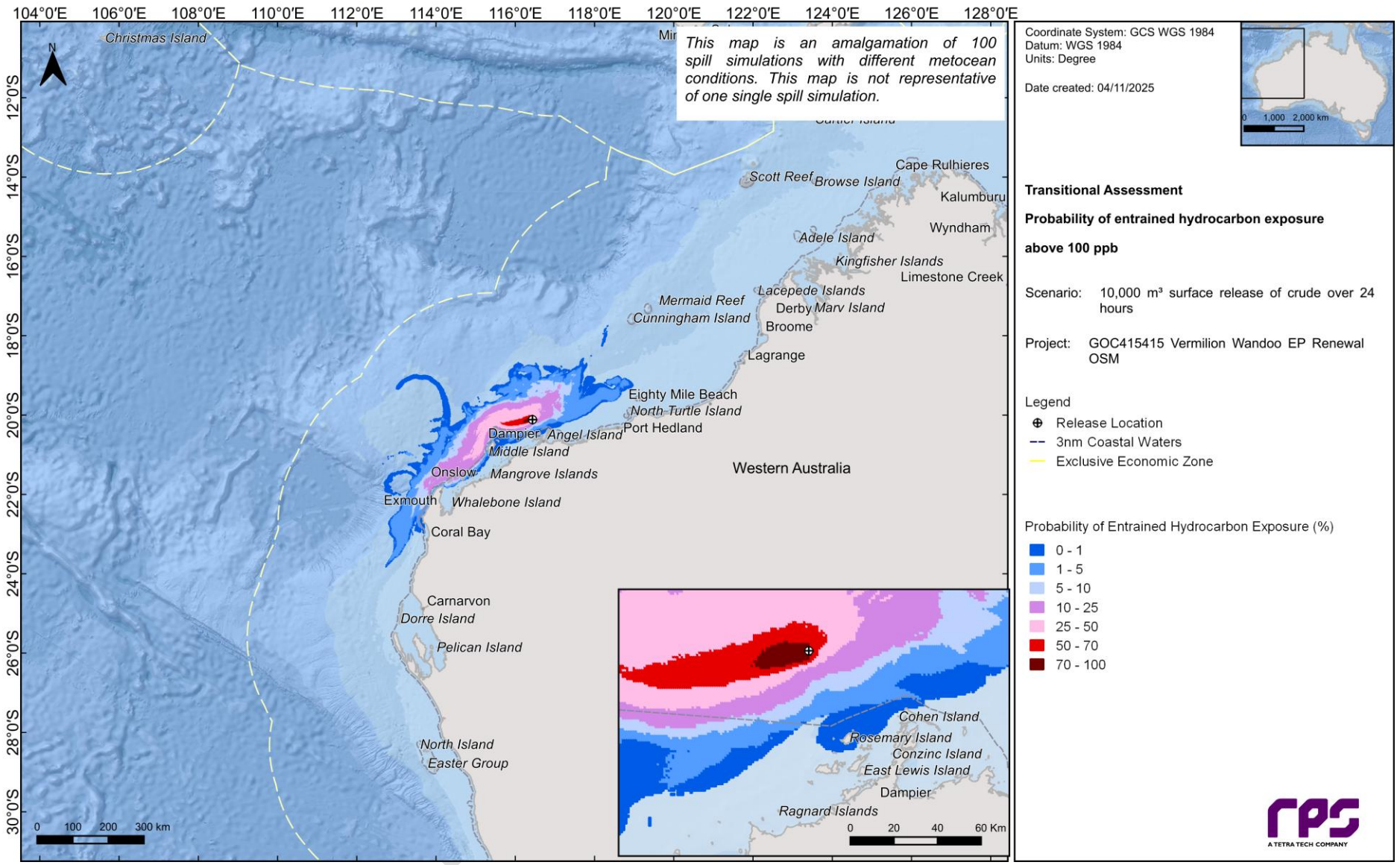


Figure 14.74 Probability of entrained hydrocarbon exposure at, or above, 100 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

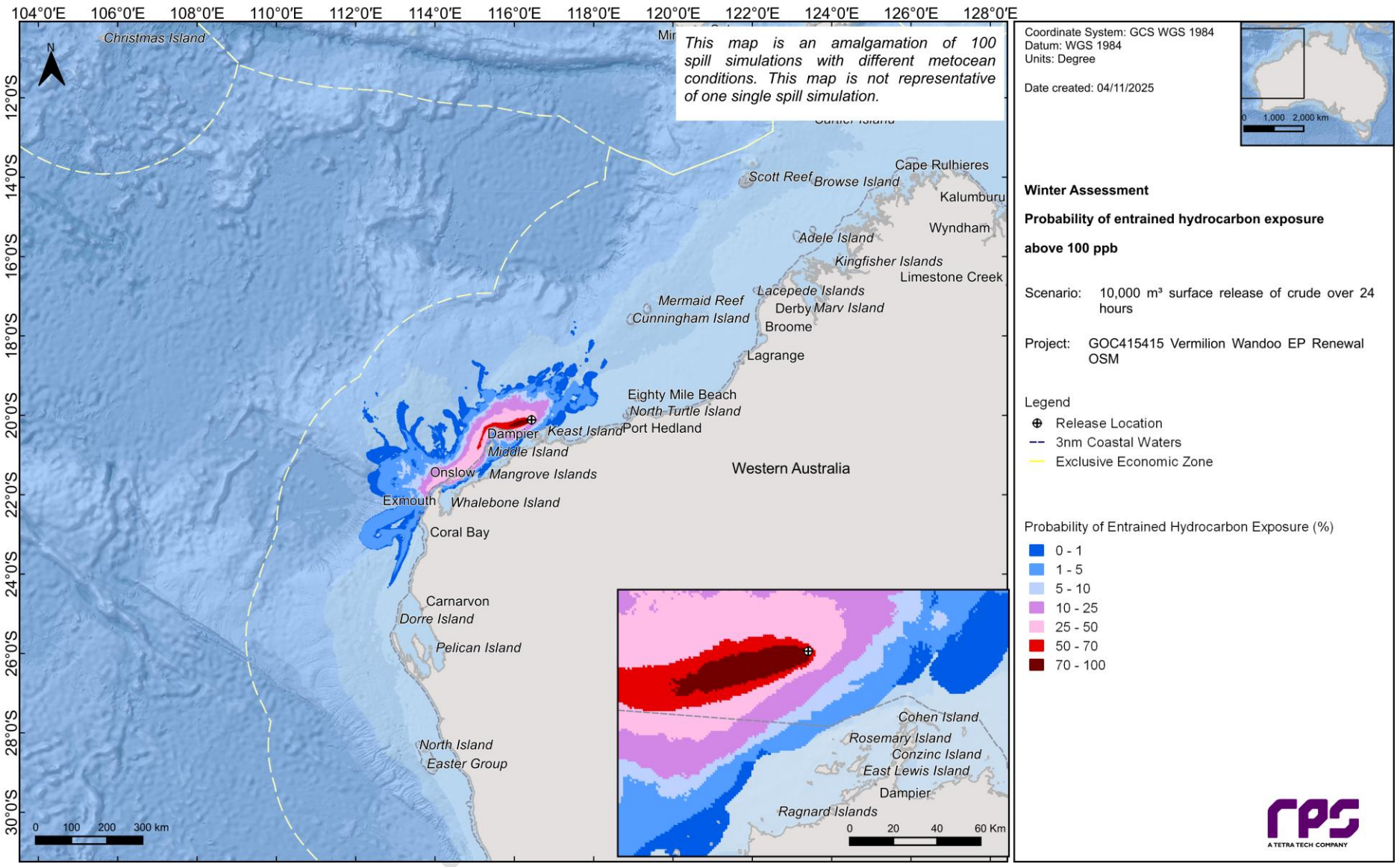


Figure 14.75 Probability of entrained hydrocarbon exposure at, or above, 100 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

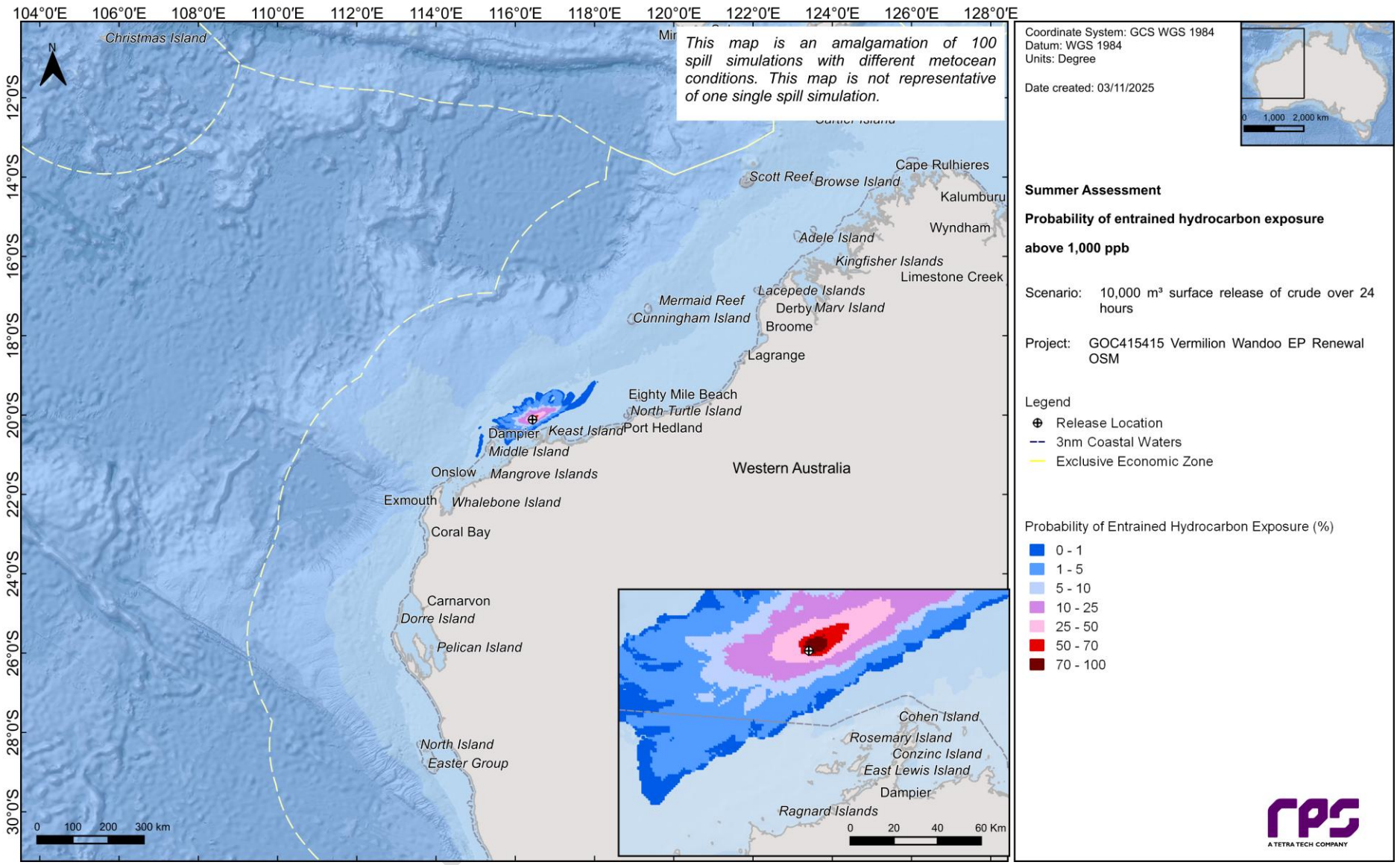


Figure 14.76 Probability of entrained hydrocarbon exposure at, or above, 1,000 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

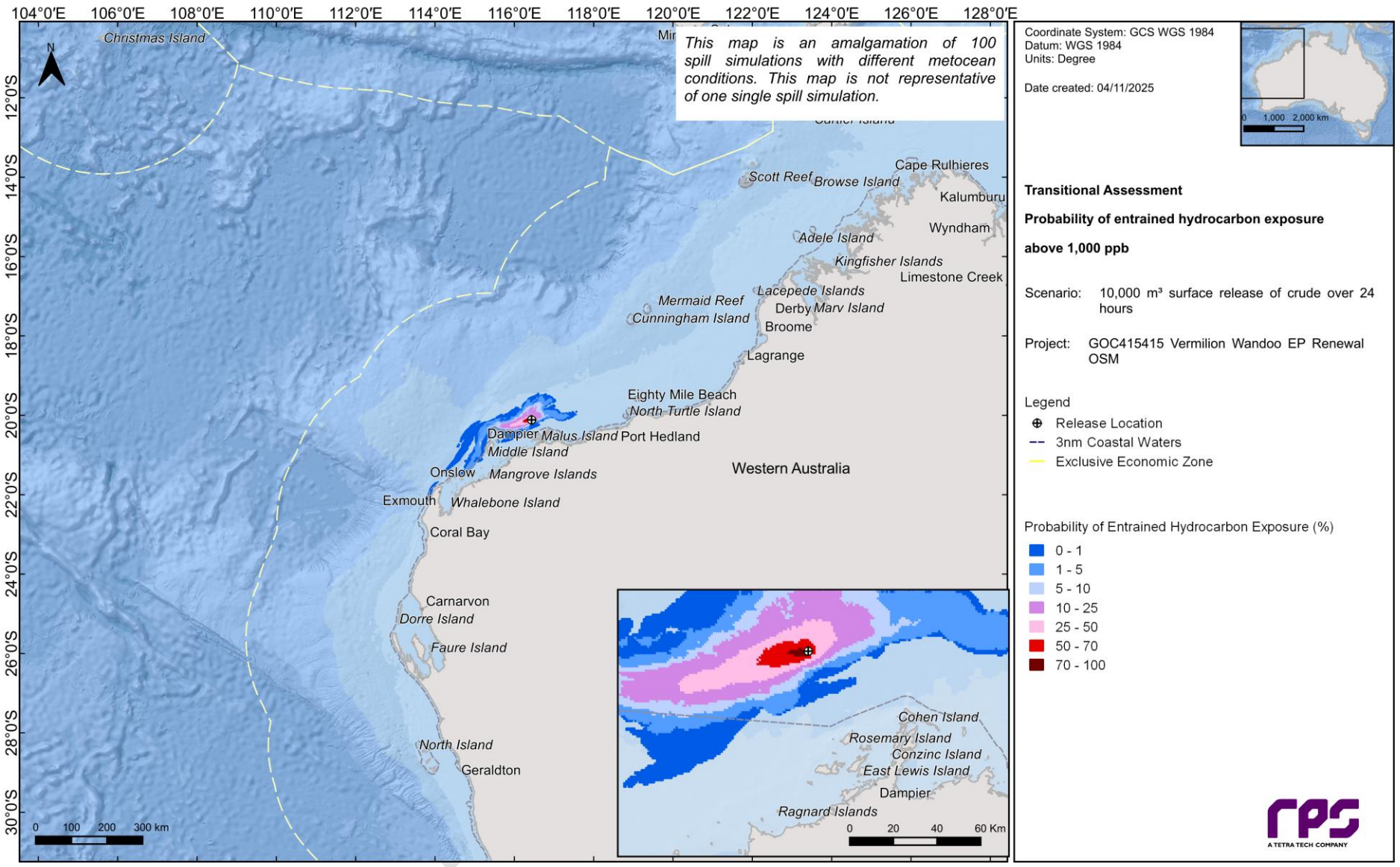


Figure 14.77 Probability of entrained hydrocarbon exposure at, or above, 1,000 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

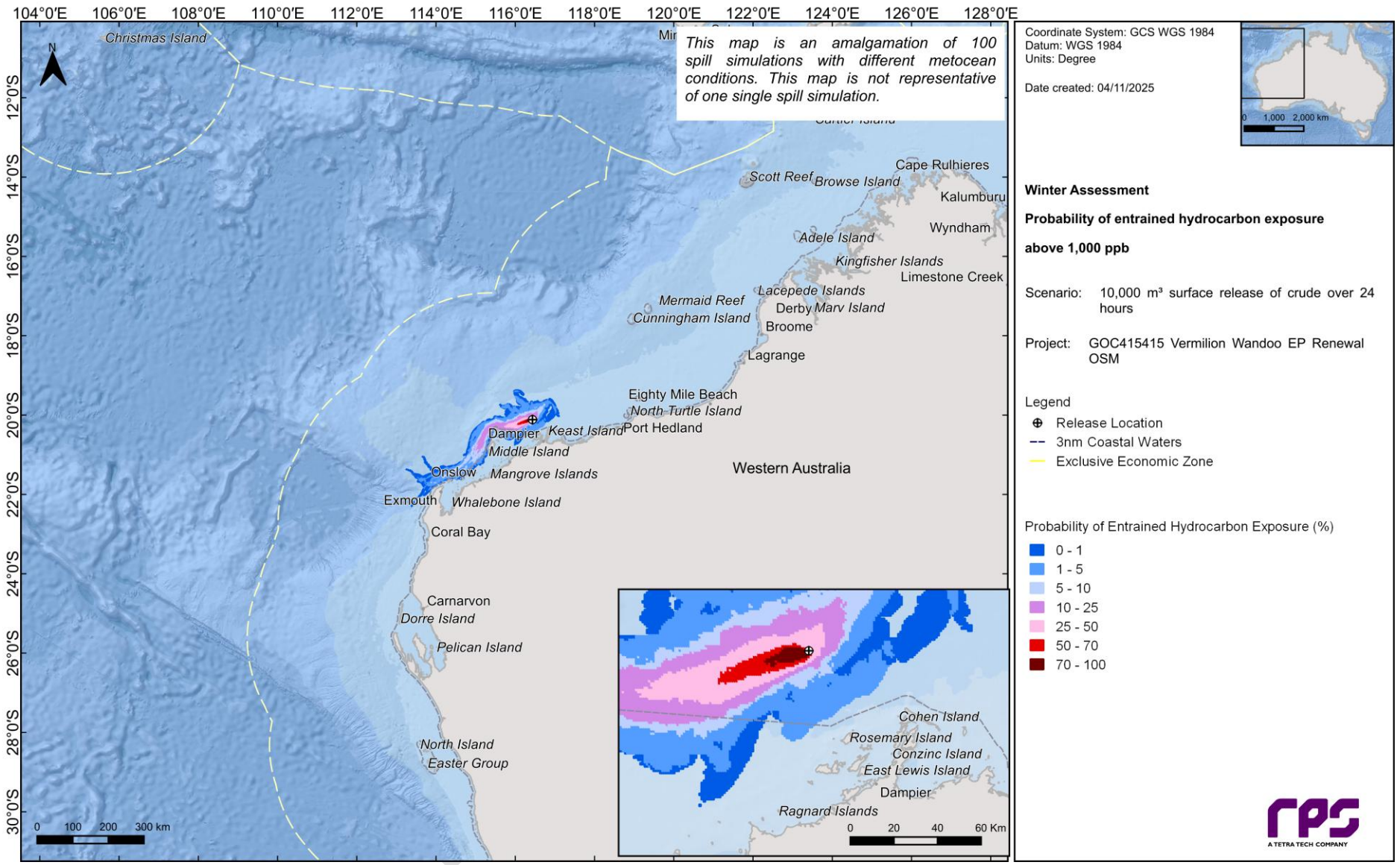


Figure 14.78 Probability of entrained hydrocarbon exposure at, or above, 1,000 ppb following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

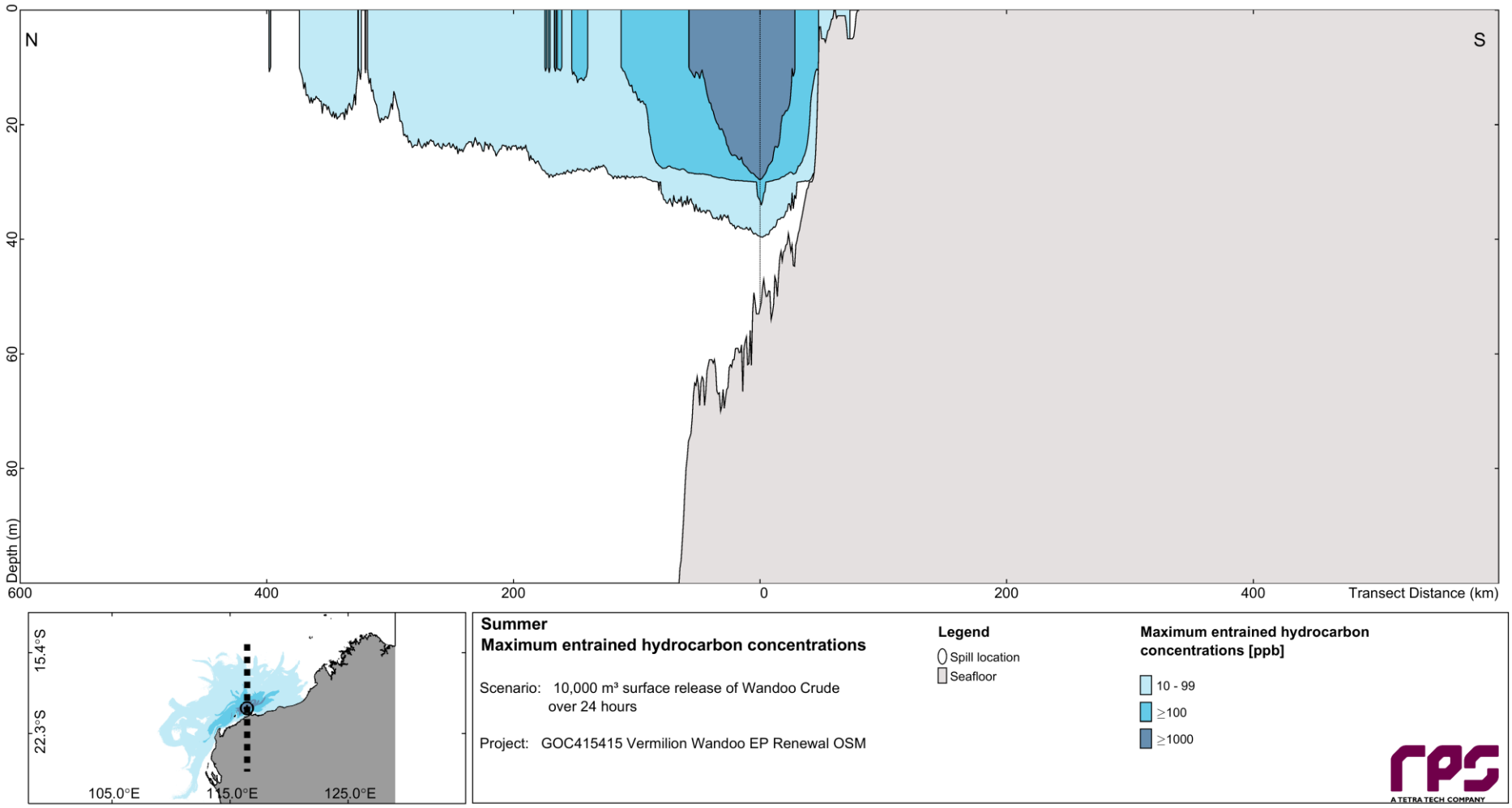


Figure 14.79 North-south cross-section transect of entrained hydrocarbon concentrations following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

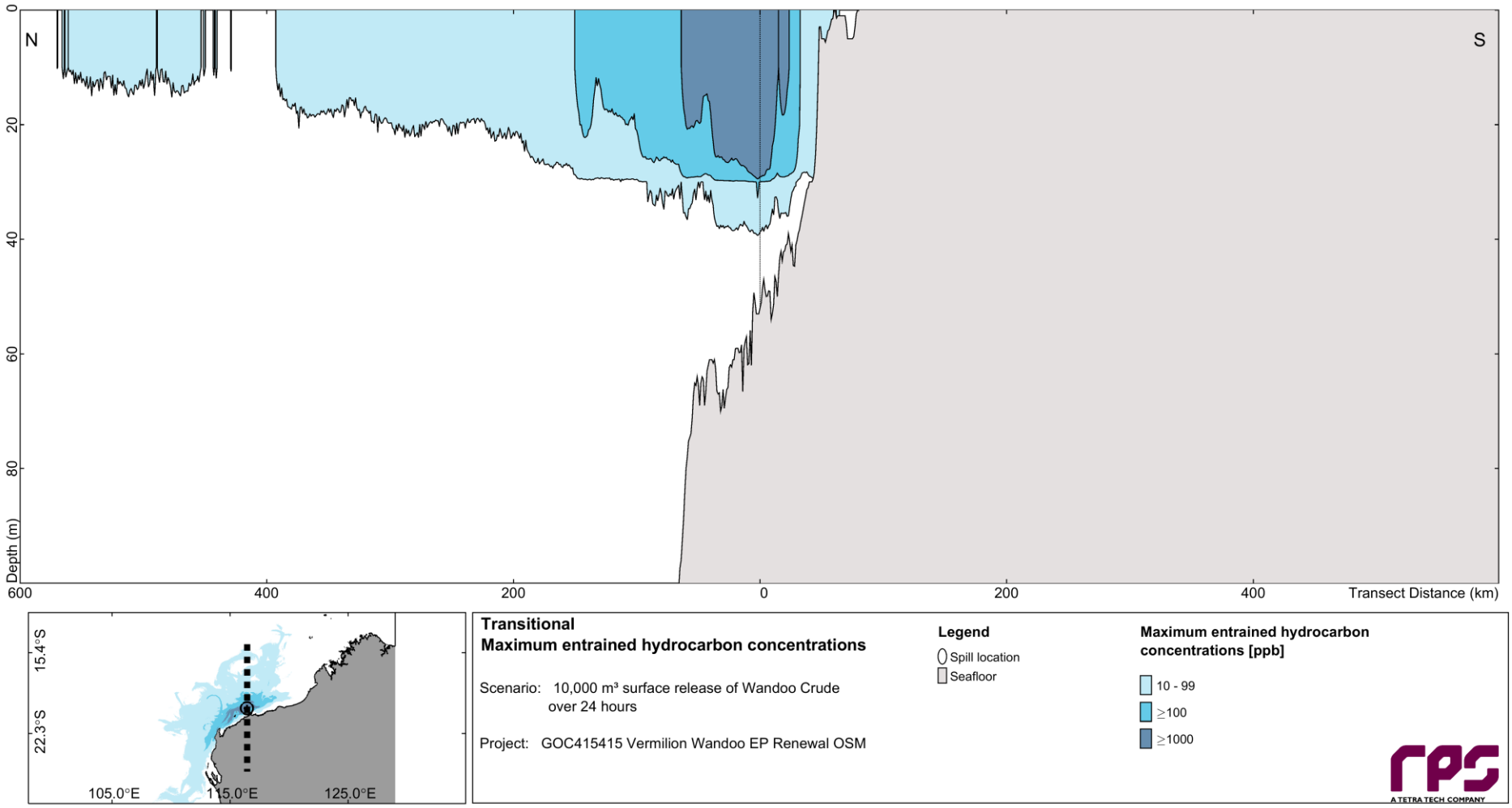


Figure 14.80 North-south cross-section transect of entrained hydrocarbon concentrations following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

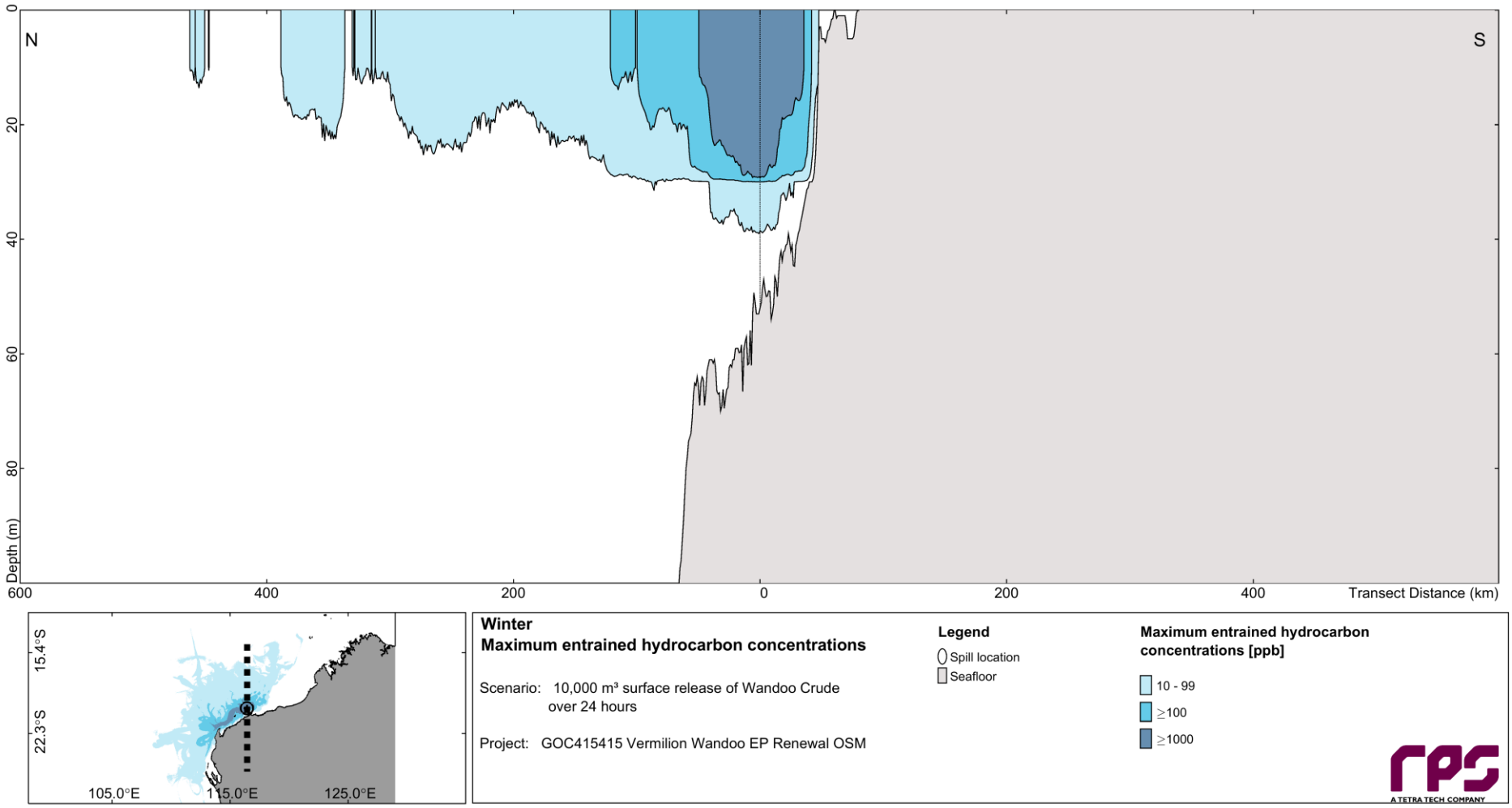


Figure 14.81 North-south cross-section transect of entrained hydrocarbon concentrations following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

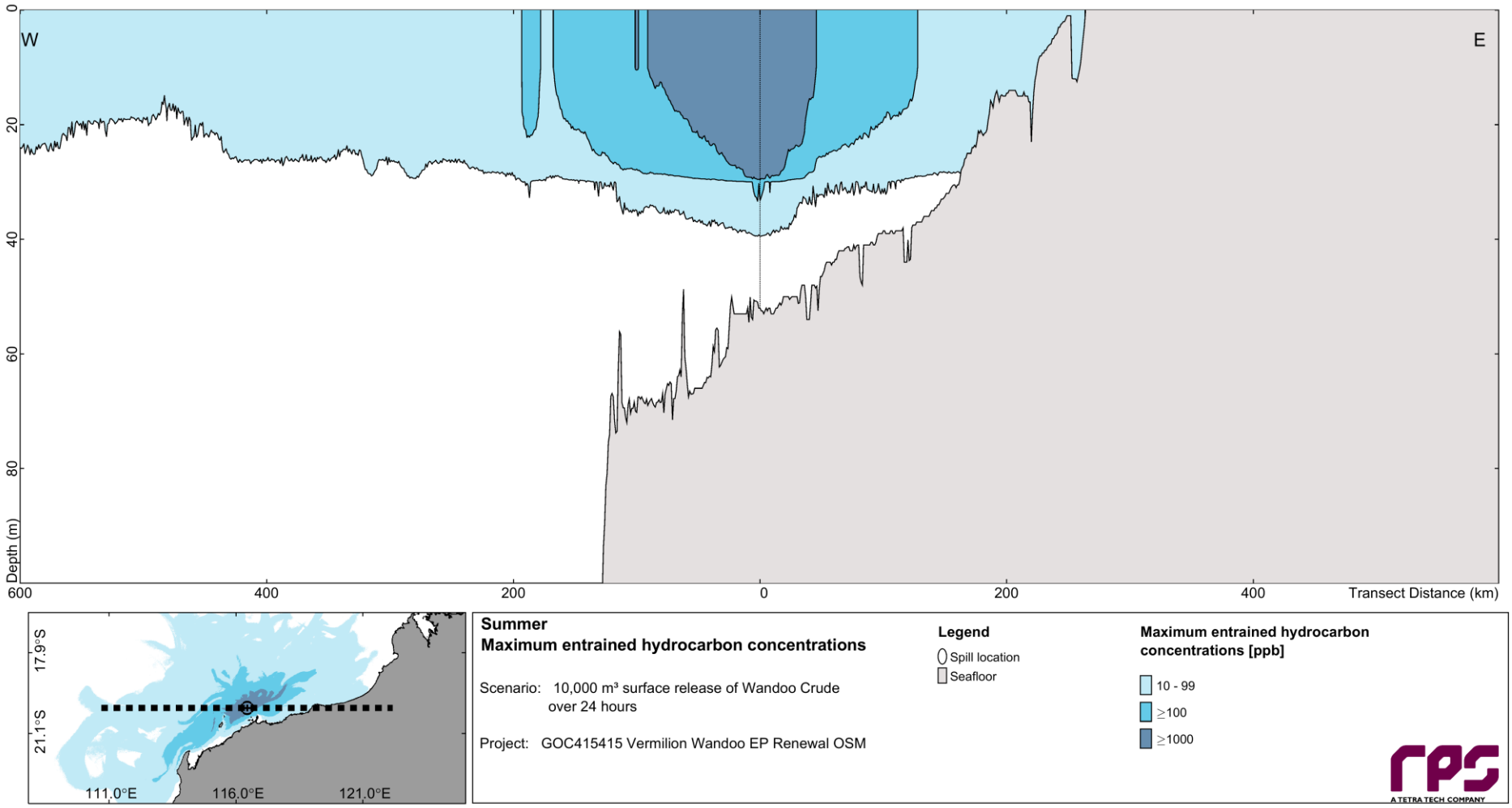


Figure 14.82 East-west cross-section transect of entrained hydrocarbon concentrations following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during summer conditions.

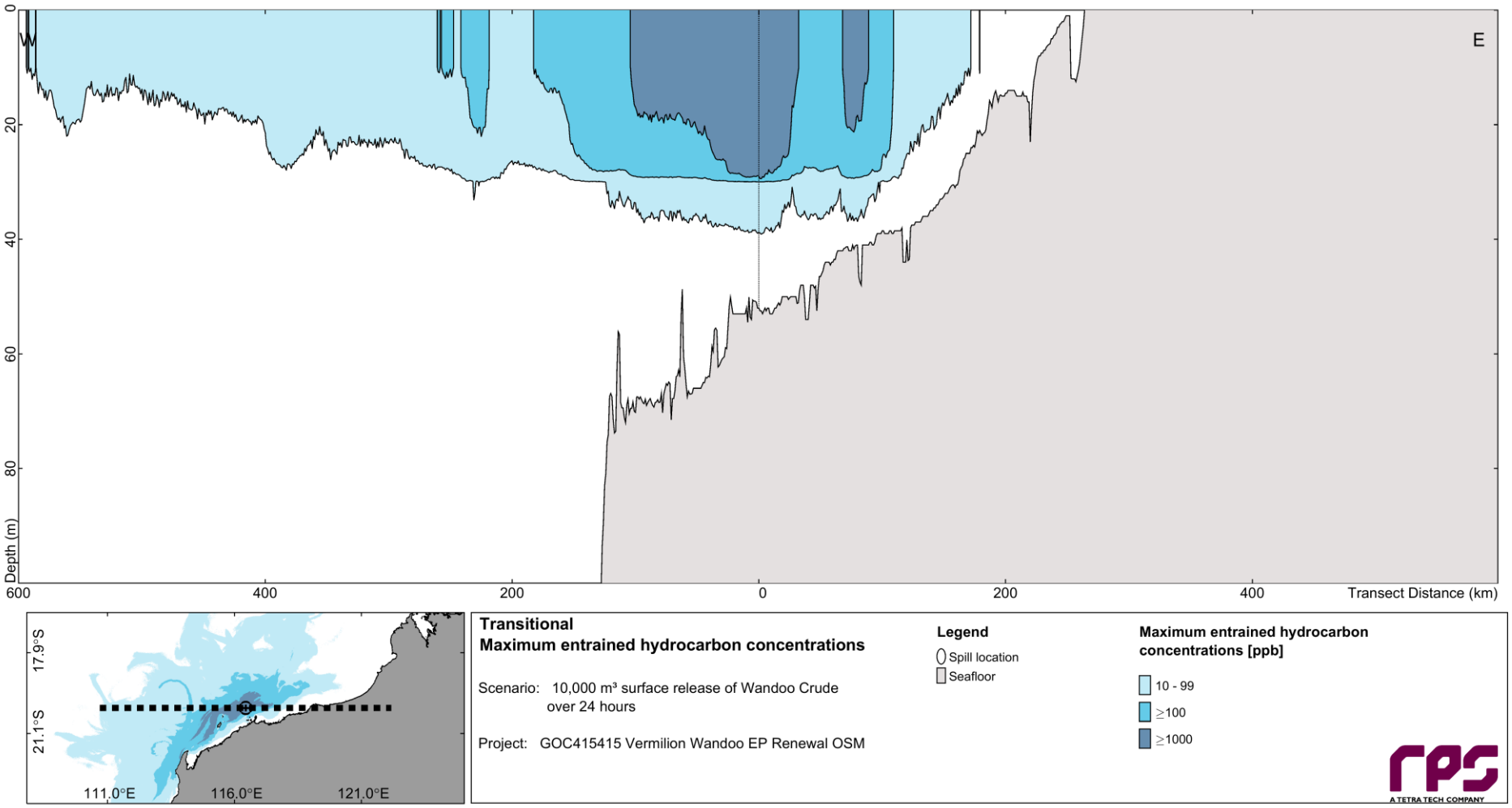


Figure 14.83 East-west cross-section transect of entrained hydrocarbon concentrations following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during transitional conditions.

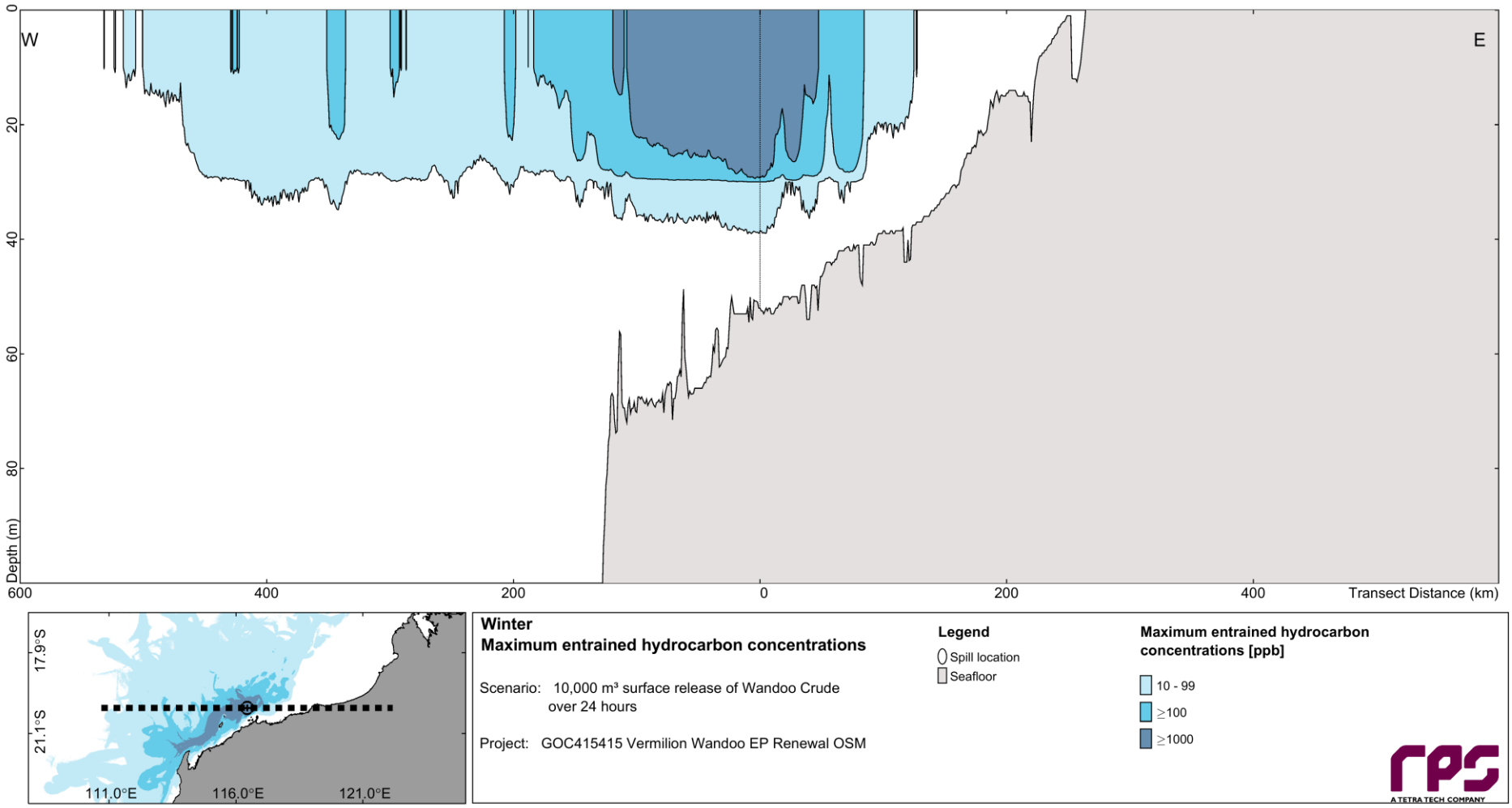


Figure 14.84 East-west cross-section transect of entrained hydrocarbon concentrations following a surface release of crude from the tanker collision. The results were calculated from 100 spill simulations that commenced during winter conditions.

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Appendix C PFW Dispersion Modelling

WANDOO

Produced Water Dispersion Modelling



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Rev 2

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Approval for issue

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EXECUTIVE SUMMARY

Vermilion Oil and Gas Australia (VOGA) serves as the operator for the Wandoo field and offshore platform located in permit area WA-14-L and is in the process of reviewing the Facility Environmental Plan (WPA-7000-YH-0007). These operations are located in Commonwealth waters within the Carnarvon Basin, approximately 80 km northwest of Dampier, along the northwest coast of Western Australia (Table 1-1 and Figure 1.1). The water depth around the platform is roughly 54 meters.

As part of their operations VOGA is discharging produced formation water (PFW) continuously overboard into the ocean. The PFW is water from the reservoir that is intimately mixed with oil and various organic and inorganic compounds such as heavy metals and minerals from the geological formations. Initial modelling was conducted in 2019 considering a discharge rate of 37,500 m^3/d.

VOGA has now determined a requirement to recalculate the field of effect for a revised rate of discharge due to a requirement to change the production rate to 37,500 m^3/d. Whole effluent toxicity (WET) testing in 2017, 2023 and 2024 reported 99% species protection is achieved with 256, 1,205 and 714 dilutions, respectively.

To accurately determine the dilution of the PFW discharge and the total, potential, area of influence, the effect of initial mixing generated by the discharge jet and buoyancy effects (near-field mixing) must be considered first. Subsequent dispersion of the remnant plume by ambient currents and turbulent forces in the water column (far-field dispersion) must then be considered where near-field mixing is inadequate to meet required dilutions. Different modelling approaches are required for calculating near-field and far-field dilutions due to the differing time and space scales that are involved. Rates of both near-field mixing and far-field dispersion will vary with prevailing currents. Hence, calculations must assess for variability in prevailing currents around the discharge site.

The potential area that may be influenced by the PFW discharge stream was assessed on an annual basis.

The following details summarise the findings of this study.

Near-Field Modelling

- Discharge under relative strong current at the site (95th percentile current) is forecasted to result in an initial dilution of approximately 42.7 and 41.6 times, with the plume reaching the surface 37.8 m and 35.2 m away from the release location under summer and winter temperatures respectively.

- Under moderate current conditions (50th percentile current) the near-field mixing region ends 19.8 m and 18.1 m from the source, reaching 31.2 and 29.4 dilutions during summer and winter respectively.

- Under weak currents (5th percentile current), the plume is predicted to result in lower dilution (10.2 and 10.0 dilutions under summer and winter temperatures) by the time the near-field processes are completed within 3.5 m and 3.1 m of the source.

Far-Field Modelling

- Far-field dispersion modelling indicated that PFW would dilute at least 256, 714 and 1,205 times within 490 m, 2,815 m and 5,690 m of the discharge respectively, at least 95 percent of the time.

1 INTRODUCTION

1.1 Background

Vermilion Oil and Gas Australia (VOGA) serves as the operator for the Wandoo field and offshore platform located in permit area WA-14-L and is in the process of developing an Environmental Plan (EP). These operations are located in Commonwealth waters within the Carnarvon Basin, approximately 80 km northwest of Dampier, along the northwest coast of Western Australia (Table 1-1 and Figure 1.1). The water depth around the platform is roughly 54 meters.

As part of their operations VOGA is discharging produced formation water (PFW) continuously overboard into the ocean. The PFW is water from the reservoir that is intimately mixed with oil and various organic and inorganic compounds such as heavy metals and minerals from the geological formations. Initial modelling was conducted in 2019 considering a discharge rate of 37,500 m^3/d.

VOGA has now determined a requirement to recalculate the field of effect considering new whole effluent toxicity (WET) tests. Testing conducted in in 2017, 2023 and 2024 reported 99% species protection is achieved with 256, 1,205 and 714 dilutions, respectively. Other tests conducted in 2021, 2022 and 2023 resulted in a requirement of 238, 588 and 5,882 dilutions.

Table 1-1 Location of the Wandoo Production Platform used as the release site for the PFW dispersion modelling assessment.

Release Site	Latitude (S)	Longitude (E)	Water Depth (m)
Wandoo Production Platform	20° 7’ 36.31’’	116° 26’ 7.67’’	54

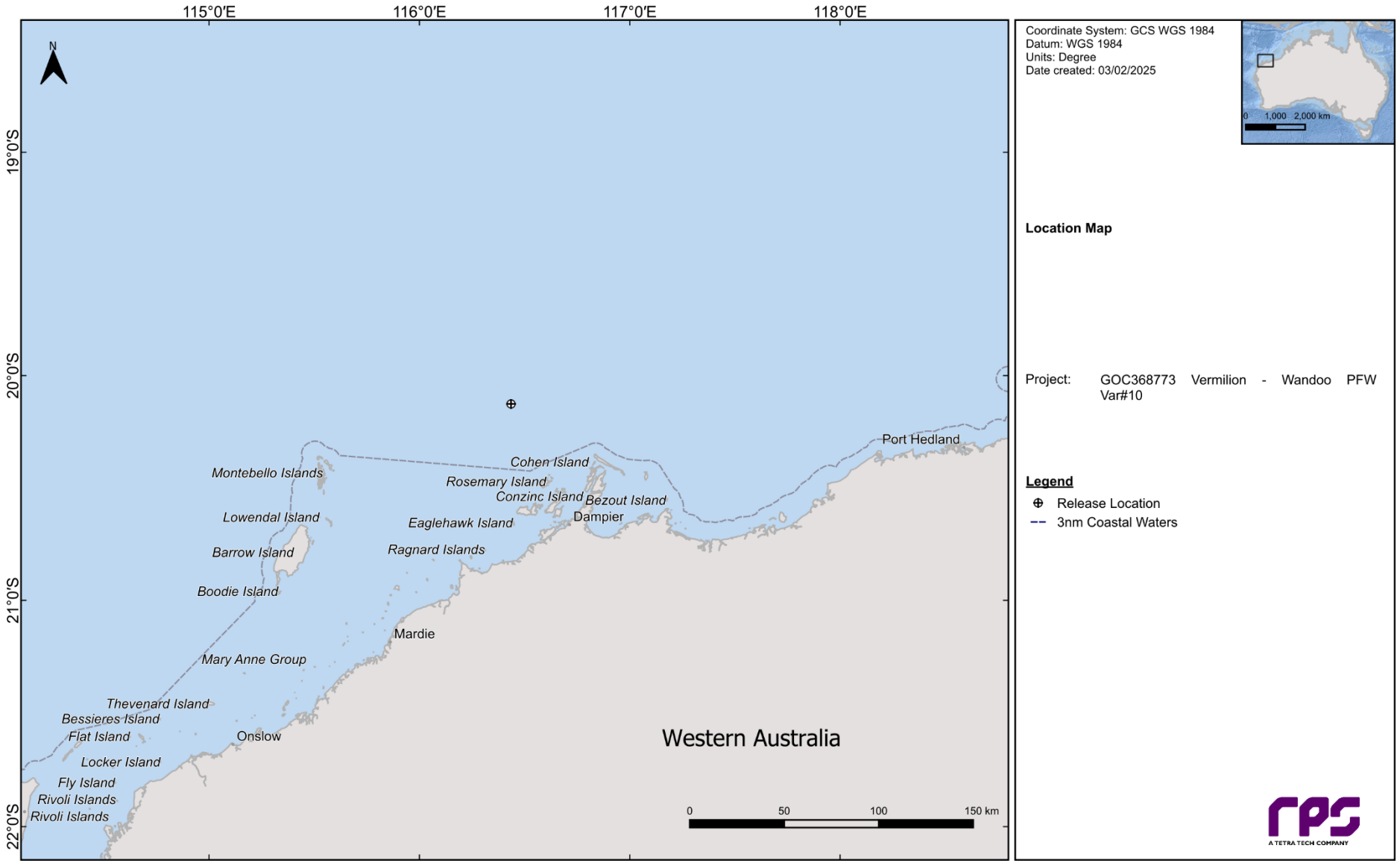


Figure 1.1 Location of the Wandoo Production Platform.

2 SCOPE OF WORK

The physical mixing and dilution of PFW with receiving waters occur through a series of processes. Initial mixing is generated during what is referred to as the “near-field” mixing zone, which occurs within metres of the discharge and within seconds to minutes. The near-field mixing is strongly affected by characteristics of the discharge configuration. Initial mixing is generated by turbulence generated as the discharge, ejected vertically and downwards, plunges due to momentum. As the plume descends, momentum will be lost due to the energy required to displace receiving water. If there is a lateral current, the centreline of the plume will bend in the direction of the current flow. Once downward momentum is lost, the fate of the plume will depend upon the plume density. If the plume remains buoyant relative to receiving water (i.e. warmer and/or at lower salinity than the receiving water), the plume will rise, undergoing further mixing by entrainment of ambient water, until either neutral density is reached or the plume collapses into a layer below the water surface. At this point, the plume is considered to enter the far-field mixing zone, where subsequent mixing is generated by water currents and turbulence in the water column.

The following scope of work was completed to assess dilution through near-field and far-field dilution phases:

- Collation of three-dimensional, spatially varying, current data for the waters surrounding the release location. Data spanning ten-years (2010-2019) was compiled by combining a hindcast from an ocean circulation model (HYCOM) with a high-resolution tidal model (HYDROMAP). The current data set included the combined influence of drift and tidal currents and was suitably long as to be indicative of interannual variability in ocean currents.

- Derivation of statistical distributions for the current speed and directions for use in the near-field modelling. Analyses included percentile distributions and development of current roses. This analysis was important to ensure that current data samples applied in the dispersion model were statistically representative.

- Collation of vertical water density profiles for summer and winter seasons at the Wandoo Production Platform location for use as input to the dispersion models.

- Near-field modelling conducted for each unique discharge to assess the initial mixing of the discharge due to turbulence and subsequent entrainment of ambient water. This modelling was conducted at high spatial and temporal resolution (scales of metres and seconds, respectively).

- Outcomes from the near-field modelling included estimates of the width, shape and orientation of the plumes, and resulting contaminant concentrations and dilutions, for each discharge at a range of incident current speeds.

- Establishment of a far-field dispersion model to calculate dispersive mixing and dilution under current and turbulence. Discharge scenarios under different sample conditions.

- Calculations for the transport and dispersive mixing of the remnant plume (remaining beyond the near-field zone) under a wide range of local current conditions by stochastic modelling (i.e. repeated simulations with each simulation using a unique time-sequence of current flow, chosen at random from the 10-year time series of current data.

- Analysis and mapping of locations that might be exposed to different levels of dilution.

3 MODELLING METHODOLOGY

3.1 Near-Field Modelling

3.1.1 Overview

Numerical modelling was applied to quantify the area of influence of PFW discharges, in terms of the distribution of the maximum contaminant concentrations that might occur with distance from the source given defined discharge configurations, source concentrations, and the range of metocean conditions that affect the discharge location.

The dispersion of the PFW discharge will depend, initially, on the geometry and hydrodynamics of the discharges themselves, where the induced momentum and buoyancy effects dominate over background processes. This region is generally referred to as the near-field zone and is characterised by variations over short time and space scales. As the discharges mix with the ambient waters, the momentum and buoyancy signatures are eroded, and the background – or ambient – processes become dominant.

The shape and orientation of the discharged water plumes, and hence the distribution and dilution rate of the plume, will vary significantly with natural variation in prevailing water currents. Therefore, to best calculate the likely outcomes of the discharges, it is necessary to simulate discharge under a range of current speeds statistically representative of the Wandoo Production Platform location.

3.1.2 Description of Near-Field Model: CORMIX

The near-field mixing and dispersion of the outfall was simulated using the three-dimensional flow model, CORMIX. CORMIX is a mixing zone model and decision support system for environmental impact assessment of regulatory mixing zones. CORMIX contains a series of elements for the analysis and design of single or multi-port discharges. Discharges may be submerged or above surface, buoyant or denser than receiving water and the receiving water may be stratified or unstratified. The emphasis of the model is the influence of the geometry and dilution characteristics on the initial mixing zone (Doneker and Jirka, 1990; Jirka et al., 1991). CORMIX is widely applied worldwide and has been validated in many independent studies (http://www.cormix.info/validations.php).

CORMIX is a collection of analytic solutions to simplified forms of the mathematical equations describing transport and dispersion of water borne constituents. The simplifications come about through a range of assumptions about the source configuration, source characteristics (discharge and buoyancy) and the ambient environment. These assumptions effectively limit the domain within which the analytic solutions apply. For the typical outfall source flow, two main zones can be defined as described in Table 3-1.

Although CORMIX does calculate far-field dispersion, the assumptions of the algorithms limit application to homogeneous environments with no eddies in the ambient flow and little recirculation. For this reason, the CORMIX component of the calculations for this study were limited to the near-field zone.

Table 3-1 CORMIX mixing zones.

Zone	Description
Near-field	Jet characteristics, momentum flux, buoyancy flux and outfall geometry influence the plume's trajectory and mixing.
Far-field	Ambient conditions control the plume's trajectory and dilution due to density current buoyant spreading and ambient turbulence.

CORMIX specifies the average dilution or bulk dilution (flux averaged) as 1.7 times the centreline dilution. The centreline is defined by the points of maximum concentration (maximum temperature, minimum dilution etc) at each vertical section along the longitudinal axis. Accordingly, centreline depth is defined as the depth of the maximum concentration point (maximum temperature, minimum dilution) along the longitudinal axis.

Figure 3.1 shows a conceptual diagram of the dispersion and fates of a positively buoyant discharge and the idealised representation of the discharge phases.

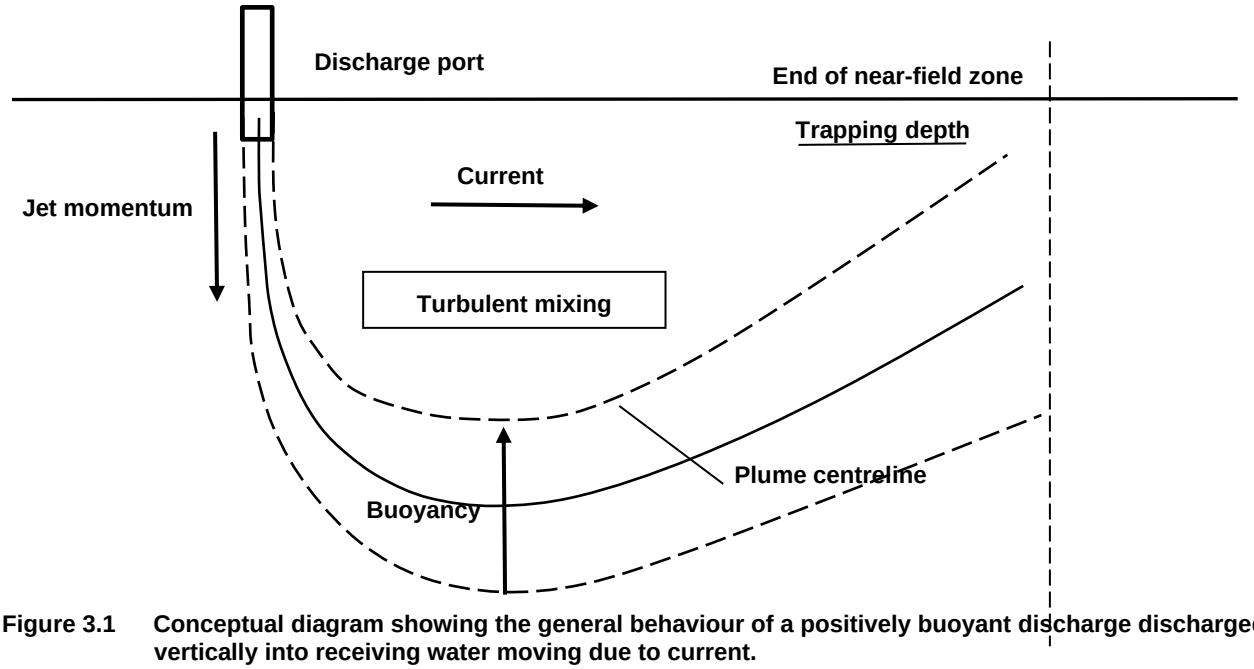


Figure 3.1 Conceptual diagram showing the general behaviour of a positively buoyant discharge discharged vertically into receiving water moving due to current.

3.1.3 Setup of Near-Field Model

3.1.3.1 Discharge Characteristics

The PFW discharge characteristics for the discharge case are summarised in Table 3-2. The discharge is assumed to occur from the Wandoo Production Platform at a discharge rate of 37,500 m^3/day. The PFW is discharged from a 0.575 m diameter pipe pointed vertically downwards and ending 8 m below the water surface. The discharge was assumed to have a temperature and salinity of 51°C and 29.2 parts per thousand (ppt), respectively.

An initial toxicological assessment of the PFW stream performed in 2017 indicated that the dilution of the soluble components of the PFW that must be achieved to protect 99% of species (based on their sensitivity) would be 256:1. Analyses updates conducted in 2023 and 2024 revealed that the number of dilutions necessary to meet that requirement would be 1,205:1 and 714:1 respectively.

Table 3-2 Summary of the PFW discharge characteristics.

Parameter	Base Case
Flow rate (m^3/d)	37,500
Location	Wandoo Production Platform
Duration (min)	Continuous
Outlet pipe internal diameter (m)	0.575
Number of Ports	1
Outlet pipe orientation	Vertical (downwards)
Discharge Depth (m)	8 (below MSL)
Discharge salinity (ppt)	29.2
Discharge temperature (°C)	51

3.1.3.2 Ambient Environmental Conditions

Inputs of ambient environmental conditions to the CORMIX model included vertical profiles of temperature and salinity for winter and summer seasons, along with constant current speeds and general direction (per simulation). The temperature and salinity profiles are required to accurately account for the relative buoyancy of the diluting plume, while the current speeds control the intensity of initial mixing and the deflection of the PFW plume. These inputs are described in the following sections.

3.1.3.2.1 Ambient Temperature and Salinity

Temperature and salinity data applied to the near-field modelling was sourced from the World Ocean Atlas 2018 (WOA18) database produced by the National Oceanographic Data Centre (National Oceanic and Atmospheric Administration, NOAA) and its co-located World Data Center for Oceanography (Levitus *et al.*, 2013).

Table 3-3 shows the seasonal water temperature and salinity levels at the top 20 m of the water column at the Wandoo Production Platform. Note that summer temperature was represented by the month which revealed the highest average surface temperature in the year (April), whilst winter is given by the lowest average temperature (August).

Table 3-3 Average temperature and salinity levels adjacent to the Wandoo Production Platform location.

Season	Temperature (°C)	Salinity (PSU)
Summer	28.20	35.25
Winter	24.26	35.25

3.1.3.2.2 Ambient Current

Ocean current data was sourced from a ten-year hindcast data set of combined large-scale ocean (HYCOM) and tidal currents. The data was statistically analysed to determine the 5th, 50th and 95th percentile current speeds. These statistical current speeds can be considered representative of annual conditions at the location as current speeds did not reveal to be substantially sensitive to seasonality.

Table 3-4 presents the annual steady-state, unidirectional, current speeds at varying depths used as input to the near-field model as forcing for each discharge case:

- 5th percentile current speed: weak currents, low dilution and slow advection.
- 50th percentile (median) current speed: average currents, moderate dilution and advection.
- 95th percentile current speed: strong currents, high dilution and rapid advection to nearby areas.

The 5th, 50th and 95th percentile values are referenced as weak, medium and strong current speeds, respectively.

Table 3-4 Adopted ambient current conditions adjacent to the Wandoo Production Platform location.

Season	5th Percentile (Weak) Current Speed (m/s)	50th Percentile (Medium) Current Speed (m/s)	95th Percentile (Strong) Current Speed (m/s)
Annual	0.07	0.26	0.50

3.2 Far-Field Modelling

3.2.1 Overview

The far-field modelling expands on the near-field work by allowing the time-varying nature of currents to be included, with the potential for localised build-up when current speeds are low (e.g. at the turning of the tide) and recirculation of the plume back to the discharge location might occur. In this case, concentrations near the discharge point can be increased due to the discharge plume mixing with the remnant plume from an earlier time. This may be a potential source of episodic increases in pollutant concentrations in the receiving waters.

The model was run seasonally (Summer – October to February, Transitional – March, August and September and Winter – April to July) but analysed annually.

3.2.2 Description of Far-Field Model: MUDMAP

The mixing and dispersion of the produced formation water discharges beyond the near-field zone was predicted using the three-dimensional discharge and plume behaviour model, MUDMAP (Koh & Chang, 1973; Khondaker, 2000). MUDMAP predicts the transport and passive dispersion of the discharged material due to the local currents and dispersive forces in the water column. Dispersion of the discharged material will be enhanced with increased current speeds, greater variation in current direction over time and increased wave energy.

The passive dispersion stage employs a particle-based, random walk, procedure. Constituents within the discharge stream are represented by a sample of Lagrangian particles. These particles are moved in three dimensions over each subsequent time step according to the prevailing local current data as well as horizontal and vertical mixing coefficients. Seabed deposition patterns are calculated for particulate sinking material, with sinking rates varying by particle size.

MUDMAP treats the Lagrangian particles as conservative tracers (i.e. they are not removed over time to account for chemical interactions, decay or precipitation). Predicted concentrations will therefore be conservative overestimates where these processes do occur. Each particle represents a proportion of the discharge, by mass, and particles are released at a given rate to represent the rate of the discharge (mass per unit time). Concentrations of constituents are predicted over time by counting the number of particles that occur within a given depth level and grid square and converting this value to mass per unit volume.

The system has been extensively validated and applied for discharge operations in Australian waters for other PFW discharges (e.g. Burns et al., 1999; King & McAllister, 1997, 1998).

3.2.3 Stochastic Modelling

A stochastic modelling procedure was applied in the far-field modelling to sample a representative set of conditions that could affect the distribution of constituents. This approach involves 100 simulations per season (300 in total) of a given discharge, with each simulation representing discharge for 5 days under a different, randomly selected, sequence of current speed and direction data. These sequences were selected at random from the 10-year database of current data for the site. The initial dilution and shape of the discharge was set by the results of the near-field results described in Section 3.1. This methodology ensures that the calculated movement and fate of each discharge is representative of the passive dispersive forces for the range of prevailing currents that occur at the discharge location. Assumed PFW characteristics are summarised in Table 3-5.

Once the stochastic modelling is complete, all simulations were statistically analysed to map distributions of possible outcomes based on likelihood. The stochastic simulations were jointly processed annually (300 replicate simulations). The analysis calculated the frequency of occurrence of a given dilution level, by depth and horizontal location, at surrounding locations. Results were summarised for the average and 95th percentile dilution over time. The average dilution will represent the central tendency while the 95th percentile represents a dilution level that should occur at least 95% of the time (i.e. lower dilution might occur up to 5% of the time). The latter case will represent the more extreme distances required for a given dilution.

3.2.4 Setup of Far-Field Model

3.2.4.1 Discharge Characteristics

The MUDMAP model simulated the discharge into a time-varying current field with the initial dilution and shape of the discharge set by the near-field results described in Section 3.1. The PFW discharge scenario was modelled as a continuous discharge under time-varying current assuming the initial dilution and density change imposed by the near-field mixing (detailed in Section 4.1).

Table 3-5 presents a summary of the far-field model inputs used to calculate the transport and mixing of the chemical treatment by the ambient currents. As previously mentioned, 300 simulations were run as a representation on annual conditions and each simulation had a different start time, which ensured a range of current conditions were sampled.

Table 3-5 Summary of PFW discharge modelling assumed for far-field modelling.

Parameter	Discharge Case
Hindcast modelling period	2010-2019
Seasons	Summer (October to February) Transitional (March, August and September) Winter (April to July)
Flow rate (m^3/d)	37,500
Initial depth of centreline (m)	3
Number of simulations	300 (100 per season)
Simulated discharge type	Continuous
Simulated discharge period (days)	5

3.2.4.2 Mixing Parameters

Horizontal and vertical dispersion coefficients in dispersion modelling represent turbulence-driven mixing and diffusion, which occur at sub-grid scales relative to the model's hydrodynamics. These coefficients, expressed in m²/s, govern the rate of area change per second. Increasing the horizontal dispersion coefficient enhances lateral plume spread, reducing centreline concentrations, while increasing the vertical coefficient accelerates downward mixing into the water column.

Horizontal turbulent diffusion depends on metocean conditions (wind, waves and currents) and the plume's scale relative to oceanic dispersion processes. For plumes 10–100 m wide, small-scale swirling motions and vertical mixing dominate, with horizontal dispersion rates near 0.1 m²/s. As the plume's width expands to 1–10 km, mesoscale eddies drive dispersion rates of a few to tens of m²/s. At scales exceeding mesoscale eddies, eddy mixing dominates with dispersion rates of 100–1,000 m²/s.

A spatially uniform and conservative dispersion coefficient of 0.2 m²/s (horizontal) and 0.001 m²/s (vertical) was applied to control produced water plume spreading. These values were selected through extensive sensitivity testing, ensuring conservative concentration estimates, as in-situ mixing under average and high-energy conditions is expected to be at least an order of magnitude greater (King & McAllister, 1997, 1998).

3.2.4.3 Grid Configuration

MUDMAP uses a three-dimensional grid to represent the geographic region under study (water depth and bathymetric profiles). The model was setup, and analysed and mapped on two grid scales, representing the aqueous and particulates components, respectively. Due to the rapid mixing and small-scale effect of the effluent discharge, it was necessary to use a fine grid with a resolution of 20 m x 20 m to track the movement and fate of the aqueous PFW discharge plume. The extent of the grid region measured approximately 20 km (longitude or x-axis) by 20 km (latitude or y-axis), which was subdivided horizontally into approximately 1,000 x 1,000 cells. The vertical resolution was set to 10 m.

3.2.5 Regional Ocean Currents

3.2.5.1 Background

Transport within and over the inner Northwest Shelf is generally dominated by wind shear and tidal currents. In contrast, transport in the deeper offshore waters is influenced predominantly by oceanic currents, particularly in water depths greater than 100 m.

The waters surrounding the release location are close to regions influenced by the Indo-Pacific through-flow (Verschell et al., 1995; Molcard et al., 1996) and the Leeuwin current (Weaver and Middleton, 1989; Sampey et al., 2004; Ridgeway and Condie, 2004).

Literature indicates waters seaward of the northern tip of Exmouth would be influenced by the Leeuwin current, a warm ocean current that flows strongly southwards along the Western Australian coastline (Holloway, 1993; Holloway and Nye, 1985; Godfrey and Ridgeway, 1985), and associated eddies and counter-currents (Figure 3.2). The strength of the current is known to vary through the year, with the weakest southwards flow occurring from November to April (Sampey et al., 2004), when winds predominantly blow strongly northwards. Maximum current flow velocities are generally experienced during autumn and winter when prevailing wind directions do not oppose current directions. Typical current speeds in the Leeuwin Current (and eddies) are approximately 0.5 m/s, although speeds of 1 m/s are common. Additionally, inter-annual variations in the strength of the currents are influenced by El Niño - Southern Oscillation events (Pearce, 1991). A comprehensive description of the circulation patterns of the Northwest Shelf is provided in a review by Condie and Andrewartha (2008).

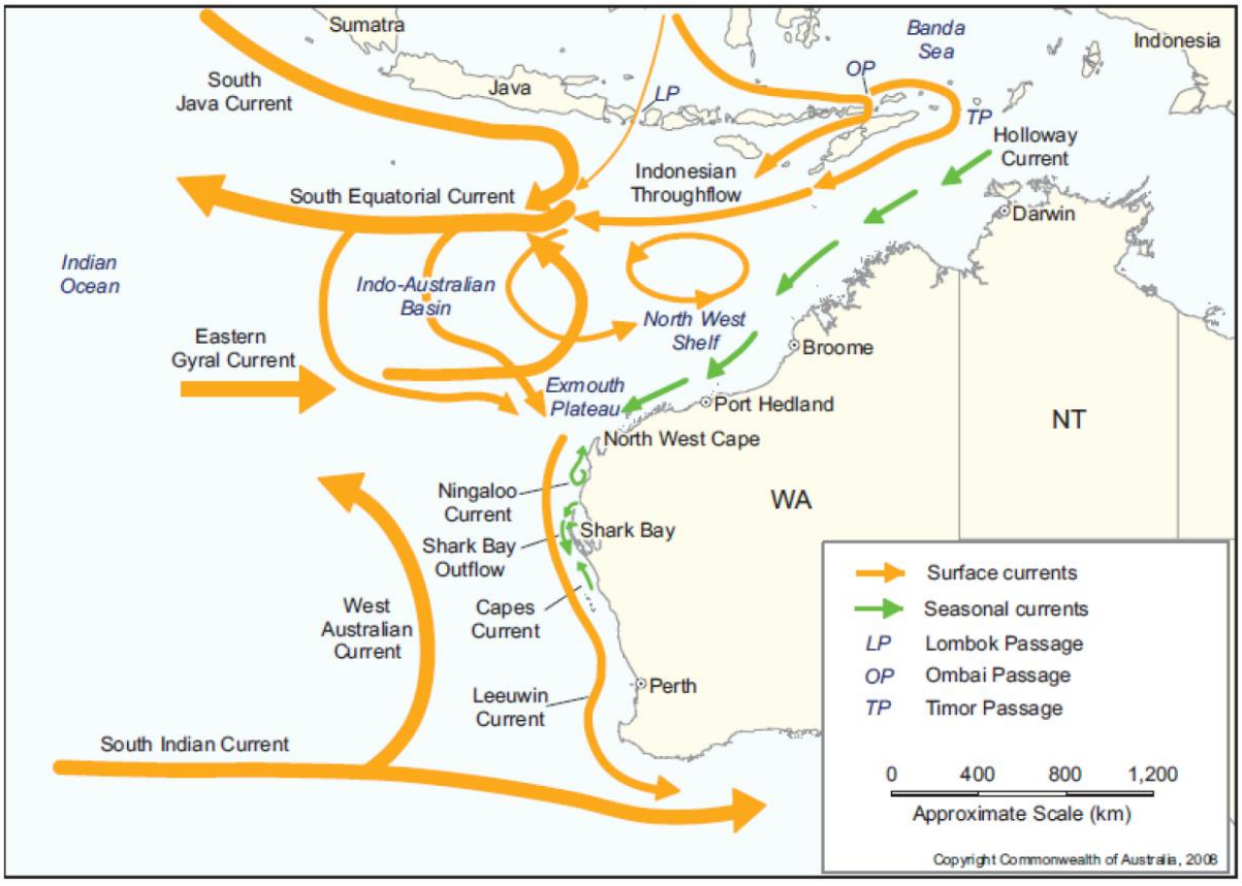


Figure 3.2 Schematic of ocean currents along the northwest Australian continental shelf (Source: DEWHA, 2007).

3.2.5.1 Tidal Currents

Tidal current data were generated using RPS's advanced ocean/coastal model, HYDROMAP. The HYDROMAP model has been thoroughly tested and verified through field measurements throughout the world over the past 38 years (Isaji & Spaulding, 1984; Isaji, et al., 2001; Zigic, et al., 2003). HYDROMAP tidal current data have been used as input to forecast (in the future) and hindcast (in the past) pollutant spills in Australian waters and forms part of the Australian National Oil Spill Emergency Response System operated by AMSA (Australian Maritime Safety Authority).

HYDROMAP employs a sophisticated sub-gridding strategy, which supports up to six levels of spatial resolution, halving the grid cell size as each level of resolution is employed. The sub-gridding allows for higher resolution of currents within areas of greater bathymetric and coastline complexity, and/or of particular interest to a study.

The numerical solution methodology follows that of Davies (1977a and 1977b) with further developments for model efficiency by Owen (1980) and Gordon (1982). A more detailed presentation of the model can be found in Isaji and Spaulding (1984) and Isaji et al. (2001).

3.2.5.2 Grid Setup

The tidal model domain has been sub-gridded to a resolution of 500 m for shallow and coastal regions, starting from an offshore (or deep water) resolution of 8 km. The finer grids were allocated in a step-wise fashion to resolve flows more accurately along the coastline, around islands and over regions with more complex bathymetry. Figure 3.3 shows the tidal model grid resolutions.

A combination of datasets was used and merged to describe the shape of the seabed within the grid domain (Figure 3.4). These included spot depths and contours which were digitised from nautical charts released by the hydrographic offices as well as Geoscience Australia database and depths extracted from the Shuttle Radar Topography Mission (SRTM30_PLUS) Plus dataset (see Becker et al., 2009).

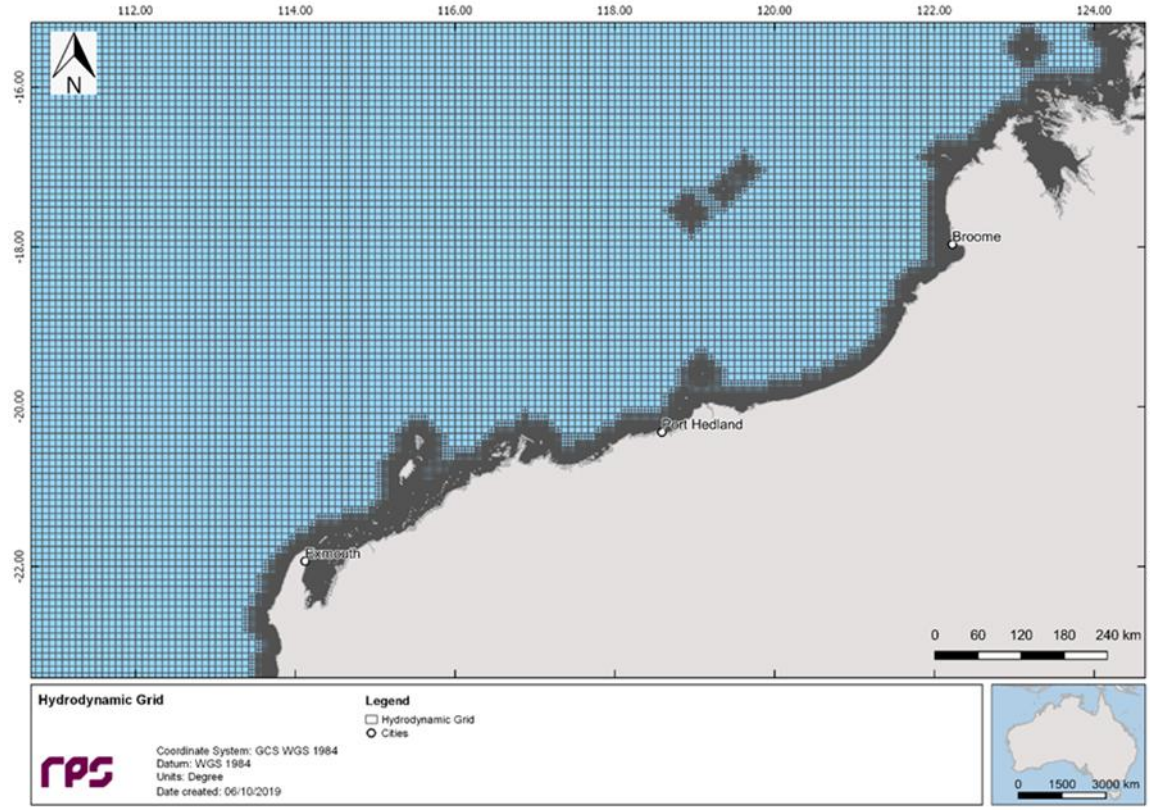


Figure 3.3 Zoomed in view of the model grid used to generate the tidal currents for the study region. Higher resolution areas are shown by the denser mesh.

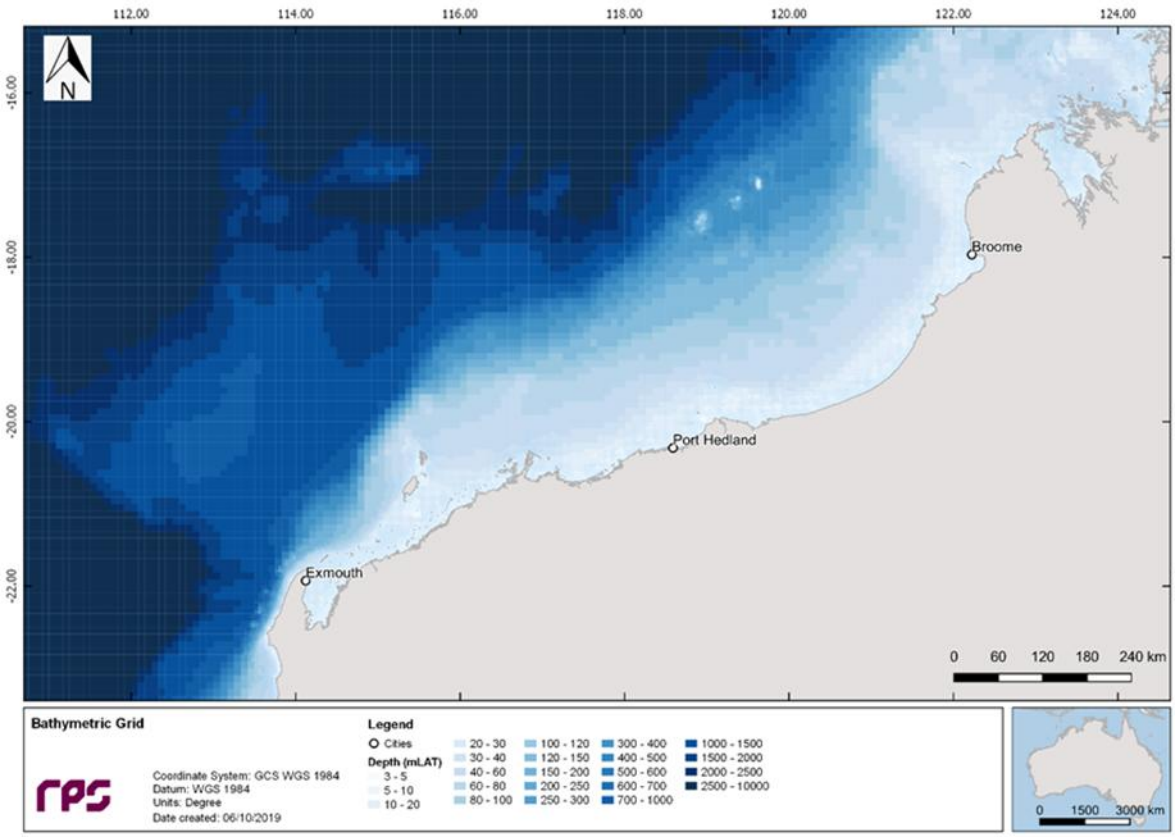


Figure 3.4 Bathymetry defined throughout the tidal model domain.

3.2.5.3 Tidal Conditions

The ocean boundary data for the regional model was obtained from satellite measured altimetry data (TOPEX/Poseidon 7.2) which provided estimates of the eight dominant tidal constituents at a horizontal scale of approximately 0.25 degrees. The eight major tidal constituents used were K_2, S_2, M_2, N_2, K_1, P_1, O_1 and Q_1. Using the tidal data, surface heights were firstly calculated along the open boundaries, at each time step in the model.

The TOPEX/Poseidon satellite data has a global resolution of 0.25 degrees and is produced and quality controlled by NASA (National Aeronautics and Space Administration). The satellites equipped with two highly accurate altimeters and capable of taking sea level measurements with an accuracy of ± 5 cm measured oceanic surface elevations (and the resultant tides) for over 13 years (1992–2005). In total, these satellites carried out 62,000 orbits of the planet.

The TOPEX/Poseidon tidal data has been widely used amongst the oceanographic community, being included in more than 2,100 research publications (e.g. Andersen, 1995; Ludicone et al., 1998; Matsumoto et al., 2000; Kostianoy et al., 2003; Yaremchuk and Tangdong, 2004; Qiu and Chen 2010). As such the TOPEX/Poseidon tidal data is considered suitably accurate for this study.

3.2.5.4 Ocean Currents

Data describing the flow of ocean currents was obtained from HYCOM (Hybrid Coordinate Ocean Model, (Chassignet et al., 2007), which is operated by the HYCOM Consortium, sponsored by the National Ocean Partnership Program (NOPP), as part of the U.S. Global Ocean Data Assimilation Experiment (GODAE). HYCOM is a data-assimilative, three-dimensional ocean model that is run as a hindcast (for a past period), assimilating time-varying observations of sea surface height, sea surface temperature and in-situ temperature and salinity measurements (Chassignet et al., 2009). The HYCOM predictions for drift currents are produced at a horizontal spatial resolution of approximately 8.25 km (1/12th of a degree) over the region, at a frequency of every 3 hours. HYCOM uses isopycnal layers in the open, stratified ocean, but uses the layered continuity equation to make a dynamically smooth transition to a terrain following coordinate in shallow coastal regions, and to z-level coordinates in the mixed layer and/or unstratified seas.

For this study, the HYCOM hindcast currents were obtained for the years 2010 to 2019 (inclusive).

Note the convention for defining current direction throughout this report is the direction the current flows towards. Each branch of the current rose distribution represents the currents flowing to that direction, with north to the top of the diagram. The branches are divided into segments of different colour, which represent the current speed ranges for each direction. Speed intervals of 0.1 m/s are typically used in these current roses. The length of each coloured segment within a branch is proportional to the frequency of currents flowing within the corresponding speed and direction.

3.2.5.5 Surface Currents

Table 3.6 presents the predicted average and maximum monthly surface current speeds at the release location.

The monthly average surface current speeds ranged between 0.24 m/s (December) and 0.29 m/s (June). Additionally, the maxima ranged between 0.66 m/s (November) and 2.08 m/s (March). The general current directions were aligned with the northwest-southeast axis.

Figure 3.5 and Figure 3.6 present the monthly and total current rose distributions, respectively.

Table 3.6 Predicted monthly average and maximum surface current speeds close to the release location. Data derived by combining the HYCOM ocean data and HYDROMAP high resolution tidal data from 2010-2019.

Month	Average current speed (m/s)	Maximum current speed (m/s)	General direction (towards)
January	0.26	1.59	Northwest and east
February	0.25	0.87	Northwest and east
March	0.26	2.08	Northwest and east-southeast
April	0.25	1.09	Northwest and east-southeast
May	0.27	1.01	West
June	0.29	0.84	West
July	0.27	1.02	West
August	0.25	0.80	West and east-southeast
September	0.26	0.81	Northwest and east-southeast
October	0.25	0.70	Northwest and east
November	0.25	0.66	Northwest and east
December	0.24	0.80	East
Minimum	**0.24**	**0.66**	-
Maximum	**0.29**	**2.08**	-

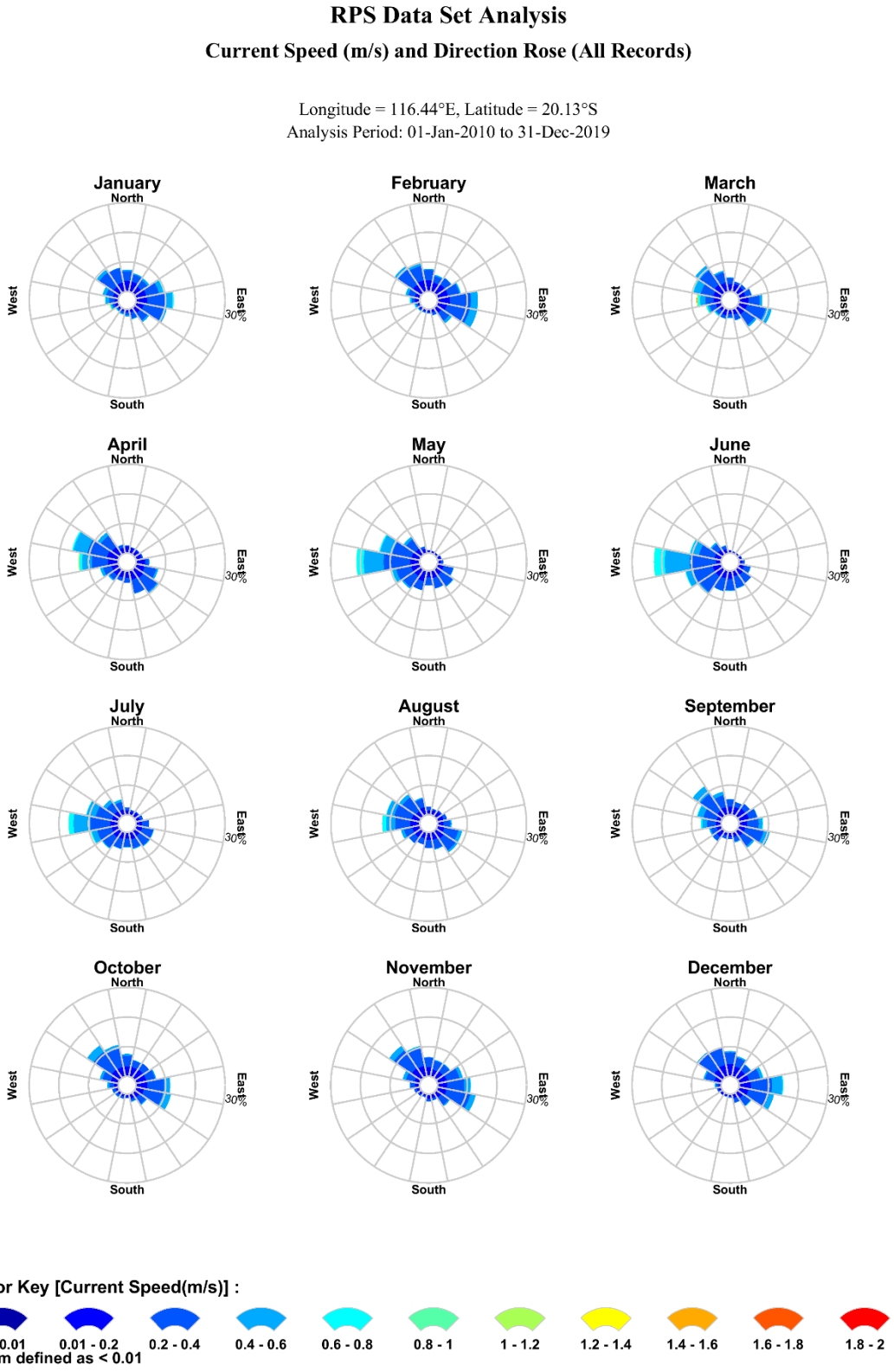


Figure 3.5 Monthly surface current rose distributions at the release location derived from the 2010 to 2019 modelled dataset.

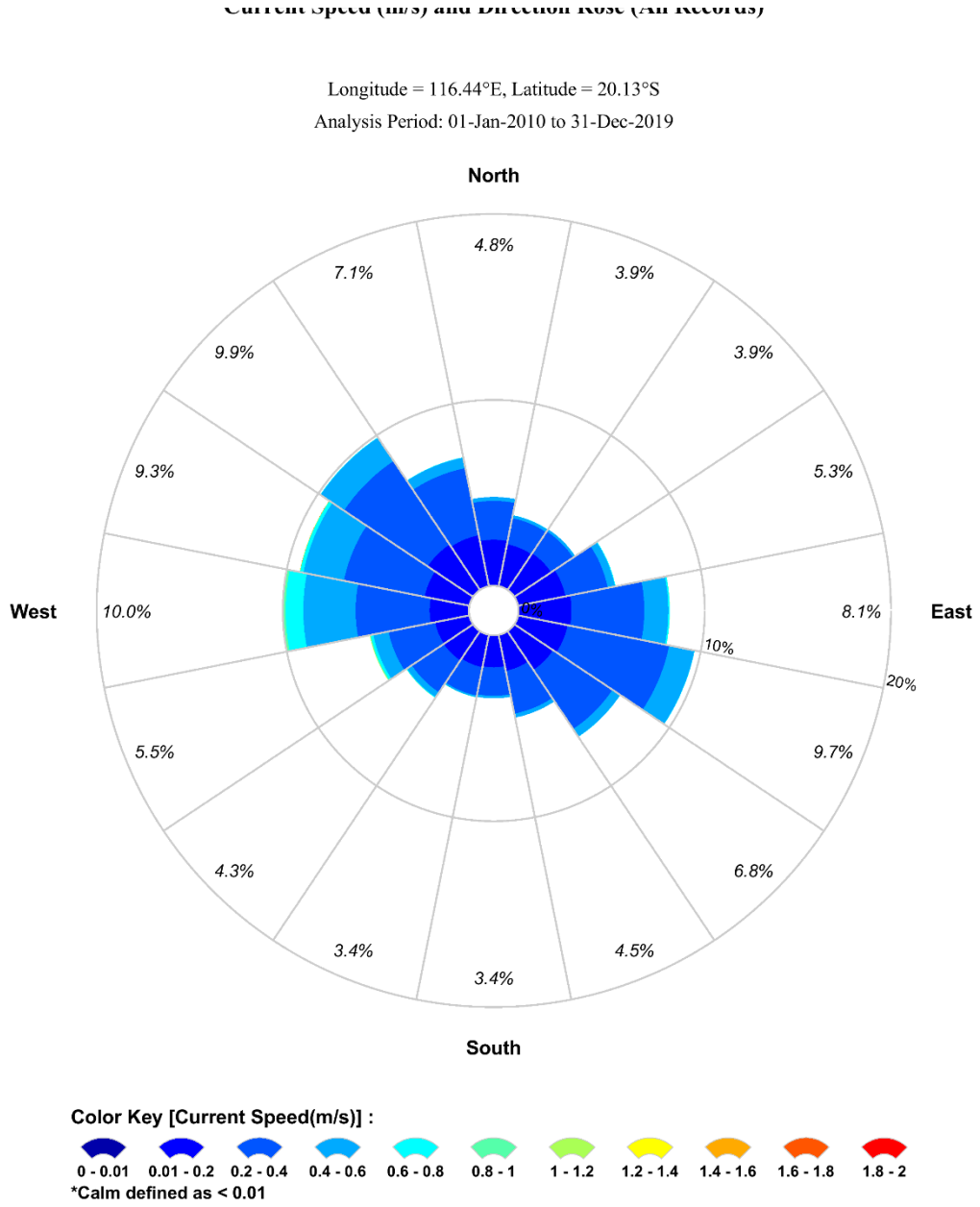


Figure 3.6 Seasonal surface current rose plot at the release location derived from the 2010 to 2019 modelled dataset.

4 MODELLING RESULTS

4.1 Near-Field Modelling

4.1.1 Overview

Figure 4.1 to Figure 4.3 show the change in minimum dilution of the plume under varying current speeds (weak, medium and strong) and seasons (summer and winter). The figures show the predicted horizontal distance travelled by the plume before the trapping depth is reached (i.e. before the plume becomes neutrally buoyant). Please note the differing x-axis and y-axis aspect ratios between the cases to best highlight details for each case.

The plots show the general shape expected for the plume given the discharge characteristics and different current speeds. The downward directed jet is forecasted to plunge due to the initial momentum of the discharge, then rise to the water surface because the plume will maintain positive buoyancy at the end of the plunge phase.

The plots also show the expected bending of the plume to align with the current direction over the plunge and rise phase. Faster currents speeds are forecasted to result in the plume aligning to the current direction more quickly, commencing during the plunge phase and continuing during the buoyant rise phase.

Under strong currents, the near-field mixing region ends 37.8 m and 35.2 m away from the release site during summer and winter respectively, when the plume reached the surface at 42.7 and 41.6 dilutions. Accordingly, under moderate current conditions, the plume reached the surface at distances of 19.8 m and 18.1 m, with 31.2 and 29.4 dilutions respectively. Under slow currents, the same happened at distances of 3.5 m and 3.1 m during summer and winter, reaching 10.2 and 10.0 dilutions.

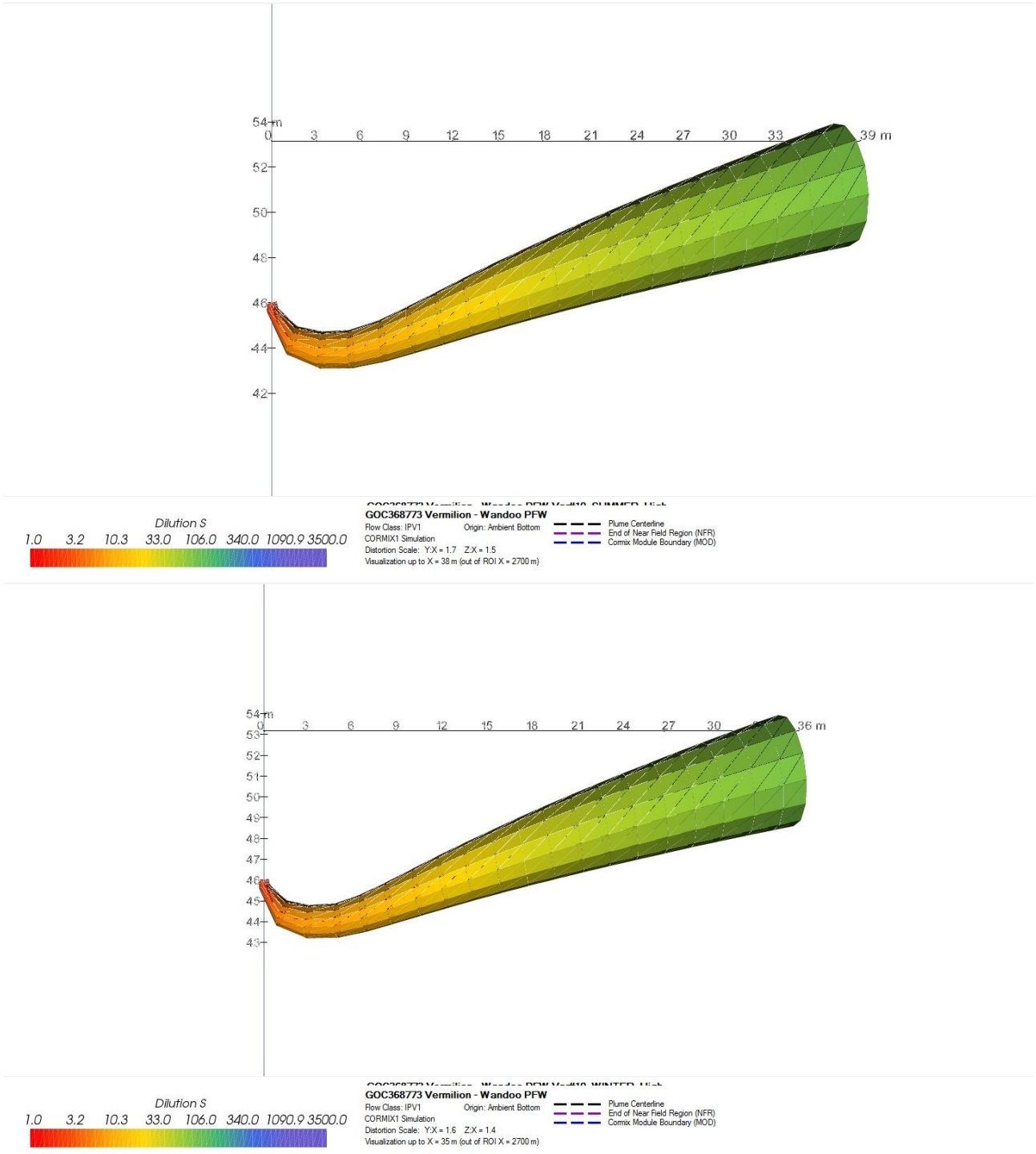


Figure 4.1 Near-field average dilution results for constant strong currents with a discharge flow rate of 37,500 m^3/d at discharge height of 8 m below the sea surface during summer (top) and winter (bottom) conditions.

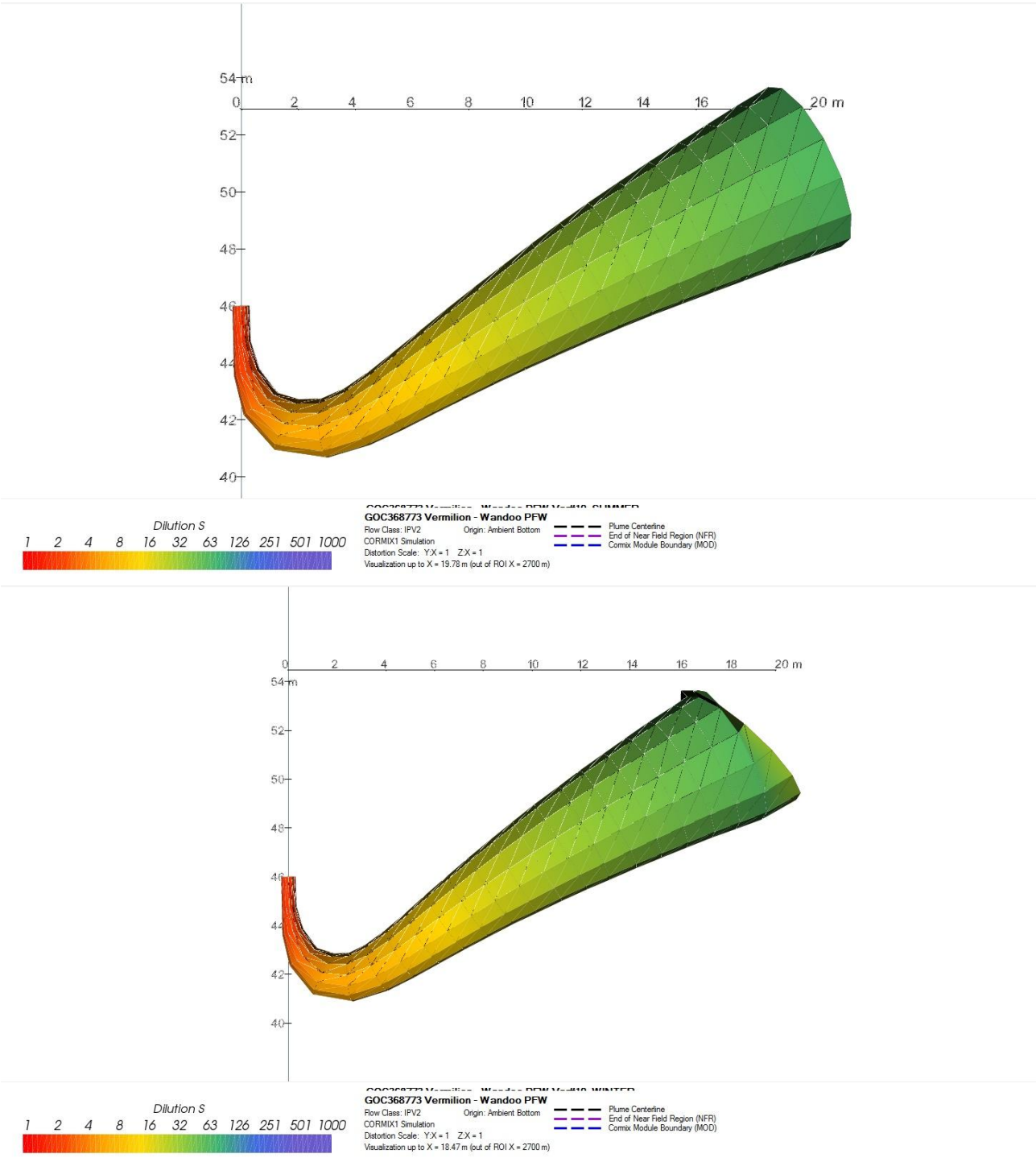


Figure 4.2 Near-field average dilution results for constant medium currents with a discharge flow rate of 37,500 m^3/d at discharge height of 8 m below the sea surface during summer (top) and winter (bottom) conditions.

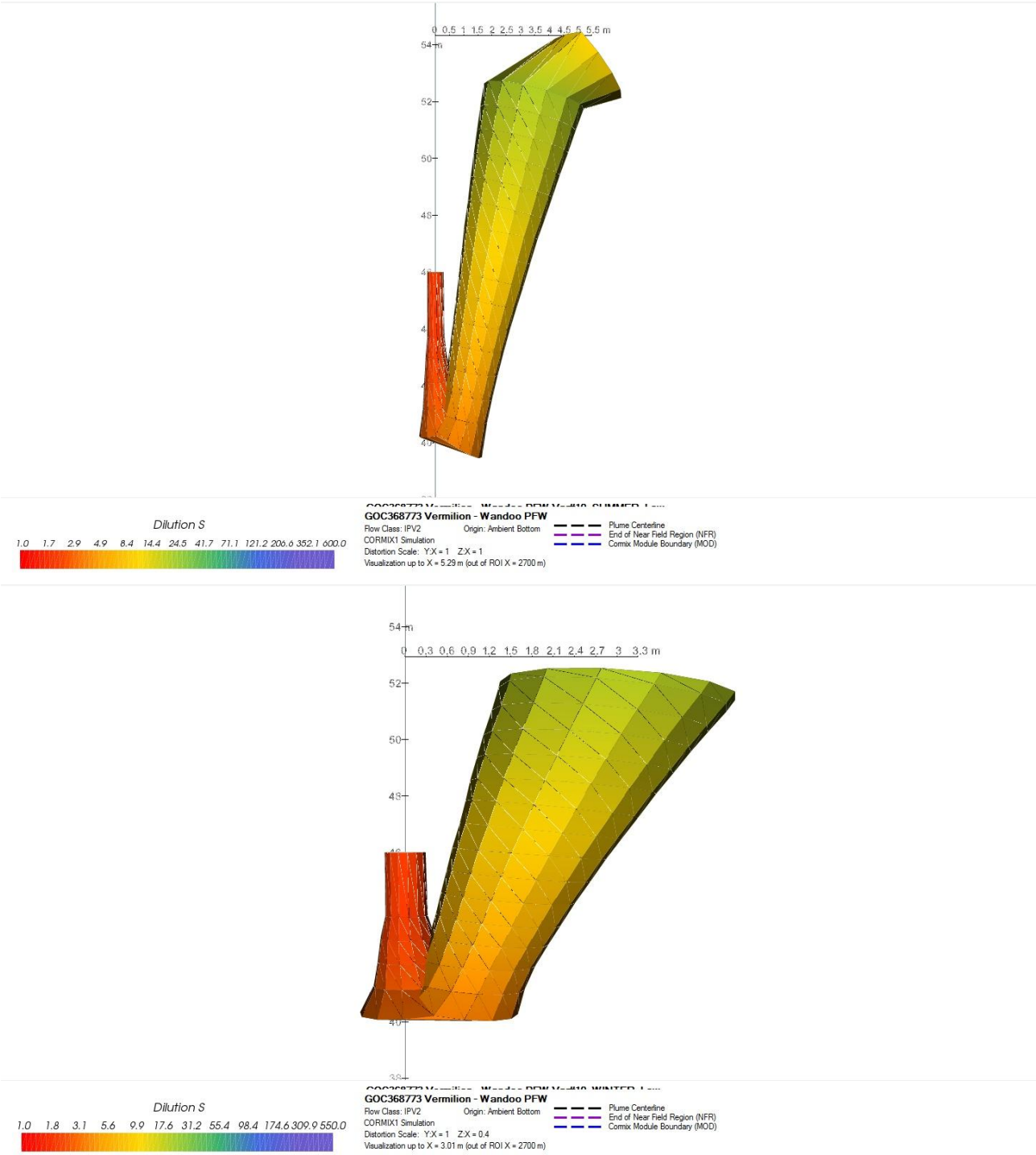


Figure 4.3 Near-field average dilution results for constant weak currents with a discharge flow rate of 37,500 m^3/d at discharge height of 8 m below the sea surface during summer (top) and winter (bottom) conditions.

4.2 Far-Field Modelling

4.2.1 Overview

Near-field and far-field modelling describe different processes at different scales, so their results may not always align where the two overlap near the discharge location. Far-field modelling accounts for time-varying currents, which can sometimes lead to plume pooling at the release site under weak currents. When this pooled plume is later carried away, it can result in lower dilutions (higher concentrations) migrating farther from the discharge point.

4.2.2 Interpretation of Percentile Dilution Contours

Simulation results were aggregated, and statistical analysis was conducted to derive the 95th percentile dilution.

It is important to note that the 95th percentile dilution figures provided do not represent the spatial extent of the plume at any single moment in time. Instead, it provides a statistical and spatial summary of how often specific dilution values occur across all simulations. For example, if the model predicts a 95th percentile minimum dilution of 100 at a given location, this indicates that dilution levels are greater than 100 for 95% of the time and fall below this threshold for only 5% of the time. Given the 5-day simulation period used in the model, a 5% exceedance translates to approximately 6 hours. This statistical approach is inherently conservative, as it compares a 6-hour exposure duration to whole effluent toxicity thresholds established over 48 or 96 hours in laboratory conditions for 99% species protection.

Dilution contours were derived by calculating the ratio of contaminant concentrations in the receiving waters to the initial discharge concentration. This analysis assumes that the background concentration of the discharged constituent is negligible and that no significant biodegradation occurs over the short timescale of the dispersion process. Under these assumptions, dilution values provide a direct means of estimating concentration changes, given an initial discharge concentration, as illustrated in Table 4-1.

Table 4-1 Example calculations for concentration change given change in dilution.

Parameter	Constituent Concentration (mg/L)
Initial concentration in discharge	100
Initial concentration in receiving waters	0.0
Concentration at 1:100 dilution	1.0
Concentration at 1:200 dilution	0.5
Concentration at 1:322 dilution	0.3
Concentration at 1:345 dilution	0.29
Concentration at 1:400 dilution	0.25

4.2.3 Annual Analysis

The model outputs over the ten-year hindcast period (2010-2019) were combined and analysed on an annual basis.

Table 4-2 summarises the maximum distances from the discharge location to achieve 256, 714 and 1,205 dilutions for the 95th percentile. Threshold concentrations relating to the assessed dilutions should be achieved within maximum distances of approximately 490 m, 2,815 m and 5,690 m respectively at the 95th percentile.

The dilution map for the 95th percentile is depicted in Figure 4.4, along with contours illustrating the distances from the release location for concentrations to reach the assessed thresholds.

Table 4-2 Maximum distance from the PFW discharge location to achieve threshold dilutions (discharge at 37,500 m^3/d).

Statistic	Dilutions (1:X)	Maximum distance (m) from discharge location to achieve given dilution
95th Percentile	200	342
	256	**490**
	400	768
	500	1,180
	600	2,268
	714	**2,815**
	800	4,151
	900	4,190
	1,000	4,930
	1,100	5,569
	1,205	**5,690**
	1,300	6,894

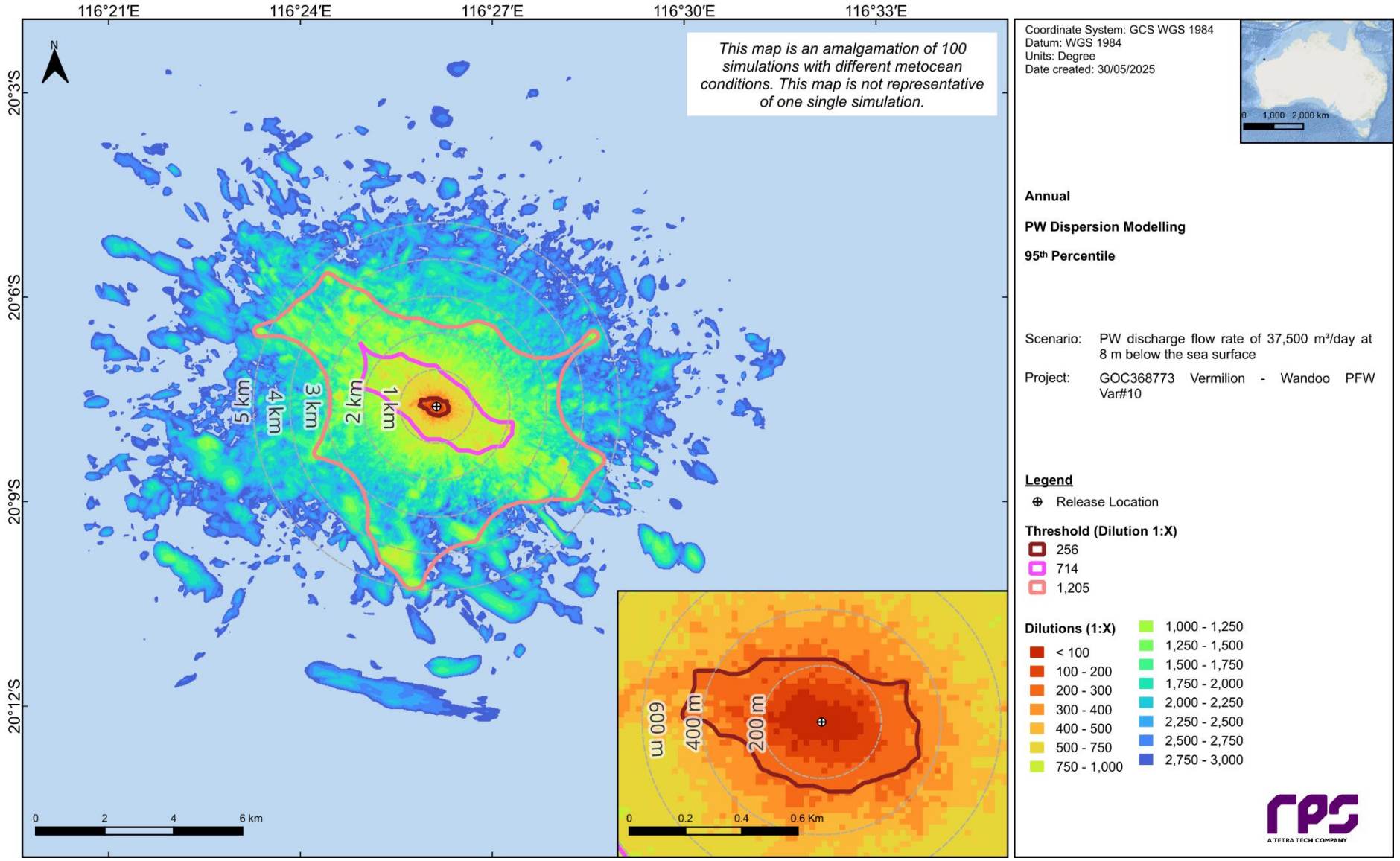


Figure 4.4 Calculation for the 95th percentile distance that may be affected by dilutions of the PFW (discharge at 37,500 m³/d). Results refer to annual conditions.

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Appendix D Protected Matters Search Reports

Australian Government

Department of Climate Change, Energy, the Environment and Water

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 18-Mar-2026

[Summary](#)

[Details](#)

- [Matters of NES](#)
- [Other Matters Protected by the EPBC Act](#)
- [Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

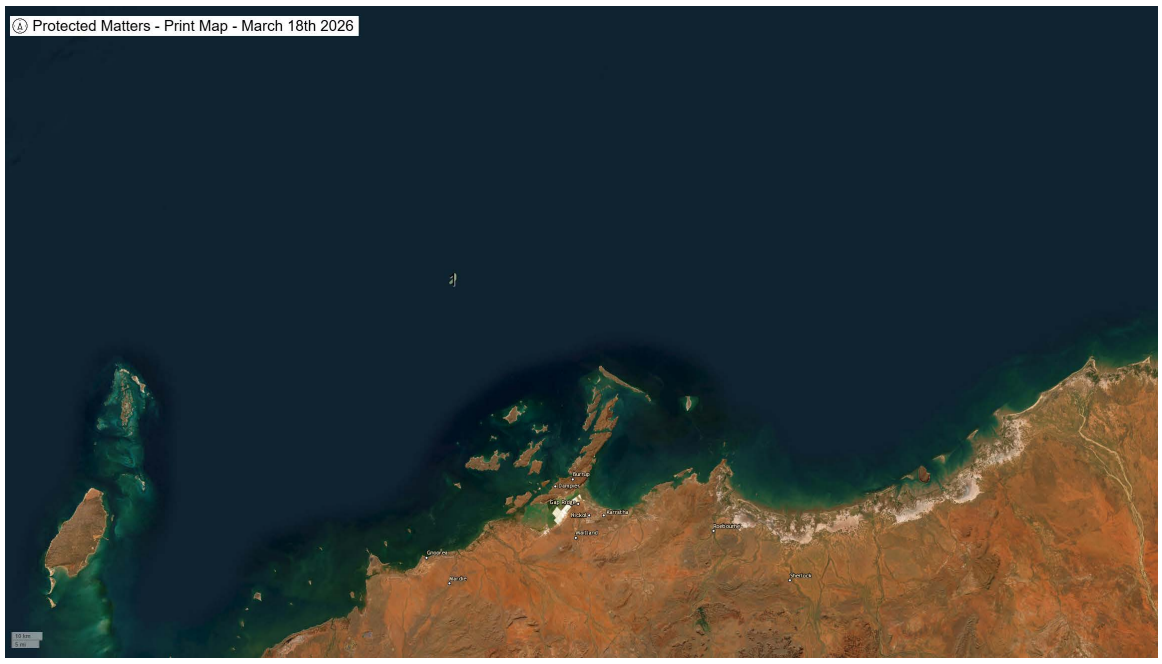


Figure 1 - Operational Area



Figure 2 - Operational Area

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	25
Listed Migratory Species:	42

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	71
Whales and Other Cetaceans:	17
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	1

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	7
Key Ecological Features (Marine):	None
Biologically Important Areas:	4
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
Commonwealth Marine Areas (EPBC Act)

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
[Phaethon rubricauda westralis](#)		
Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Species or species habitat likely to occur within area
[Sternula nereis nereis](#)		
Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
MAMMAL		
[Balaenoptera borealis](#)		
Sei Whale [34]	Vulnerable	Species or species habitat may occur within area
[Balaenoptera musculus](#)		
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
[Balaenoptera physalus](#)		
Fin Whale [37]	Vulnerable	Species or species habitat may occur within area
[Orcaella heinsohni](#)		
Australian Snubfin Dolphin [81322]	Vulnerable	Species or species habitat may occur within area
[Sousa sahulensis](#)		
Australian Humpback Dolphin [87942]	Vulnerable	Species or species habitat may occur within area
REPTILE		
[Caretta caretta](#)		
Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
[Chelonia mydas](#)		
Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
[Dermochelys coriacea](#)		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
[Eretmochelys imbricata](#)		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area
SHARK		
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Pristis clavata		
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis		
Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Endangered	Species or species habitat may occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sphyrna lewini		
Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
null		
Balaenoptera omurai		
Omura's Whale [87136]		Species or species habitat likely to occur within area
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Species or species habitat likely to occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharias taurus Grey Nurse Shark [64469]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Vulnerable	Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Endangered	Species or species habitat may occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sousa sahulensis as Sousa chinensis Australian Humpback Dolphin [87942]	Vulnerable	Species or species habitat may occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area

Migratory Wetlands Species

Scientific Name	Threatened Category	Presence Text
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
[Phaethon lepturus fulvus](#) Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
[Phaethon rubricauda](#) Red-tailed Tropicbird [994]		Species or species habitat likely to occur within area
Fish		
[Acentronura larsonae](#) Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area
[Bulbonaricus brauni](#) Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
[Campichthys tricarinatus](#) Three-keel Pipefish [66192]		Species or species habitat may occur within area
[Choeroichthys brachysoma](#) Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
[Choeroichthys latispinosus](#) Muiron Island Pipefish [66196]		Species or species habitat may occur within area
[Choeroichthys suillus](#) Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
[Corythoichthys flavofasciatus](#) Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
[Cosmocampus banneri](#) Roughridge Pipefish [66206]		Species or species habitat may occur within area
[Doryrhamphus dactyliophorus](#) Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Reptile		
Aipysurus duboisii Dubois' Sea Snake, Dubois' Seasnake, Reef Shallows Sea Snake [1116]		Species or species habitat may occur within area
Aipysurus laevis Olive Sea Snake, Olive-brown Sea Snake [1120]		Species or species habitat may occur within area
Aipysurus mosaicus as Aipysurus eydouxii Mosaic Sea Snake [87261]		Species or species habitat may occur within area
Aipysurus tenuis Brown-lined Sea Snake, Mjoberg's Sea Snake [1121]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Ephalophis greyae as Ephalophis greyi Mangrove Sea Snake [93738]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Hydrelaps darwiniensis Port Darwin Sea Snake, Black-ringed Mangrove Sea Snake [1100]		Species or species habitat may occur within area
Hydrophis czeblukovi Fine-spined Sea Snake [59233]		Species or species habitat may occur within area
Hydrophis elegans Elegant Sea Snake, Bar-bellied Sea Snake [1104]		Species or species habitat may occur within area
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]		Species or species habitat may occur within area
Hydrophis macdowelli as Hydrophis mcdowelli MacDowell's Sea Snake, Small-headed Sea Snake, [75601]		Species or species habitat may occur within area
Hydrophis major as Disteira major Olive-headed Sea Snake [93512]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Sea Snake, Ornate Reef Sea Snake [1111]		Species or species habitat may occur within area
Hydrophis peronii as Acalyptophis peronii Horned Sea Snake [93509]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hydrophis platura as Pelamis platurus Yellow-bellied Sea Snake [93746]		Species or species habitat may occur within area
Hydrophis stokesii as Astrotia stokesii Stokes' Sea Snake [93510]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area

Whales and Other Cetaceans		[Resource Information]
Current Scientific Name	Status	Type of Presence
Mammal		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera omurai Omura's Whale [87136]		Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat may occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Vulnerable	Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa sahulensis Australian Humpback Dolphin [87942]	Vulnerable	Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat may occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Habitat Critical to the Survival of Marine Turtles		[Resource Information]
Scientific Name	Behaviour	Presence
All year (Jun - Aug)		

Scientific Name	Behaviour	Presence
Natator depressus		
Flatback Turtle [59257]	Nesting	Known to occur

Extra Information

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
DAVROS MC 3D marine seismic survey northwaet of Dampier, WA	2013/7092		Completed
Deep Water Northwest Shelf 2D Seismic Survey	2007/3260		Completed
Not controlled action (particular manner)			
'Tourmaline' 2D marine seismic survey, permit areas WA-323-P, WA-330-P and WA-32	2005/2282	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey in WA 457-P & WA 458-P, North West Shelf, offshore WA	2013/6862	Not Controlled Action (Particular Manner)	Post-Approval
Reindeer gas reservior development, Devil Creek, Carnarvon Basin - WA	2007/3917	Not Controlled Action (Particular Manner)	Post-Approval
Stag 4D & Reindeer MAZ Marine Seismic Surveys, WA	2013/7080	Not Controlled Action (Particular Manner)	Post-Approval
West Panaeus 3D seismic survey	2006/3141	Not Controlled Action (Particular Manner)	Post-Approval

Biologically Important Areas		[Resource Information]
Scientific Name	Behaviour	Presence
Marine Turtles		

Scientific Name	Behaviour	Presence
[Natator depressus](#) Flatback Turtle [59257]	Internesting buffer	Known to occur
Seabirds		
[Ardenna pacifica](#) Wedge-tailed Shearwater [84292]	Breeding	Known to occur
Sharks		
[Rhincodon typus](#) Whale Shark [66680]	Foraging	Known to occur
Whales		
[Megaptera novaeangliae](#) Humpback Whale [38]	Migration (north and south)	Known to occur

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data is available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on the contents of this report.

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions when time permits.

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded breeding sites; and
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 26-Mar-2026

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	1
National Heritage Places:	1
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	36
Listed Migratory Species:	60

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	96
Whales and Other Cetaceans:	27
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	2
Habitat Critical to the Survival of Marine Turtles:	3

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	6
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	44
Key Ecological Features (Marine):	2
Biologically Important Areas:	25
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Legal Status
Murujuga Cultural Landscape	WA	Declared property

National Heritage Places [Resource Information]

Name	State	Legal Status
Indigenous		
Dampier Archipelago (including Burrup Peninsula)	WA	Listed place

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Endangered	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Phaethon rubricauda westralis Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Sternula albifrons Little Tern [82849]	Vulnerable	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area
MAMMAL		

Scientific Name	Threatened Category	Presence Text
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Vulnerable	Species or species habitat likely to occur within area
Sousa sahulensis Australian Humpback Dolphin [87942]	Vulnerable	Species or species habitat known to occur within area
REPTILE		
Aipysurus apraefrontalis Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus foliosquama Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Liasis olivaceus barroni		
Pilbara Olive Python [66699]	Vulnerable	Species or species habitat known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
SHARK		
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Pristis clavata		
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis		
Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Endangered	Species or species habitat may occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sphyrna lewini		
Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
null		
Balaenoptera omurai		
Omura's Whale [87136]		Species or species habitat likely to occur within area
Migratory Marine Birds		

Scientific Name	Threatened Category	Presence Text
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat likely to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Species or species habitat likely to occur within area
Sterna dougallii Roseate Tern [817]		Breeding likely to occur within area

Scientific Name	Threatened Category	Presence Text
Sternula albifrons Little Tern [82849]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharias taurus Grey Nurse Shark [64469]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Vulnerable	Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Endangered	Species or species habitat may occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sousa sahulensis as Sousa chinensis Australian Humpback Dolphin [87942]	Vulnerable	Species or species habitat known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Tringa nebularia		
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus		
Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Ardenna pacifica as Puffinus pacificus		
Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris canutus		
Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area overfly marine area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area overfly marine area
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]		Breeding known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area overfly marine area
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat may occur within area overfly marine area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat likely to occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Phaethon rubricauda Red-tailed Tropicbird [994]		Species or species habitat likely to occur within area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area
Sterna dougallii Roseate Tern [817]		Breeding likely to occur within area
Sternula albifrons as Sterna albifrons Little Tern [82849]	Vulnerable	Species or species habitat may occur within area
Sternula nereis as Sterna nereis Fairy Tern [82949]		Breeding known to occur within area
Thalasseus bergii as Sterna bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area overfly marine area
Fish		
Acentronura larsonae Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Choeroichthys latispinosus Muiron Island Pipefish [66196]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammal		
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Reptile		
Aipysurus apraefrontalis Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Aipysurus duboisii Dubois' Sea Snake, Dubois' Seasnake, Reef Shallows Sea Snake [1116]		Species or species habitat may occur within area
Aipysurus foliosquama Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus laevis Olive Sea Snake, Olive-brown Sea Snake [1120]		Species or species habitat may occur within area
Aipysurus mosaicus as Aipysurus eydouxii Mosaic Sea Snake [87261]		Species or species habitat may occur within area
Aipysurus tenuis Brown-lined Sea Snake, Mjoberg's Sea Snake [1121]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Emydocephalus annulatus Eastern Turtle-headed Sea Snake [1125]		Species or species habitat may occur within area
Ephalophis greyae as Ephalophis greyi Mangrove Sea Snake [93738]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Hydrelaps darwiniensis Port Darwin Sea Snake, Black-ringed Mangrove Sea Snake [1100]		Species or species habitat may occur within area
Hydrophis czeblukovi Fine-spined Sea Snake [59233]		Species or species habitat may occur within area
Hydrophis elegans Elegant Sea Snake, Bar-bellied Sea Snake [1104]		Species or species habitat may occur within area
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]		Species or species habitat may occur within area
Hydrophis macdowelli as Hydrophis mcdowelli MacDowell's Sea Snake, Small-headed Sea Snake, [75601]		Species or species habitat may occur within area
Hydrophis major as Disteira major Olive-headed Sea Snake [93512]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Sea Snake, Ornate Reef Sea Snake [1111]		Species or species habitat may occur within area
Hydrophis peronii as Acalyptophis peronii Horned Sea Snake [93509]		Species or species habitat may occur within area
Hydrophis platura as Pelamis platurus Yellow-bellied Sea Snake [93746]		Species or species habitat may occur within area
Hydrophis stokesii as Astrotia stokesii Stokes' Sea Snake [93510]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area

Whales and Other Cetaceans

[Resource Information]

Current Scientific Name	Status	Type of Presence
Mammal		

Current Scientific Name	Status	Type of Presence
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Balaenoptera omurai Omura's Whale [87136]		Species or species habitat likely to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Kogia sima Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Vulnerable	Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa sahulensis Australian Humpback Dolphin [87942]	Vulnerable	Species or species habitat known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks [Resource Information]

Park Name	Zone & IUCN Categories
Dampier	Habitat Protection Zone (IUCN IV)
Montebello	Multiple Use Zone (IUCN VI)

Habitat Critical to the Survival of Marine Turtles [Resource Information]

Scientific Name	Behaviour	Presence
All year (Jun - Aug)		
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur
Oct - Feb		
Eretmochelys imbricata Hawksbill Turtle [1766]	Nesting	Known to occur
Oct - Mar		
Chelonia mydas Green Turtle [1765]	Nesting	Known to occur

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State
Unnamed WA36907	5(1)(h) Reserve	WA
Unnamed WA36909	5(1)(h) Reserve	WA
Unnamed WA36910	5(1)(h) Reserve	WA
Unnamed WA36913	Nature Reserve	WA
Unnamed WA36915	Nature Reserve	WA
Unnamed WA40877	5(1)(h) Reserve	WA

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status
Browse to North West Shelf Development, Indian Ocean, WA	2018/8319		Approval
DAVROS MC 3D marine seismic survey northwaet of Dampier, WA	2013/7092		Completed
Deep Water Northwest Shelf 2D Seismic Survey	2007/3260		Completed
North West Shelf Project Extension, Carnarvon Basin, WA	2018/8335		Approval
Controlled action			
Construct and operate LNG & domestic gas plant including onshore and offshore facilities - Wheatston	2008/4469	Controlled Action	Post-Approval
Development of Angel gas and condensate field, North West Shelf	2004/1805	Controlled Action	Post-Approval
Development of Browse Basin Gas Fields (Upstream)	2008/4111	Controlled Action	Completed
Equus Gas Fields Development Project, Carnarvon Basin	2012/6301	Controlled Action	Completed
Eramurra Industrial Salt Project	2021/9027	Controlled Action	Assessment Approach
Perdaman Urea Project, near Karratha, WA	2018/8383	Controlled Action	Post-Approval
Not controlled action			

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
'Goodwyn A' Low Pressure Train Project	2003/914	Not Controlled Action	Completed
Drilling of an exploration well Gats-1 in Permit Area WA-261-P	2004/1701	Not Controlled Action	Completed
Maia-Gaea Exploration wells	2000/17	Not Controlled Action	Completed
Murujuga archaeological excavation, collection and sampling, Dampier Archipelago, WA	2014/7160	Not Controlled Action	Completed
North Rankin B gas compression facility	2005/2500	Not Controlled Action	Completed
Pipeline System Modifications Project	2000/3	Not Controlled Action	Completed
Port Expansion and Dredging	2003/1265	Not Controlled Action	Completed
Project Highclere Geophysical Survey	2021/9023	Not Controlled Action	Completed
Searipple gas and condensate field development	2000/89	Not Controlled Action	Completed
sub-sea tieback of Perseus field wells	2004/1326	Not Controlled Action	Completed
Telstra North Rankin Spur Fibre Optic Cable	2016/7836	Not Controlled Action	Completed
To construct and operate an offshore submarine fibre optic cable, WA	2014/7373	Not Controlled Action	Completed
Western Flank Gas Development	2005/2464	Not Controlled Action	Completed
Not controlled action (particular manner)			
'Tourmaline' 2D marine seismic survey, permit areas WA-323-P, WA-330-P and WA-32	2005/2282	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Survey	2005/2146	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Survey Permit Area WA-352-P	2008/4628	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
3D Marine Seismic Survey in WA 457-P & WA 458-P, North West Shelf, offshore WA	2013/6862	Not Controlled Action (Particular Manner)	Post-Approval
Cue Seismic Survey within WA-359-P, WA-361-P and WA-360-P	2007/3647	Not Controlled Action (Particular Manner)	Post-Approval
Decommissioning of the Legendre facilities	2010/5681	Not Controlled Action (Particular Manner)	Post-Approval
Demeter 3D Seismic Survey, off Dampier, WA	2002/900	Not Controlled Action (Particular Manner)	Post-Approval
Diesel Fuel Bunker Operation	2012/6289	Not Controlled Action (Particular Manner)	Post-Approval
Foxhound 3D Non-Exclusive Marine Seismic Survey	2009/4703	Not Controlled Action (Particular Manner)	Post-Approval
Greater Western Flank Phase 1 gas Development	2011/5980	Not Controlled Action (Particular Manner)	Post-Approval
Moosehead 2D seismic survey within permit WA-192-P	2005/2167	Not Controlled Action (Particular Manner)	Post-Approval
Reindeer gas reservior development, Devil Creek, Carnarvon Basin - WA	2007/3917	Not Controlled Action (Particular Manner)	Post-Approval
Santos Winchester three dimensional seismic survey - WA-323-P & WA-330-P	2011/6107	Not Controlled Action (Particular Manner)	Post-Approval
Scarborough Development nearshore component, NWS, WA	2018/8362	Not Controlled Action (Particular Manner)	Post-Approval
Stag 4D & Reindeer MAZ Marine Seismic Surveys, WA	2013/7080	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Stag Off-bottom Cable Seismic Survey	2007/3696	Not Controlled Action (Particular Manner)	Post-Approval
The Dampier Heavy Load Out Facility Berth and Swing Basin Expansion	2012/6271	Not Controlled Action (Particular Manner)	Post-Approval
Tidepole Maz 3D Seismic Survey Campaign	2007/3706	Not Controlled Action (Particular Manner)	Post-Approval
Undertake a 3D marine seismic survey	2010/5695	Not Controlled Action (Particular Manner)	Post-Approval
West Panaeus 3D seismic survey	2006/3141	Not Controlled Action (Particular Manner)	Post-Approval
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Ancient coastline at 125 m depth contour	North-west
Glomar Shoals	North-west

Biologically Important Areas [Resource Information]

Scientific Name	Behaviour	Presence
Marine Turtles		
Caretta caretta Loggerhead Turtle [1763]	Internesting buffer	Known to occur
Caretta caretta Loggerhead Turtle [1763]	Nesting	Known to occur

Scientific Name	Behaviour	Presence
Chelonia mydas Green Turtle [1765]	Foraging	Known to occur
Chelonia mydas Green Turtle [1765]	Internesting	Known to occur
Chelonia mydas Green Turtle [1765]	Internesting buffer	Known to occur
Chelonia mydas Green Turtle [1765]	Mating	Known to occur
Chelonia mydas Green Turtle [1765]	Migration corridor	Known to occur
Chelonia mydas Green Turtle [1765]	Nesting	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Foraging	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting buffer	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Mating	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Migration corridor	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Nesting	Known to occur
Natator depressus Flatback Turtle [59257]	Foraging	Known to occur
Natator depressus Flatback Turtle [59257]	Internesting	Known to occur

Scientific Name	Behaviour	Presence
Natator depressus Flatback Turtle [59257]	Internesting buffer	Known to occur
Natator depressus Flatback Turtle [59257]	Mating	Known to occur
Natator depressus Flatback Turtle [59257]	Migration corridor	Known to occur
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur
Seabirds		
Ardenna pacifica Wedge-tailed Shearwater [84292]	Breeding	Known to occur
Sterna dougallii Roseate Tern [817]	Breeding	Known to occur
Sternula nereis Fairy Tern [82949]	Breeding	Known to occur
Sharks		
Rhincodon typus Whale Shark [66680]	Foraging	Known to occur
Whales		
Megaptera novaeangliae Humpback Whale [38]	Migration (north and south)	Known to occur

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data is available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on the contents of this report.

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions when time permits.

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded breeding sites; and
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.



Figure: Wandoo Facility EP Hydrocarbon Area

Report created: 27-Nov-2025

Summary

Details

- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat

Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	2
National Heritage Places:	2
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	2
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	56
Listed Migratory Species:	68

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	3
Commonwealth Heritage Places:	2
Listed Marine Species:	106
Whales and Other Cetaceans:	31
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	7
Habitat Critical to the Survival of Marine Turtles:	4

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	29
Regional Forest Agreements:	None
Nationally Important Wetlands:	1
EPBC Act Referrals:	183
Key Ecological Features (Marine):	6
Biologically Important Areas:	39
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Legal Status
Murujuga Cultural Landscape	WA	Declared property
The Ningaloo Coast	WA	Declared property

National Heritage Places [Resource Information]

Name	State	Legal Status
Indigenous		
Dampier Archipelago (including Burrup Peninsula)	WA	Listed place
Natural		
The Ningaloo Coast	WA	Listed place

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Endangered	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Malurus leucopterus edouardi White-winged Fairy-wren (Barrow Island), Barrow Island Black-and-white Fairy-wren [26194]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pezoporus occidentalis Night Parrot [59350]	Critically Endangered	Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Phaethon rubricauda westralis Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
[Pterodroma mollis](#) Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Rostratula australis](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
[Sternula albifrons](#) Little Tern [82849]	Vulnerable	Breeding known to occur within area
[Sternula nereis nereis](#) Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area
[Thalassarche carteri](#) Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
[Thalassarche impavida](#) Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area
FISH		
[Milyeringa justitia](#) Barrow Cave Gudgeon [86867]	Endangered	Species or species habitat known to occur within area
[Milyeringa veritas](#) Cape Range Cave Gudgeon, Blind Gudgeon [66676]	Vulnerable	Species or species habitat known to occur within area
[Ophisternon candidum](#) Blind Cave Eel [66678]	Vulnerable	Species or species habitat known to occur within area
MAMMAL		
[Balaenoptera borealis](#) Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Scientific Name	Threatened Category	Presence Text
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Bettongia lesueur Barrow and Boodie Islands subspecies Boodie, Burrowing Bettong (Barrow and Boodie Islands) [88021]	Vulnerable	Species or species habitat known to occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Isoodon auratus barrowensis Golden Bandicoot (Barrow Island) [66666]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes conspicillatus conspicillatus Spectacled Hare-wallaby (Barrow Island) [66661]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes hirsutus Central Australian subspecies Mala, Rufous Hare-Wallaby (Central Australia) [88019]	Endangered	Translocated population known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Osphranter robustus isabellinus		
Barrow Island Wallaroo, Barrow Island Euro [89262]	Vulnerable	Species or species habitat likely to occur within area
Petrogale lateralis lateralis		
Black-flanked Rock-wallaby, Moororong, Black-footed Rock Wallaby [66647]	Endangered	Species or species habitat known to occur within area
Rhinonicteris aurantia (Pilbara form)		
Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
Sousa sahulensis		
Australian Humpback Dolphin [87942]	Vulnerable	Species or species habitat known to occur within area
REPTILE		
Aipysurus apraefrontalis		
Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus foliosquama		
Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Ctenotus zastictus		
Hamelin Ctenotus [25570]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Liasis olivaceus barroni		
Pilbara Olive Python [66699]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
SHARK		
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Congregation or aggregation known to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Pristis clavata		
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis		
Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Endangered	Species or species habitat likely to occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sphyrna lewini		
Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area

Listed Migratory Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
null		
Balaenoptera omurai		
Omura's Whale [87136]		Species or species habitat likely to occur within area
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat known to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Species or species habitat likely to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Sternula albifrons Little Tern [82849]	Vulnerable	Breeding known to occur within area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat known to occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Scientific Name	Threatened Category	Presence Text
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharias taurus Grey Nurse Shark [64469]		Congregation or aggregation known to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Dugong dugon Dugong [28]		Breeding known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Endangered	Species or species habitat likely to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sousa sahulensis as Sousa chinensis		
Australian Humpback Dolphin [87942]	Vulnerable	Species or species habitat known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations)		
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Hirundo rustica		
Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Defence	
Defence - EXMOUTH VLF TRANSMITTER STATION [50123]	WA

Commonwealth Land Name	State
Defence - LEARMONTH - AIR WEAPONS RANGE [50193]	WA

Unknown	
Commonwealth Land - [52236]	WA

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Natural		
Learmonth Air Weapons Range Facility	WA	Listed place
Ningaloo Marine Area - Commonwealth Waters	WA	Listed place

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus		
Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Ardenna carneipes as Puffinus carneipes		
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Ardenna pacifica as Puffinus pacificus		
Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Bubulcus ibis as Ardea ibis		
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area overfly marine area
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]		Breeding known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area overfly marine area
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Breeding known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat known to occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Species or species habitat likely to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons as Sterna albifrons Little Tern [82849]	Vulnerable	Breeding known to occur within area
Sternula nereis as Sterna nereis Fairy Tern [82949]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalasseus bengalensis as Sterna bengalensis Lesser Crested Tern [66546]		Breeding known to occur within area
Thalasseus bergii as Sterna bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat likely to occur within area overfly marine area
Fish		
Acentronura larsonae Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys latispinosus Muiron Island Pipefish [66196]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
[Micrognathus micronotopterus](#) Tidepool Pipefish [66255]		Species or species habitat may occur within area
[Phoxocampus belcheri](#) Black Rock Pipefish [66719]		Species or species habitat may occur within area
[Solegnathus hardwickii](#) Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
[Solegnathus lettiensis](#) Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
[Solenostomus cyanopterus](#) Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
[Syngnathoides biaculeatus](#) Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
[Trachyrhamphus bicoarctatus](#) Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
[Trachyrhamphus longirostris](#) Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammal		
[Dugong dugon](#) Dugong [28]		Breeding known to occur within area
Reptile		
[Aipysurus apraefrontalis](#) Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
[Aipysurus duboisii](#) Dubois' Sea Snake, Dubois' Seasnake, Reef Shallows Sea Snake [1116]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Aipysurus foliosquama Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus laevis Olive Sea Snake, Olive-brown Sea Snake [1120]		Species or species habitat may occur within area
Aipysurus mosaicus as Aipysurus eydouxii Mosaic Sea Snake [87261]		Species or species habitat may occur within area
Aipysurus tenuis Brown-lined Sea Snake, Mjoberg's Sea Snake [1121]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Emydocephalus annulatus Eastern Turtle-headed Sea Snake [1125]		Species or species habitat may occur within area
Ephalophis greyae as Ephalophis greyi Mangrove Sea Snake [93738]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Hydrelaps darwiniensis Port Darwin Sea Snake, Black-ringed Mangrove Sea Snake [1100]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hydrophis czeblukovi Fine-spined Sea Snake [59233]		Species or species habitat may occur within area
Hydrophis elegans Elegant Sea Snake, Bar-bellied Sea Snake [1104]		Species or species habitat may occur within area
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]		Species or species habitat may occur within area
Hydrophis macdowelli as Hydrophis mcdowelli MacDowell's Sea Snake, Small-headed Sea Snake, [75601]		Species or species habitat may occur within area
Hydrophis major as Disteira major Olive-headed Sea Snake [93512]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Sea Snake, Ornate Reef Sea Snake [1111]		Species or species habitat may occur within area
Hydrophis peronii as Acalyptophis peronii Horned Sea Snake [93509]		Species or species habitat may occur within area
Hydrophis platura as Pelamis platurus Yellow-bellied Sea Snake [93746]		Species or species habitat may occur within area
Hydrophis stokesii as Astrotia stokesii Stokes' Sea Snake [93510]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area

Whales and Other Cetaceans		[Resource Information]
Current Scientific Name	Status	Type of Presence
Mammal		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
[Balaenoptera bonaerensis](#) Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
[Balaenoptera borealis](#) Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Balaenoptera edeni](#) Bryde's Whale [35]		Species or species habitat likely to occur within area
[Balaenoptera musculus](#) Blue Whale [36]	Endangered	Migration route known to occur within area
[Balaenoptera omurai](#) Omura's Whale [87136]		Species or species habitat likely to occur within area
[Balaenoptera physalus](#) Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Delphinus delphis](#) Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
[Eubalaena australis](#) Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
[Feresa attenuata](#) Pygmy Killer Whale [61]		Species or species habitat may occur within area
[Globicephala macrorhynchus](#) Short-finned Pilot Whale [62]		Species or species habitat may occur within area
[Grampus griseus](#) Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area
Kogia sima Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa sahulensis Australian Humpback Dolphin [87942]	Vulnerable	Species or species habitat known to occur within area

Current Scientific Name	Status	Type of Presence
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks	[Resource Information]
Park Name	Zone & IUCN Categories
Dampier	Habitat Protection Zone (IUCN IV)
Gascoyne	Habitat Protection Zone (IUCN IV)
Dampier	Multiple Use Zone (IUCN VI)
Gascoyne	Multiple Use Zone (IUCN VI)
Montebello	Multiple Use Zone (IUCN VI)

Park Name	Zone & IUCN Categories
Dampier	National Park Zone (IUCN II)
Ningaloo	Recreational Use Zone (IUCN IV)

Habitat Critical to the Survival of Marine Turtles [Resource Information]

Scientific Name	Behaviour	Presence
All year (Jun - Aug)		
Natator depressus		
Flatback Turtle [59257]	Nesting	Known to occur
Nov-Feb		
Caretta caretta		
Loggerhead Turtle [1763]	Nesting	Known to occur
Oct - Feb		
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Nesting	Known to occur
Oct - Mar		
Chelonia mydas		
Green Turtle [1765]	Nesting	Known to occur

Extra Information

State and Territory Reserves [Resource Information]

Protected Area Name	Reserve Type	State
Airlie Island	Nature Reserve	WA
Barrow Island	Nature Reserve	WA
Barrow Island	Marine Park	WA
Barrow Island	Marine Management Area	WA
Bedout Island	Nature Reserve	WA
Bessieres Island	Nature Reserve	WA
Boodie, Double Middle Islands	Nature Reserve	WA
Cape Range	National Park	WA
Great Sandy Island	Nature Reserve	WA
Great Sandy Island	Nature Reserve	WA

Protected Area Name	Reserve Type	State
Jurabi Coastal Park	5(1)(h) Reserve	WA
Locker Island	Nature Reserve	WA
Lowendal Islands	Nature Reserve	WA
Montebello Islands	Conservation Park	WA
Montebello Islands	Marine Park	WA
Montebello Islands	Conservation Park	WA
Muiron Islands	Nature Reserve	WA
Muiron Islands	Marine Management Area	WA
Ningaloo	Marine Park	WA
Round Island	Nature Reserve	WA
Serrurier Island	Nature Reserve	WA
Thevenard Island	Nature Reserve	WA
Thevenard Island	Nature Reserve	WA
Unnamed WA36909	5(1)(h) Reserve	WA
Unnamed WA36915	Nature Reserve	WA
Unnamed WA40322	5(1)(h) Reserve	WA
Unnamed WA40877	5(1)(h) Reserve	WA
Unnamed WA44665	5(1)(h) Reserve	WA
Unnamed WA44672	5(1)(h) Reserve	WA

Nationally Important Wetlands [Resource Information]

Wetland Name	State
Cape Range Subterranean Waterways	WA

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status
3D Seismic Survey in the Carnarvon Bsin on the North West Shelf	2002/778		Completed
Babylon 3D Marine Seismic Survey, Commonwealth Waters, nr	2013/7081		Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Exmouth WA			
Browse to North West Shelf Development, Indian Ocean, WA	2018/8319		Approval
DAVROS MC 3D marine seismic survey northwaet of Dampier, WA	2013/7092		Completed
Deep Water Northwest Shelf 2D Seismic Survey	2007/3260		Completed
Development of Mutineer and Exeter petroleum fields for oil production, Permit	2003/1033		Completed
Gorgon Gas Development	2003/1294		Post-Approval
North West Shelf Project Extension, Carnarvon Basin, WA	2018/8335		Approval
Offshore Dredge Spoil Disposal - Mardie Project	2024/10054		Referral Decision
Project Highclere Cable Lay and Operation	2022/09203		Completed
Action clearly unacceptable			
Highlands 3D Marine Seismic Survey	2012/6680	Action Clearly Unacceptable	Completed
Controlled action			
'Van Gogh' Petroleum Field Development	2007/3213	Controlled Action	Post-Approval
Construct and operate LNG & domestic gas plant including onshore and offshore facilities - Wheatston	2008/4469	Controlled Action	Post-Approval
Construction and operation of a Solar Salt Project, SW Onslow, WA	2016/7793	Controlled Action	Assessment Approach
Development of Angel gas and condensate field, North West Shelf	2004/1805	Controlled Action	Post-Approval
Development of Browse Basin Gas Fields (Upstream)	2008/4111	Controlled Action	Completed
Development of Coniston/Novara fields within the Exmouth Sub-basin	2011/5995	Controlled Action	Post-Approval
Development of Stybarrow petroleum field incl drilling and facility installation	2004/1469	Controlled Action	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Echo-Yodel Production Wells	2000/11	Controlled Action	Post-Approval
Enfield full field development	2001/257	Controlled Action	Post-Approval
Equus Gas Fields Development Project, Carnarvon Basin	2012/6301	Controlled Action	Completed
Eramurra Industrial Salt Project	2021/9027	Controlled Action	Assessment Approach
Gorgon Gas Development 4th Train Proposal	2011/5942	Controlled Action	Post-Approval
Gorgon Gas Revised Development	2008/4178	Controlled Action	Post-Approval
Greater Enfield (Vincent) Development	2005/2110	Controlled Action	Post-Approval
Greater Gorgon Development - Optical Fibre Cable, Mainland to Barrow Island	2005/2141	Controlled Action	Completed
Light Crude Oil Production	2001/365	Controlled Action	Post-Approval
Mardie Project, 80 km south west of Karratha, WA	2018/8236	Controlled Action	Post-Approval
Pluto Gas Project	2005/2258	Controlled Action	Completed
Pluto Gas Project Including Site B	2006/2968	Controlled Action	Post-Approval
Pyrenees Oil Fields Development	2005/2034	Controlled Action	Post-Approval
Simpson Development	2000/59	Controlled Action	Completed
Simpson Oil Field Development	2001/227	Controlled Action	Post-Approval
Vincent Appraisal Well	2000/22	Controlled Action	Post-Approval
Not controlled action			
'Goodwyn A' Low Pressure Train Project	2003/914	Not Controlled Action	Completed
'Van Gogh' Oil Appraisal Drilling Program, Exploration Permit Area WA-155-P(1)	2006/3148	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Airlie Island soil and groundwater investigations, Exmouth Gulf, offshore Pilbara coast	2014/7250	Not Controlled Action	Completed
Barrow Island 2D Seismic survey	2006/2667	Not Controlled Action	Completed
Bultaco-2, Laverda-2, Laverda-3 and Montesa-2 Appraisal Wells	2000/103	Not Controlled Action	Completed
Carnarvon 3D Marine Seismic Survey	2004/1890	Not Controlled Action	Completed
Construction and operation of an unmanned sea platform and connecting pipeline to Varanus Island for	2004/1703	Not Controlled Action	Completed
Development of Halyard Field off the west coast of WA	2010/5611	Not Controlled Action	Completed
Drilling of an exploration well Gats-1 in Permit Area WA-261-P	2004/1701	Not Controlled Action	Completed
Eagle-1 Exploration Drilling, North West Shelf, WA	2019/8578	Not Controlled Action	Completed
Echo A Development WA-23-L, WA-24-L	2005/2042	Not Controlled Action	Completed
Exploration drilling well WA-155-P(1)	2003/971	Not Controlled Action	Completed
Exploration of appraisal wells	2006/3065	Not Controlled Action	Completed
Exploration Well (Taunton-2)	2002/731	Not Controlled Action	Completed
Exploration Well in Permit Area WA-155-P(1)	2002/759	Not Controlled Action	Completed
Exploratory drilling in permit area WA-225-P	2001/490	Not Controlled Action	Completed
Extension of Simpson Oil Platforms & Wells	2002/685	Not Controlled Action	Completed
HCA05X Macedon Experimental Survey	2004/1926	Not Controlled Action	Completed
Hess Exploration Drilling Programme	2007/3566	Not Controlled Action	Completed
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Infill Production Well (Griffin-9)	2001/417	Not Controlled Action	Completed
Klammer 2D Seismic Survey	2002/868	Not Controlled Action	Completed
Maia-Gaea Exploration wells	2000/17	Not Controlled Action	Completed
Mermaid Marine Australia Desalination Project	2011/5916	Not Controlled Action	Completed
Montesa-1 and Bultaco-1 Exploration Wells	2000/102	Not Controlled Action	Completed
Murujuga archaeological excavation, collection and sampling, Dampier Archipelago, WA	2014/7160	Not Controlled Action	Completed
North Rankin B gas compression facility	2005/2500	Not Controlled Action	Completed
Pipeline System Modifications Project	2000/3	Not Controlled Action	Completed
Project Highclere Geophysical Survey	2021/9023	Not Controlled Action	Completed
Searipple gas and condensate field development	2000/89	Not Controlled Action	Completed
Spool Base Facility	2001/263	Not Controlled Action	Completed
Subsea Gas Pipeline From Stybarrow Field to Griffin Venture Gas Export Pipeline	2005/2033	Not Controlled Action	Completed
sub-sea tieback of Perseus field wells	2004/1326	Not Controlled Action	Completed
Telstra North Rankin Spur Fibre Optic Cable	2016/7836	Not Controlled Action	Completed
Thevenard Island Retirement Project	2015/7423	Not Controlled Action	Completed
To construct and operate an offshore submarine fibre optic cable, WA	2014/7373	Not Controlled Action	Completed
Wanda Offshore Research Project, 80 km north-east of Exmouth, WA	2018/8293	Not Controlled Action	Completed
Western Flank Gas Development	2005/2464	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Wheatstone 3D seismic survey, 70km north of Barrow Island	2004/1761	Not Controlled Action	Completed
Not controlled action (particular manner)			
'Kate' 3D marine seismic survey, exploration permits WA-320-P and WA-345-P, 60km	2005/2037	Not Controlled Action (Particular Manner)	Post-Approval
'Tourmaline' 2D marine seismic survey, permit areas WA-323-P, WA-330-P and WA-32	2005/2282	Not Controlled Action (Particular Manner)	Post-Approval
"Leanne" offshore 3D seismic exploration, WA-356-P	2005/1938	Not Controlled Action (Particular Manner)	Post-Approval
2D and 3D seismic surveys	2005/2151	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Survey	2005/2146	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Survey Permit Area WA-352-P	2008/4628	Not Controlled Action (Particular Manner)	Post-Approval
2D seismic survey within permit WA-291	2007/3265	Not Controlled Action (Particular Manner)	Post-Approval
3D marine seismic survey	2008/4281	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey in Permit Areas WA-15-R, WA-18-R, WA-205-P, WA-253-P, WA-267-P and WA-268-P	2003/1271	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey in WA 457-P & WA 458-P, North West Shelf, offshore WA	2013/6862	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Surveys - Contos CT-13 & Supertubes CT-13, offshore WA	2013/6901	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
3D seismic survey	2006/2715	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey, WA	2008/4428	Not Controlled Action (Particular Manner)	Post-Approval
3D sesmic survey	2006/2781	Not Controlled Action (Particular Manner)	Post-Approval
Acheron Non-Exclusive 2D Seismic Survey	2008/4565	Not Controlled Action (Particular Manner)	Post-Approval
Acheron Non-Exclusive 2D Seismic Survey	2009/4968	Not Controlled Action (Particular Manner)	Post-Approval
Apache Northwest Shelf Van Gogh Field Appraisal Drilling Program	2007/3495	Not Controlled Action (Particular Manner)	Post-Approval
Aperio 3D Marine Seismic Survey, WA	2012/6648	Not Controlled Action (Particular Manner)	Post-Approval
Artemis-1 Drilling Program (WA-360-P)	2010/5432	Not Controlled Action (Particular Manner)	Post-Approval
Balnaves Condensate Field Development	2011/6188	Not Controlled Action (Particular Manner)	Post-Approval
Cable Seismic Exploration Permit areas WA-323-P and WA-330-P	2008/4227	Not Controlled Action (Particular Manner)	Post-Approval
Cerberus exploration drilling campaign, Carnarvon Basin, WA	2016/7645	Not Controlled Action (Particular Manner)	Post-Approval
CGGVERITAS 2010 2D Seismic Survey	2010/5714	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Charon 3D Marine Seismic Survey	2007/3477	Not Controlled Action (Particular Manner)	Post-Approval
Consturction & operation of the Varanus Island kitchen & mess cyclone refuge building, compression p	2013/6952	Not Controlled Action (Particular Manner)	Post-Approval
Coverack Marine Seismic Survey	2001/399	Not Controlled Action (Particular Manner)	Post-Approval
Cue Seismic Survey within WA-359-P, WA-361-P and WA-360-P	2007/3647	Not Controlled Action (Particular Manner)	Post-Approval
CVG 3D Marine Seismic Survey	2012/6654	Not Controlled Action (Particular Manner)	Post-Approval
Decommissioning of the Legendre facilities	2010/5681	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Drilling Program	2010/5532	Not Controlled Action (Particular Manner)	Post-Approval
Demeter 3D Seismic Survey, off Dampier, WA	2002/900	Not Controlled Action (Particular Manner)	Post-Approval
Draeck 3D Marine Seismic Survey, WA-205-P	2006/3067	Not Controlled Action (Particular Manner)	Post-Approval
Drilling 35-40 offshore exploration wells in deep water	2008/4461	Not Controlled Action (Particular Manner)	Post-Approval
Earthworks for kitchen/mess, cyclone refuge building & Compression Plant, Varanus Island	2013/6900	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Eendracht Multi-Client 3D Marine Seismic Survey	2009/4749	Not Controlled Action (Particular Manner)	Post-Approval
Effect of marine seismic sounds to demersal fish and pearl oysters, north-west WA	2018/8169	Not Controlled Action (Particular Manner)	Post-Approval
Enfield M3 & Vincent 4D Marine Seismic Surveys	2008/3981	Not Controlled Action (Particular Manner)	Completed
Enfield M3 4D, Vincent 4D & 4D Line Test Marine Seismic Surveys	2008/4122	Not Controlled Action (Particular Manner)	Post-Approval
Enfield M4 4D Marine Seismic Survey	2008/4558	Not Controlled Action (Particular Manner)	Post-Approval
Enfield oilfield 3D Seismic Survey	2006/3132	Not Controlled Action (Particular Manner)	Post-Approval
Exmouth West 2D Marine Seismic Survey	2008/4132	Not Controlled Action (Particular Manner)	Post-Approval
Exploration drilling of Zeus-1 well	2008/4351	Not Controlled Action (Particular Manner)	Post-Approval
Fletcher-Finucane Development, WA26-L and WA191-P	2011/6123	Not Controlled Action (Particular Manner)	Post-Approval
Foxhound 3D Non-Exclusive Marine Seismic Survey	2009/4703	Not Controlled Action (Particular Manner)	Post-Approval
Gazelle 3D Marine Seismic Survey in WA-399-P and WA-42-L	2010/5570	Not Controlled Action (Particular Manner)	Post-Approval
Glencoe 3D Marine Seismic Survey WA-390-P	2007/3684	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Greater Western Flank Phase 1 gas Development	2011/5980	Not Controlled Action (Particular Manner)	Post-Approval
Grimalkin 3D Seismic Survey	2008/4523	Not Controlled Action (Particular Manner)	Post-Approval
Guacamole 2D Marine Seismic Survey	2008/4381	Not Controlled Action (Particular Manner)	Post-Approval
Harmony 3D Marine Seismic Survey	2012/6699	Not Controlled Action (Particular Manner)	Post-Approval
Harpy 1 exploration well	2001/183	Not Controlled Action (Particular Manner)	Post-Approval
Huzzas MC3D Marine Seismic Survey (HZ-13) Carnarvon Basin, offshore WA	2013/7003	Not Controlled Action (Particular Manner)	Post-Approval
Huzzas phase 2 marine seismic survey, Exmouth Plateau, Northern Carnarvon Basin, WA	2013/7093	Not Controlled Action (Particular Manner)	Post-Approval
John Ross & Rosella Off Bottom Cable Seismic Exploration Program	2008/3966	Not Controlled Action (Particular Manner)	Post-Approval
Judo Marine 3D Seismic Survey within and adjacent to WA-412-P	2009/4801	Not Controlled Action (Particular Manner)	Post-Approval
Judo Marine 3D Seismic Survey within and adjacent to WA-412-P	2008/4630	Not Controlled Action (Particular Manner)	Post-Approval
Julimar Brunello Gas Development Project	2011/5936	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Klimt 2D Marine Seismic Survey	2007/3856	Not Controlled Action (Particular Manner)	Post-Approval
Laverda 3D Marine Seismic Survey and Vincent M1 4D Marine Seismic Survey	2010/5415	Not Controlled Action (Particular Manner)	Post-Approval
Leopard 2D marine seismic survey	2005/2290	Not Controlled Action (Particular Manner)	Post-Approval
Macedon Gas Field Development	2008/4605	Not Controlled Action (Particular Manner)	Post-Approval
Marine reconnaissance survey	2008/4466	Not Controlled Action (Particular Manner)	Post-Approval
Moosehead 2D seismic survey within permit WA-192-P	2005/2167	Not Controlled Action (Particular Manner)	Post-Approval
Munmorah 2D seismic survey within permits WA-308/9-P	2003/970	Not Controlled Action (Particular Manner)	Post-Approval
Ocean Bottom Cable Seismic Program, WA-264-P	2007/3844	Not Controlled Action (Particular Manner)	Post-Approval
Ocean Bottom Cable Seismic Survey	2005/2017	Not Controlled Action (Particular Manner)	Post-Approval
Offshore Canning Multi Client 2D Marine Seismic Survey	2010/5393	Not Controlled Action (Particular Manner)	Post-Approval
Offshore Drilling Campaign	2011/5830	Not Controlled Action (Particular Manner)	Post-Approval
Offshore Fibre Optic Cable Network Construction & Operation, Port Hedland WA to	2014/7223	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Darwin NT		Manner)	
Orcus 3D Marine Seismic Survey in WA-450-P	2010/5723	Not Controlled Action (Particular Manner)	Post-Approval
Osprey and Dionysus Marine Seismic Survey	2011/6215	Not Controlled Action (Particular Manner)	Post-Approval
Pomodoro 3D Marine Seismic Survey in WA-426-P and WA-427-P	2010/5472	Not Controlled Action (Particular Manner)	Post-Approval
Pyrenees 4D Marine Seismic Monitor Survey, HCA12A	2012/6579	Not Controlled Action (Particular Manner)	Post-Approval
Pyrenees-Macedon 3D marine seismic survey	2005/2325	Not Controlled Action (Particular Manner)	Post-Approval
Quiberon 2D Seismic Survey, permit area WA-385P, offshore of Carnarvon	2009/5077	Not Controlled Action (Particular Manner)	Post-Approval
Reindeer gas reservior development, Devil Creek, Carnarvon Basin - WA	2007/3917	Not Controlled Action (Particular Manner)	Post-Approval
Rose 3D Seismic Program	2008/4239	Not Controlled Action (Particular Manner)	Post-Approval
Rydal-1 Petroleum Exploration Well, WA	2012/6522	Not Controlled Action (Particular Manner)	Post-Approval
Salsa 3D Marine Seismic Survey	2010/5629	Not Controlled Action (Particular Manner)	Post-Approval
Santos Winchester three dimensional seismic survey - WA-323-P & WA-330-P	2011/6107	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Scarborough Development nearshore component, NWS, WA	2018/8362	Not Controlled Action (Particular Manner)	Post-Approval
Skorpion Marine Seismic Survey WA	2001/416	Not Controlled Action (Particular Manner)	Post-Approval
Stag 4D & Reindeer MAZ Marine Seismic Surveys, WA	2013/7080	Not Controlled Action (Particular Manner)	Post-Approval
Stag Off-bottom Cable Seismic Survey	2007/3696	Not Controlled Action (Particular Manner)	Post-Approval
Stybarrow 4D Marine Seismic Survey	2011/5810	Not Controlled Action (Particular Manner)	Post-Approval
Stybarrow Baseline 4D marine seismic survey	2008/4530	Not Controlled Action (Particular Manner)	Post-Approval
Tantabiddi Boat Ramp Sand Bypassing	2015/7411	Not Controlled Action (Particular Manner)	Post-Approval
Tidepole Maz 3D Seismic Survey Campaign	2007/3706	Not Controlled Action (Particular Manner)	Post-Approval
Tortilla 2D Seismic Survey, WA	2011/6110	Not Controlled Action (Particular Manner)	Post-Approval
Triton 3D Marine Seismic Survey, WA-2-R and WA-3-R	2006/2609	Not Controlled Action (Particular Manner)	Post-Approval
Undertake a 3D marine seismic survey	2010/5695	Not Controlled Action (Particular Manner)	Post-Approval
Undertake a three dimensional marine seismic survey	2010/5715	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Undertake a three dimensional marine seismic survey	2010/5679	Not Controlled Action (Particular Manner)	Post-Approval
Vincent M1 and Enfield M5 4D Marine Seismic Survey	2010/5720	Not Controlled Action (Particular Manner)	Post-Approval
Warramunga Non-Inclusive 3D Seismic Survey	2008/4553	Not Controlled Action (Particular Manner)	Post-Approval
West Anchor 3D Marine Seismic Survey	2008/4507	Not Controlled Action (Particular Manner)	Post-Approval
West Panaeus 3D seismic survey	2006/3141	Not Controlled Action (Particular Manner)	Post-Approval
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone 3D MAZ Marine Seismic Survey	2011/6058	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone Iago Appraisal Well Drilling	2007/3941	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone Iago Appraisal Well Drilling	2008/4134	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
3D Marine Seismic Survey in the offshore northwest Carnarvon Basin	2011/6175	Referral Decision	Completed
3D Seismic Survey	2008/4219	Referral Decision	Completed
Bianchi 3D Marine Seismic Survey, Carnavon Basin, WA	2013/7078	Referral Decision	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Referral decision			
CVG 3D Marine Seismic Survey	2012/6270	Referral Decision	Completed
Enfield 4D Marine Seismic Surveys, Production Permit WA-28-L	2005/2370	Referral Decision	Completed
Rose 3D Seismic acquisition survey	2008/4220	Referral Decision	Completed
Stybarrow Baseline 4D Marine Seismic Survey (Permit Areas WA-255-P, WA-32-L, WA-	2008/4165	Referral Decision	Completed
Two Dimensional Transition Zone Seismic Survey - TP/7 (R1)	2010/5507	Referral Decision	Completed
Varanus Island Compression Project	2012/6698	Referral Decision	Completed

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Ancient coastline at 125 m depth contour	North-west
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	North-west
Commonwealth waters adjacent to Ningaloo Reef	North-west
Continental Slope Demersal Fish Communities	North-west
Exmouth Plateau	North-west
Glomar Shoals	North-west

Biologically Important Areas [Resource Information]

Scientific Name	Behaviour	Presence
Dugong		
Dugong dugon Dugong [28]	Breeding	Known to occur
Dugong dugon Dugong [28]	Calving	Known to occur
Dugong dugon Dugong [28]	Foraging (high density seagrass beds)	Known to occur

Scientific Name	Behaviour	Presence
Dugong dugon Dugong [28]	Nursing	Known to occur
Marine Turtles		
Caretta caretta Loggerhead Turtle [1763]	Internesting buffer	Known to occur
Caretta caretta Loggerhead Turtle [1763]	Nesting	Known to occur
Chelonia mydas Green Turtle [1765]	Aggregation	Known to occur
Chelonia mydas Green Turtle [1765]	Basking	Known to occur
Chelonia mydas Green Turtle [1765]	Foraging	Known to occur
Chelonia mydas Green Turtle [1765]	Internesting	Known to occur
Chelonia mydas Green Turtle [1765]	Internesting buffer	Known to occur
Chelonia mydas Green Turtle [1765]	Mating	Known to occur
Chelonia mydas Green Turtle [1765]	Migration corridor	Known to occur
Chelonia mydas Green Turtle [1765]	Nesting	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Foraging	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting buffer	Known to occur

Scientific Name	Behaviour	Presence
Eretmochelys imbricata Hawksbill Turtle [1766]	Mating	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Migration corridor	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Nesting	Known to occur
Natator depressus Flatback Turtle [59257]	Aggregation	Known to occur
Natator depressus Flatback Turtle [59257]	Foraging	Known to occur
Natator depressus Flatback Turtle [59257]	Internesting	Known to occur
Natator depressus Flatback Turtle [59257]	Internesting buffer	Known to occur
Natator depressus Flatback Turtle [59257]	Mating	Known to occur
Natator depressus Flatback Turtle [59257]	Migration corridor	Known to occur
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur
Seabirds		
Ardenna pacifica Wedge-tailed Shearwater [84292]	Breeding	Known to occur
Fregata ariel Lesser Frigatebird [1012]	Breeding	Known to occur
Sterna dougallii Roseate Tern [817]	Breeding	Known to occur
Sternula nereis Fairy Tern [82949]	Breeding	Known to occur

Scientific Name	Behaviour	Presence
Sula leucogaster Brown Booby [1022]	Breeding	Known to occur
Thalasseus bengalensis Lesser Crested Tern [66546]	Breeding	Known to occur
Sharks		
Rhincodon typus Whale Shark [66680]	Foraging	Known to occur
Rhincodon typus Whale Shark [66680]	Foraging (high density prey)	Known to occur
Whales		
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Foraging	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration (north and south)	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Resting	Known to occur

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data is available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on the contents of this report.

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions when time permits.

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded breeding sites; and
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 27-Nov-2025



Figure: Wandoo Facility EP EMBA

Summary

Details

Matters of NES

Other Matters Protected by the EPBC Act

Extra Information

Caveat

Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	2
National Heritage Places:	2
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	4
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	71
Listed Migratory Species:	90

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	75
Commonwealth Heritage Places:	2
Listed Marine Species:	144
Whales and Other Cetaceans:	33
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	15
Habitat Critical to the Survival of Marine Turtles:	4

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	45
Regional Forest Agreements:	None
Nationally Important Wetlands:	3
EPBC Act Referrals:	251
Key Ecological Features (Marine):	7
Biologically Important Areas:	43
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Legal Status
Murujuga Cultural Landscape	WA	Declared property
The Ningaloo Coast	WA	Declared property

National Heritage Places [Resource Information]

Name	State	Legal Status
Indigenous		
Dampier Archipelago (including Burrup Peninsula)	WA	Listed place
Natural		
The Ningaloo Coast	WA	Listed place

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside a Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Feature Name
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)
Commonwealth Marine Areas (EPBC Act)

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Arenaria interpres		
Ruddy Turnstone [872]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Vulnerable	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Endangered	Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Malurus leucopterus edouardi White-winged Fairy-wren (Barrow Island), Barrow Island Black-and-white Fairy-wren [26194]	Vulnerable	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Critically Endangered	Species or species habitat may occur within area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Phaethon rubricauda westralis Red-tailed Tropicbird (Indian Ocean), Indian Ocean Red-tailed Tropicbird [91824]	Endangered	Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Species or species habitat known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Sternula albifrons Little Tern [82849]	Vulnerable	Breeding known to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Species or species habitat known to occur within area
CRUSTACEAN		
Kumonga exleyi Cape Range Remipede [86875]	Vulnerable	Species or species habitat likely to occur within area
FISH		
Milyeringa justitia Barrow Cave Gudgeon [86867]	Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Milyeringa veritas		
Cape Range Cave Gudgeon, Blind Gudgeon [66676]	Vulnerable	Species or species habitat known to occur within area
Ophisternon candidum		
Blind Cave Eel [66678]	Vulnerable	Species or species habitat known to occur within area
MAMMAL		
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Bettongia lesueur Barrow and Boodie Islands subspecies		
Boodie, Burrowing Bettong (Barrow and Boodie Islands) [88021]	Vulnerable	Species or species habitat known to occur within area
Dasyurus hallucatus		
Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Isoodon auratus barrowensis		
Golden Bandicoot (Barrow Island) [66666]	Vulnerable	Species or species habitat known to occur within area
Lagorchestes conspicillatus conspicillatus		
Spectacled Hare-wallaby (Barrow Island) [66661]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Lagorchestes hirsutus Central Australian subspecies		
Mala, Rufous Hare-Wallaby (Central Australia) [88019]	Endangered	Translocated population known to occur within area
Macroderma gigas		
Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Macrotis lagotis		
Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
Orcaella heinsohni		
Australian Snubfin Dolphin [81322]	Vulnerable	Species or species habitat known to occur within area
Osphranter robustus isabellinus		
Barrow Island Wallaroo, Barrow Island Euro [89262]	Vulnerable	Species or species habitat likely to occur within area
Petrogale lateralis lateralis		
Black-flanked Rock-wallaby, Moororong, Black-footed Rock Wallaby [66647]	Endangered	Species or species habitat known to occur within area
Rhinonicteris aurantia (Pilbara form)		
Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
Sousa sahulensis		
Australian Humpback Dolphin [87942]	Vulnerable	Species or species habitat known to occur within area
PLANT		
Minuria tridens		
Minnie Daisy [13753]	Vulnerable	Species or species habitat may occur within area
REPTILE		
Aipysurus apraefrontalis		
Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
Aipysurus foliosquama		
Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Ctenotus zastictus Hamelin Ctenotus [25570]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Liasis olivaceus barroni Pilbara Olive Python [66699]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
SHARK		
Carcharias taurus (west coast population) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Congregation or aggregation known to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Centrophorus uyato Little Gulper Shark [68446]	Conservation Dependent	Species or species habitat likely to occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat known to occur within area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
null		
Balaenoptera omurai Omura's Whale [87136]		Species or species habitat likely to occur within area
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat known to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Species or species habitat known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons Little Tern [82849]	Vulnerable	Breeding known to occur within area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Thalassarche cauta		
Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Anoxypristis cuspidata		
Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat known to occur within area
Balaenoptera bonaerensis		
Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Carcharhinus longimanus		
Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Carcharias taurus Grey Nurse Shark [64469]		Congregation or aggregation known to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Dugong dugon Dugong [28]		Breeding known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis pristis Largetooth Sawfish, Freshwater Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Endangered	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area

Scientific Name	Threatened Category	Presence Text
Sousa sahulensis as Sousa chinensis		
Australian Humpback Dolphin [87942]	Vulnerable	Species or species habitat known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations)		
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Cuculus optatus		
Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundo rustica		
Barn Swallow [662]		Species or species habitat known to occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres		
Ruddy Turnstone [872]	Vulnerable	Species or species habitat known to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris alba		
Sanderling [875]		Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Calidris falcinellus as Limicola falcinellus Broad-billed Sandpiper [91731]		Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Vulnerable	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat known to occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Endangered	Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Phalaropus lobatus Red-necked Phalarope [838]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Species or species habitat known to occur within area
Thalasseus bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Tringa nebularia		
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area
Tringa stagnatilis		
Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area
Xenus cinereus		
Terek Sandpiper [59300]	Vulnerable	Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State
Defence	
Defence - EXMOUTH ADMIN & HF TRANSMITTING [50126]	WA
Defence - EXMOUTH ADMIN & HF TRANSMITTING [50128]	WA
Defence - EXMOUTH ADMIN & HF TRANSMITTING [50129]	WA
Defence - EXMOUTH ADMIN & HF TRANSMITTING [50124]	WA
Defence - EXMOUTH ADMIN & HF TRANSMITTING [50125]	WA
Defence - EXMOUTH ADMIN & HF TRANSMITTING [50127]	WA
Defence - EXMOUTH VLF TRANSMITTER STATION [50122]	WA
Defence - EXMOUTH VLF TRANSMITTER STATION [50123]	WA
Defence - LEARMONTH - AIR WEAPONS RANGE [50193]	WA
Defence - LEARMONTH RADAR SITE - TWIN TANKS EXMOUTH [50002]	WA
Defence - LEARMONTH RADAR SITE - VLAMING HEAD EXMOUTH [50001]	WA
Unknown	
Commonwealth Land - [51476]	WA
Commonwealth Land - [51474]	WA

Commonwealth Land Name	State
Commonwealth Land - [51477]	WA
Commonwealth Land - [51887]	WA
Commonwealth Land - [51472]	WA
Commonwealth Land - [51471]	WA
Commonwealth Land - [51696]	WA
Commonwealth Land - [51404]	WA
Commonwealth Land - [51403]	WA
Commonwealth Land - [51473]	WA
Commonwealth Land - [51470]	WA
Commonwealth Land - [51468]	WA
Commonwealth Land - [52236]	WA
Commonwealth Land - [51469]	WA
Commonwealth Land - [51055]	WA
Commonwealth Land - [51054]	WA
Commonwealth Land - [51668]	WA
Commonwealth Land - [51053]	WA
Commonwealth Land - [51458]	WA
Commonwealth Land - [51671]	WA
Commonwealth Land - [51463]	WA
Commonwealth Land - [51667]	WA
Commonwealth Land - [51467]	WA
Commonwealth Land - [51460]	WA
Commonwealth Land - [51461]	WA
Commonwealth Land - [51462]	WA
Commonwealth Land - [51464]	WA
Commonwealth Land - [51465]	WA
Commonwealth Land - [51466]	WA

Commonwealth Land Name	State
Commonwealth Land - [51455]	WA
Commonwealth Land - [51457]	WA
Commonwealth Land - [51454]	WA
Commonwealth Land - [51451]	WA
Commonwealth Land - [51456]	WA
Commonwealth Land - [51453]	WA
Commonwealth Land - [51450]	WA
Commonwealth Land - [51698]	WA
Commonwealth Land - [51452]	WA
Commonwealth Land - [51459]	WA
Commonwealth Land - [51447]	WA
Commonwealth Land - [51446]	WA
Commonwealth Land - [51449]	WA
Commonwealth Land - [51448]	WA
Commonwealth Land - [51445]	WA
Commonwealth Land - [51444]	WA
Commonwealth Land - [51695]	WA
Commonwealth Land - [51706]	WA
Commonwealth Land - [51707]	WA
Commonwealth Land - [51699]	WA
Commonwealth Land - [51442]	WA
Commonwealth Land - [51443]	WA
Commonwealth Land - [51672]	WA
Commonwealth Land - [51670]	WA
Commonwealth Land - [51700]	WA
Commonwealth Land - [51705]	WA
Commonwealth Land - [51947]	WA

Commonwealth Land Name	State
Commonwealth Land - [51475]	WA
Commonwealth Land - [51702]	WA
Commonwealth Land - [51712]	WA
Commonwealth Land - [51703]	WA
Commonwealth Land - [51704]	WA
Commonwealth Land - [51884]	WA
Commonwealth Land - [51666]	WA
Commonwealth Land - [51711]	WA

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Natural		
Learmonth Air Weapons Range Facility	WA	Listed place
Ningaloo Marine Area - Commonwealth Waters	WA	Listed place

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Ardenna pacifica as Puffinus pacificus Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Arenaria interpres Ruddy Turnstone [872]	Vulnerable	Species or species habitat known to occur within area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Calidris falcinellus as Limicola falcinellus Broad-billed Sandpiper [91731]		Species or species habitat known to occur within area overfly marine area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area overfly marine area
Calidris tenuirostris Great Knot [862]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area overfly marine area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat known to occur within area overfly marine area
Chroicocephalus novaehollandiae as Larus novaehollandiae Silver Gull [82326]		Breeding known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Breeding known to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat known to occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Species or species habitat known to occur within area overfly marine area
Hirundo rustica Barn Swallow [662]		Species or species habitat known to occur within area overfly marine area
Hydroprogne caspia as Sterna caspia Caspian Tern [808]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Breeding known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]	Endangered	Species or species habitat known to occur within area overfly marine area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area
Motacilla flava Yellow Wagtail [644]		Species or species habitat known to occur within area overfly marine area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Species or species habitat known to occur within area overfly marine area
Numenius phaeopus Whimbrel [849]		Species or species habitat known to occur within area
Onychoprion anaethetus as Sterna anaethetus Bridled Tern [82845]		Breeding known to occur within area
Onychoprion fuscatus as Sterna fuscata Sooty Tern [90682]		Breeding known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Papasula abbotti Abbott's Booby [59297]	Endangered	Species or species habitat may occur within area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Species or species habitat known to occur within area
Phalaropus lobatus Red-necked Phalarope [838]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur within area overfly marine area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sternula albifrons as Sterna albifrons Little Tern [82849]	Vulnerable	Breeding known to occur within area
Sternula nereis as Sterna nereis Fairy Tern [82949]		Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
Stiltia isabella Australian Pratincole [818]		Species or species habitat known to occur within area overfly marine area
Sula dactylatra Masked Booby [1021]		Breeding known to occur within area
Sula leucogaster Brown Booby [1022]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Species or species habitat may occur within area
Thalasseus bengalensis as Sterna bengalensis Lesser Crested Tern [66546]		Breeding known to occur within area
Thalasseus bergii as Sterna bergii Greater Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes as Heteroscelus brevipes Grey-tailed Tattler [851]		Species or species habitat known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area overfly marine area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area overfly marine area
Xenus cinereus Terek Sandpiper [59300]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Fish		
Acentronura larsonae Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area
Bhanotia fasciolata Corrugated Pipefish, Barbed Pipefish [66188]		Species or species habitat may occur within area
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Campichthys galei Gale's Pipefish [66191]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys latispinosus Muiron Island Pipefish [66196]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area
Cosmocampus banneri Roughridge Pipefish [66206]		Species or species habitat may occur within area
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus spinosissimus Hedgehog Seahorse [66239]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Lissocampus fatiloquus Prophet's Pipefish [66250]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
[Stigmatopora argus](#) Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
[Syngnathoides biaculeatus](#) Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
[Trachyrhamphus bicoarctatus](#) Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
[Trachyrhamphus longirostris](#) Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammal		
[Dugong dugon](#) Dugong [28]		Breeding known to occur within area
Reptile		
[Aipysurus apraefrontalis](#) Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat known to occur within area
[Aipysurus duboisii](#) Dubois' Sea Snake, Dubois' Seasnake, Reef Shallows Sea Snake [1116]		Species or species habitat may occur within area
[Aipysurus foliosquama](#) Leaf-scaled Sea Snake, Leaf-scaled Seasnake [1118]	Critically Endangered	Species or species habitat known to occur within area
[Aipysurus laevis](#) Olive Sea Snake, Olive-brown Sea Snake [1120]		Species or species habitat may occur within area
[Aipysurus mosaicus as Aipysurus eydouxii](#) Mosaic Sea Snake [87261]		Species or species habitat may occur within area
[Aipysurus pooleorum](#) Shark Bay Sea Snake [66061]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Aipysurus tenuis Brown-lined Sea Snake, Mjoberg's Sea Snake [1121]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat may occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Emydocephalus annulatus Eastern Turtle-headed Sea Snake [1125]		Species or species habitat may occur within area
Ephalophis greyae as Ephalophis greyi Mangrove Sea Snake [93738]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Hydrelaps darwiniensis Port Darwin Sea Snake, Black-ringed Mangrove Sea Snake [1100]		Species or species habitat may occur within area
Hydrophis czeblukovi Fine-spined Sea Snake [59233]		Species or species habitat may occur within area
Hydrophis elegans Elegant Sea Snake, Bar-bellied Sea Snake [1104]		Species or species habitat may occur within area
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
Hydrophis macdowelli as Hydrophis mcdowelli		
MacDowell's Sea Snake, Small-headed Sea Snake, [75601]		Species or species habitat may occur within area
Hydrophis major as Disteira major		
Olive-headed Sea Snake [93512]		Species or species habitat may occur within area
Hydrophis ornatus		
Spotted Sea Snake, Ornate Reef Sea Snake [1111]		Species or species habitat may occur within area
Hydrophis peronii as Acalyptophis peronii		
Horned Sea Snake [93509]		Species or species habitat may occur within area
Hydrophis platura as Pelamis platurus		
Yellow-bellied Sea Snake [93746]		Species or species habitat may occur within area
Hydrophis stokesii as Astrotia stokesii		
Stokes' Sea Snake [93510]		Species or species habitat may occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area

Whales and Other Cetaceans		[Resource Information]
Current Scientific Name	Status	Type of Presence
Mammal		
Balaenoptera acutorostrata		
Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera bonaerensis		
Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Current Scientific Name	Status	Type of Presence
[Balaenoptera edeni](#) Bryde's Whale [35]		Species or species habitat likely to occur within area
[Balaenoptera musculus](#) Blue Whale [36]	Endangered	Migration route known to occur within area
[Balaenoptera omurai](#) Omura's Whale [87136]		Species or species habitat likely to occur within area
[Balaenoptera physalus](#) Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Delphinus delphis](#) Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
[Eubalaena australis](#) Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
[Feresa attenuata](#) Pygmy Killer Whale [61]		Species or species habitat may occur within area
[Globicephala macrorhynchus](#) Short-finned Pilot Whale [62]		Species or species habitat may occur within area
[Grampus griseus](#) Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
[Indopacetus pacificus](#) Longman's Beaked Whale [72]		Species or species habitat may occur within area
[Kogia breviceps](#) Pygmy Sperm Whale [57]		Species or species habitat may occur within area

Current Scientific Name	Status	Type of Presence
Kogia sima Dwarf Sperm Whale [85043]		Species or species habitat may occur within area
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area
Mesoplodon ginkgodens Gingko-toothed Beaked Whale, Gingko-toothed Whale, Gingko Beaked Whale [59564]		Species or species habitat may occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area
Sousa sahulensis Australian Humpback Dolphin [87942]	Vulnerable	Species or species habitat known to occur within area

Current Scientific Name	Status	Type of Presence
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area

Australian Marine Parks	[Resource Information]
Park Name	Zone & IUCN Categories
Carnarvon Canyon	Habitat Protection Zone (IUCN IV)
Dampier	Habitat Protection Zone (IUCN IV)
Gascoyne	Habitat Protection Zone (IUCN IV)
Argo-Rowley Terrace	Multiple Use Zone (IUCN VI)
Argo-Rowley Terrace	Multiple Use Zone (IUCN VI)

Park Name	Zone & IUCN Categories
Dampier	Multiple Use Zone (IUCN VI)
Eighty Mile Beach	Multiple Use Zone (IUCN VI)
Gascoyne	Multiple Use Zone (IUCN VI)
Montebello	Multiple Use Zone (IUCN VI)
Shark Bay	Multiple Use Zone (IUCN VI)
Dampier	National Park Zone (IUCN II)
Ningaloo	National Park Zone (IUCN II)
Ningaloo	Recreational Use Zone (IUCN IV)
Ningaloo	Recreational Use Zone (IUCN IV)
Argo-Rowley Terrace	Special Purpose Zone (Trawl) (IUCN VI)

Habitat Critical to the Survival of Marine Turtles		[Resource Information]
Scientific Name	Behaviour	Presence
All year (Jun - Aug)		
Natator depressus		
Flatback Turtle [59257]	Nesting	Known to occur
Nov-Feb		
Caretta caretta		
Loggerhead Turtle [1763]	Nesting	Known to occur
Oct - Feb		
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Nesting	Known to occur
Oct - Mar		
Chelonia mydas		
Green Turtle [1765]	Nesting	Known to occur

Extra Information

State and Territory Reserves		[Resource Information]
Protected Area Name	Reserve Type	State
Airlie Island	Nature Reserve	WA
Barrow Island	Nature Reserve	WA
Barrow Island	Marine Management Area	WA
Barrow Island	Marine Park	WA
Bedout Island	Nature Reserve	WA
Bessieres Island	Nature Reserve	WA
Boodie, Double Middle Islands	Nature Reserve	WA
Bundegi Coastal Park	5(1)(h) Reserve	WA
Cape Range	National Park	WA
Cape Range (South)	National Park	WA
Gnandaroo Island	Nature Reserve	WA
Great Sandy Island	Nature Reserve	WA
Great Sandy Island	Nature Reserve	WA
Jurabi Coastal Park	5(1)(h) Reserve	WA
Locker Island	Nature Reserve	WA
Lowendal Islands	Nature Reserve	WA
Montebello Islands	Conservation Park	WA
Montebello Islands	Conservation Park	WA
Montebello Islands	Marine Park	WA
Muiron Islands	Nature Reserve	WA
Muiron Islands	Marine Management Area	WA
Murujuga	National Park	WA
Ningaloo	Marine Park	WA
North Sandy Island	Nature Reserve	WA

Protected Area Name	Reserve Type	State
North Turtle Island	Nature Reserve	WA
Nyingguulu (Ningaloo) Coastal Reserve	5(1)(h) Reserve	WA
Rocky Island	Nature Reserve	WA
Round Island	Nature Reserve	WA
Rowley Shoals	Marine Park	WA
Serrurier Island	Nature Reserve	WA
Tent Island	Nature Reserve	WA
Thevenard Island	Nature Reserve	WA
Thevenard Island	Nature Reserve	WA
Unnamed WA36907	5(1)(h) Reserve	WA
Unnamed WA36909	5(1)(h) Reserve	WA
Unnamed WA36910	5(1)(h) Reserve	WA
Unnamed WA36913	Nature Reserve	WA
Unnamed WA36915	Nature Reserve	WA
Unnamed WA40322	5(1)(h) Reserve	WA
Unnamed WA40877	5(1)(h) Reserve	WA
Unnamed WA44665	5(1)(h) Reserve	WA
Unnamed WA44667	5(1)(h) Reserve	WA
Unnamed WA44672	5(1)(h) Reserve	WA
Victor Island	Nature Reserve	WA
Y Island	Nature Reserve	WA

Nationally Important Wetlands	[Resource Information]
Wetland Name	State
Cape Range Subterranean Waterways	WA
Exmouth Gulf East	WA
Leslie (Port Hedland) Saltfields System	WA

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
3D Seismic Survey in the Carnarvon Bsin on the North West Shelf	2002/778		Completed
Babylon 3D Marine Seismic Survey, Commonwealth Waters, nr Exmouth WA	2013/7081		Completed
Balla Balla Export Facilities ? Design Variation	2022/09254		Assessment
Browse to North West Shelf Development, Indian Ocean, WA	2018/8319		Approval
DAVROS MC 3D marine seismic survey northwaet of Dampier, WA	2013/7092		Completed
Deep Water Northwest Shelf 2D Seismic Survey	2007/3260		Completed
Development of Mutineer and Exeter petroleum fields for oil production, Permit	2003/1033		Completed
Gorgon Gas Development	2003/1294		Post-Approval
Ningaloo Lighthouse Development, 17km north west Exmouth, Western Australia	2020/8693		Post-Approval
North West Shelf Project Extension, Carnarvon Basin, WA	2018/8335		Approval
Offshore Dredge Spoil Disposal - Mardie Project	2024/10054		Referral Decision
Optimised Mardie Project ? Additional Triodia Grassland Habitat Clearing	2024/10094		Referral Decision
Optimised Mardie Solar Salt Project	2022/9169		Post-Approval
Port Hedland Green Steel Project - Stage 1	2023/09764		Assessment
Project Highclere Cable Lay and Operation	2022/09203		Completed
Ridley Magnetite Project	2023/09477		Referral Decision
Single Jetty Deep Water Port Renewable Hub, WA	2021/8942		Assessment
Action clearly unacceptable			

Title of referral	Reference	Referral Outcome	Assessment Status
Action clearly unacceptable			
Highlands 3D Marine Seismic Survey	2012/6680	Action Clearly Unacceptable	Completed
Controlled action			
'Van Gogh' Petroleum Field Development	2007/3213	Controlled Action	Post-Approval
Additional Rail Infrastructure between Herb Elliott Port Facility and Cloudbreak Mine Site	2010/5513	Controlled Action	Post-Approval
Anketell Point Iron Ore Processing & Export Port	2009/5120	Controlled Action	Post-Approval
Balmoral South Iron Ore Mine	2008/4236	Controlled Action	Post-Approval
Binowee Iron Ore Project	2001/366	Controlled Action	Proposed Decision
Construct and operate LNG & domestic gas plant including onshore and offshore facilities - Wheatston	2008/4469	Controlled Action	Post-Approval
Construction and operation of a Solar Salt Project, SW Onslow, WA	2016/7793	Controlled Action	Assessment Approach
Develop Jansz-Io deepwater gas field in Permit Areas WA-18-R, WA-25-R and WA-26-	2005/2184	Controlled Action	Post-Approval
Development of Angel gas and condensate field, North West Shelf	2004/1805	Controlled Action	Post-Approval
Development of Browse Basin Gas Fields (Upstream)	2008/4111	Controlled Action	Completed
Development of Coniston/Novara fields within the Exmouth Sub-basin	2011/5995	Controlled Action	Post-Approval
Development of Stybarrow petroleum field incl drilling and facility installation	2004/1469	Controlled Action	Post-Approval
Echo-Yodel Production Wells	2000/11	Controlled Action	Post-Approval
Enfield full field development	2001/257	Controlled Action	Post-Approval
Equus Gas Fields Development Project, Carnarvon Basin	2012/6301	Controlled Action	Completed
Eramurra Industrial Salt Project	2021/9027	Controlled Action	Assessment Approach

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Eramurra Industrial Salt Project, near Karratha, WA	2019/8448	Controlled Action	Completed
Gorgon Gas Development 4th Train Proposal	2011/5942	Controlled Action	Post-Approval
Gorgon Gas Revised Development	2008/4178	Controlled Action	Post-Approval
Greater Enfield (Vincent) Development	2005/2110	Controlled Action	Post-Approval
Greater Gorgon Development - Optical Fibre Cable, Mainland to Barrow Island	2005/2141	Controlled Action	Completed
Light Crude Oil Production	2001/365	Controlled Action	Post-Approval
Mardie Project, 80 km south west of Karratha, WA	2018/8236	Controlled Action	Post-Approval
Mauds Landing Marina	2000/98	Controlled Action	Completed
Perdaman Urea Project, near Karratha, WA	2018/8383	Controlled Action	Post-Approval
Pluto Gas Project	2005/2258	Controlled Action	Completed
Pluto Gas Project Including Site B	2006/2968	Controlled Action	Post-Approval
Port Hedland Outer Harbour Development and associated marine and terrestrial in	2008/4159	Controlled Action	Post-Approval
Port Hedland Spoilbank Marina, WA	2019/8520	Controlled Action	Post-Approval
Proposed West Pilbara Iron Ore Project	2009/4706	Controlled Action	Post-Approval
Pyrenees Oil Fields Development	2005/2034	Controlled Action	Post-Approval
Simpson Development	2000/59	Controlled Action	Completed
Simpson Oil Field Development	2001/227	Controlled Action	Post-Approval
The Scarborough Project - FLNG & assoc subsea infrastructure, Carnarvon Basin	2013/6811	Controlled Action	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Vincent Appraisal Well	2000/22	Controlled Action	Post-Approval
Yardie Creek Road Realignment Project	2021/8967	Controlled Action	Assessment Approach
Not controlled action			
'Goodwyn A' Low Pressure Train Project	2003/914	Not Controlled Action	Completed
'Van Gogh' Oil Appraisal Drilling Program, Exploration Permit Area WA-155-P(1)	2006/3148	Not Controlled Action	Completed
Airlie Island soil and groundwater investigations, Exmouth Gulf, offshore Pilbara coast	2014/7250	Not Controlled Action	Completed
Baniyas-1 Exploration Well, EP-424, near Onslow	2007/3282	Not Controlled Action	Completed
Barrow Island 2D Seismic survey	2006/2667	Not Controlled Action	Completed
Bollinger 2D Seismic Survey 200km North of North West Cape WA	2004/1868	Not Controlled Action	Completed
Bultaco-2, Laverda-2, Laverda-3 and Montesa-2 Appraisal Wells	2000/103	Not Controlled Action	Completed
Carnarvon 3D Marine Seismic Survey	2004/1890	Not Controlled Action	Completed
Cazadores 2D seismic survey	2004/1720	Not Controlled Action	Completed
Construct 110km buried natural gas pipeline from Onslow, connecting to Dampier/Bunbury natural gas p	2013/7039	Not Controlled Action	Completed
Construction and operation of an unmanned sea platform and connecting pipeline to Varanus Island for	2004/1703	Not Controlled Action	Completed
Construction of a Commodities Berth, Wharf and Associated Infrastructure	2008/4129	Not Controlled Action	Completed
Controlled Source Electromagnetic Survey	2007/3262	Not Controlled Action	Completed
Development of Halyard Field off the west coast of WA	2010/5611	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Development of iron ore facilities	2013/7013	Not Controlled Action	Completed
Development of iron ore resources in eastern Pilbara region, including port at P	2004/1562	Not Controlled Action	Completed
Differential Global Positioning System (DGPS)	2001/445	Not Controlled Action	Completed
Drilling of an exploration well Gats-1 in Permit Area WA-261-P	2004/1701	Not Controlled Action	Completed
Eagle-1 Exploration Drilling, North West Shelf, WA	2019/8578	Not Controlled Action	Completed
Echo A Development WA-23-L, WA-24-L	2005/2042	Not Controlled Action	Completed
Expansion of the Sino Iron Ore Mine and export facilities, Cape Preston, WA	2017/7862	Not Controlled Action	Completed
Expansion Proposal, Mineralogy Cape Preston Iron Ore Project, Cape Preston, WA	2009/5010	Not Controlled Action	Completed
Exploration drilling well WA-155-P(1)	2003/971	Not Controlled Action	Completed
Exploration of appraisal wells	2006/3065	Not Controlled Action	Completed
Exploration Well (Taunton-2)	2002/731	Not Controlled Action	Completed
Exploration Well in Permit Area WA-155-P(1)	2002/759	Not Controlled Action	Completed
Exploratory drilling in permit area WA-225-P	2001/490	Not Controlled Action	Completed
Extension of Simpson Oil Platforms & Wells	2002/685	Not Controlled Action	Completed
HCA05X Macedon Experimental Survey	2004/1926	Not Controlled Action	Completed
Hess Exploration Drilling Programme	2007/3566	Not Controlled Action	Completed
Huascaran-1 exploration well (WA-292-P)	2001/539	Not Controlled Action	Completed
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
INDIGO West Submarine Telecommunications Cable, WA	2017/8126	Not Controlled Action	Completed
Infill Production Well (Griffin-9)	2001/417	Not Controlled Action	Completed
Jansz-2 and 3 Appraisal Wells	2002/754	Not Controlled Action	Completed
Klammer 2D Seismic Survey	2002/868	Not Controlled Action	Completed
Mahimahi Aquaculture Facility	2002/891	Not Controlled Action	Completed
Maia-Gaea Exploration wells	2000/17	Not Controlled Action	Completed
Manaslu - 1 and Huascaran - 1 Offshore Exploration Wells	2001/235	Not Controlled Action	Completed
Mermaid Marine Australia Desalination Project	2011/5916	Not Controlled Action	Completed
Montesa-1 and Bultaco-1 Exploration Wells	2000/102	Not Controlled Action	Completed
Murujuga archaeological excavation, collection and sampling, Dampier Archipelago, WA	2014/7160	Not Controlled Action	Completed
North Rankin B gas compression facility	2005/2500	Not Controlled Action	Completed
Pilbara Bulk Ore Transport System Project, WA	2016/7637	Not Controlled Action	Completed
Pipeline System Modifications Project	2000/3	Not Controlled Action	Completed
Port Expansion and Dredging	2003/1265	Not Controlled Action	Completed
Port Hedland Channel Risk and Optimisation Project, WA	2017/7915	Not Controlled Action	Completed
Project Highclere Geophysical Survey	2021/9023	Not Controlled Action	Completed
Rail and Port Facilities	2001/474	Not Controlled Action	Completed
Searipple gas and condensate field development	2000/89	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Spool Base Facility	2001/263	Not Controlled Action	Completed
Subsea Gas Pipeline From Stybarrow Field to Griffin Venture Gas Export Pipeline	2005/2033	Not Controlled Action	Completed
sub-sea tieback of Perseus field wells	2004/1326	Not Controlled Action	Completed
Telfer Gold Mine Project - Mine and Borefield Extensions and Upgrade of Storage	2002/787	Not Controlled Action	Completed
Telstra North Rankin Spur Fibre Optic Cable	2016/7836	Not Controlled Action	Completed
Thevenard Island Retirement Project	2015/7423	Not Controlled Action	Completed
To construct and operate an offshore submarine fibre optic cable, WA	2014/7373	Not Controlled Action	Completed
WA-295-P Kerr-McGee Exploration Wells	2001/152	Not Controlled Action	Completed
Walkway Lighting Upgrade	2009/4965	Not Controlled Action	Completed
Wanda Offshore Research Project, 80 km north-east of Exmouth, WA	2018/8293	Not Controlled Action	Completed
Western Flank Gas Development	2005/2464	Not Controlled Action	Completed
Wheatstone 3D seismic survey, 70km north of Barrow Island	2004/1761	Not Controlled Action	Completed
Not controlled action (particular manner)			
'Kate' 3D marine seismic survey, exploration permits WA-320-P and WA-345-P, 60km	2005/2037	Not Controlled Action (Particular Manner)	Post-Approval
'Tourmaline' 2D marine seismic survey, permit areas WA-323-P, WA-330-P and WA-32	2005/2282	Not Controlled Action (Particular Manner)	Post-Approval
"Leanne" offshore 3D seismic exploration, WA-356-P	2005/1938	Not Controlled Action (Particular Manner)	Post-Approval
2D and 3D seismic surveys	2005/2151	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
2D marine seismic survey	2012/6296	Not Controlled Action (Particular Manner)	Post-Approval
2D seismic survey	2008/4493	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Survey	2005/2146	Not Controlled Action (Particular Manner)	Post-Approval
2D Seismic Survey Permit Area WA-352-P	2008/4628	Not Controlled Action (Particular Manner)	Post-Approval
2D seismic survey within permit WA-291	2007/3265	Not Controlled Action (Particular Manner)	Post-Approval
3D marine seismic survey	2008/4281	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey (WA-482-P, WA-363-P), WA	2013/6761	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey in Permit Areas WA-15-R, WA-18-R, WA-205-P, WA-253-P, WA-267-P and WA-268-P	2003/1271	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Survey in WA 457-P & WA 458-P, North West Shelf, offshore WA	2013/6862	Not Controlled Action (Particular Manner)	Post-Approval
3D marine seismic survey over petroleum title WA-268-P	2007/3458	Not Controlled Action (Particular Manner)	Post-Approval
3D Marine Seismic Surveys - Contos CT-13 & Supertubes CT-13, offshore WA	2013/6901	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
3D seismic survey	2006/2715	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey, WA	2008/4428	Not Controlled Action (Particular Manner)	Post-Approval
3D sesmic survey	2006/2781	Not Controlled Action (Particular Manner)	Post-Approval
Acheron Non-Exclusive 2D Seismic Survey	2009/4968	Not Controlled Action (Particular Manner)	Post-Approval
Acheron Non-Exclusive 2D Seismic Survey	2008/4565	Not Controlled Action (Particular Manner)	Post-Approval
Additional Rail Infrastructure	2012/6314	Not Controlled Action (Particular Manner)	Post-Approval
Agrippina 3D Seismic Marine Survey	2009/5212	Not Controlled Action (Particular Manner)	Post-Approval
Apache Northwest Shelf Van Gogh Field Appraisal Drilling Program	2007/3495	Not Controlled Action (Particular Manner)	Post-Approval
Aperio 3D Marine Seismic Survey, WA	2012/6648	Not Controlled Action (Particular Manner)	Post-Approval
Artemis-1 Drilling Program (WA-360-P)	2010/5432	Not Controlled Action (Particular Manner)	Post-Approval
Australia to Singapore Fibre Optic Submarine Cable System	2011/6127	Not Controlled Action (Particular Manner)	Post-Approval
Balnaves Condensate Field Development	2011/6188	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Bonaventure 3D seismic survey	2006/2514	Not Controlled Action (Particular Manner)	Post-Approval
Cable Seismic Exploration Permit areas WA-323-P and WA-330-P	2008/4227	Not Controlled Action (Particular Manner)	Post-Approval
Cape Preston East - Iron Ore Export Facilities, Pilbara, WA	2013/6844	Not Controlled Action (Particular Manner)	Post-Approval
Cerberus exploration drilling campaign, Carnarvon Basin, WA	2016/7645	Not Controlled Action (Particular Manner)	Post-Approval
CGGVERITAS 2010 2D Seismic Survey	2010/5714	Not Controlled Action (Particular Manner)	Post-Approval
Charon 3D Marine Seismic Survey	2007/3477	Not Controlled Action (Particular Manner)	Post-Approval
Consturction & operation of the Varanus Island kitchen & mess cyclone refuge building, compression p	2013/6952	Not Controlled Action (Particular Manner)	Post-Approval
Coverack Marine Seismic Survey	2001/399	Not Controlled Action (Particular Manner)	Post-Approval
Cue Seismic Survey within WA-359-P, WA-361-P and WA-360-P	2007/3647	Not Controlled Action (Particular Manner)	Post-Approval
CVG 3D Marine Seismic Survey	2012/6654	Not Controlled Action (Particular Manner)	Post-Approval
Decommissioning of the Legendre facilities	2010/5681	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Deep Water Drilling Program	2010/5532	Not Controlled Action (Particular Manner)	Post-Approval
Demeter 3D Seismic Survey, off Dampier, WA	2002/900	Not Controlled Action (Particular Manner)	Post-Approval
Diesel Fuel Bunker Operation	2012/6289	Not Controlled Action (Particular Manner)	Post-Approval
Draeck 3D Marine Seismic Survey, WA-205-P	2006/3067	Not Controlled Action (Particular Manner)	Post-Approval
Dredging of marine sediment to enable construction of eight berths and a turnin	2010/5678	Not Controlled Action (Particular Manner)	Post-Approval
Drilling 35-40 offshore exploration wells in deep water	2008/4461	Not Controlled Action (Particular Manner)	Post-Approval
Earthworks for kitchen/mess, cyclone refuge building & Compression Plant, Varanus Island	2013/6900	Not Controlled Action (Particular Manner)	Post-Approval
Eendracht Multi-Client 3D Marine Seismic Survey	2009/4749	Not Controlled Action (Particular Manner)	Post-Approval
Effect of marine seismic sounds to demersal fish and pearl oysters, north-west WA	2018/8169	Not Controlled Action (Particular Manner)	Post-Approval
Enfield M3 & Vincent 4D Marine Seismic Surveys	2008/3981	Not Controlled Action (Particular Manner)	Completed
Enfield M3 4D, Vincent 4D & 4D Line Test Marine Seismic Surveys	2008/4122	Not Controlled Action (Particular Manner)	Post-Approval
Enfield M4 4D Marine Seismic Survey	2008/4558	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Enfield oilfield 3D Seismic Survey	2006/3132	Not Controlled Action (Particular Manner)	Post-Approval
Exmouth West 2D Marine Seismic Survey	2008/4132	Not Controlled Action (Particular Manner)	Post-Approval
Exploration drilling of Zeus-1 well	2008/4351	Not Controlled Action (Particular Manner)	Post-Approval
Fletcher-Finucane Development, WA26-L and WA191-P	2011/6123	Not Controlled Action (Particular Manner)	Post-Approval
Foxhound 3D Non-Exclusive Marine Seismic Survey	2009/4703	Not Controlled Action (Particular Manner)	Post-Approval
Gazelle 3D Marine Seismic Survey in WA-399-P and WA-42-L	2010/5570	Not Controlled Action (Particular Manner)	Post-Approval
Geco Eagle 3D Marine Seismic Survey	2008/3958	Not Controlled Action (Particular Manner)	Post-Approval
Glencoe 3D Marine Seismic Survey WA-390-P	2007/3684	Not Controlled Action (Particular Manner)	Post-Approval
Greater Western Flank Phase 1 gas Development	2011/5980	Not Controlled Action (Particular Manner)	Post-Approval
Grimalkin 3D Seismic Survey	2008/4523	Not Controlled Action (Particular Manner)	Post-Approval
Guacamole 2D Marine Seismic Survey	2008/4381	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Harmony 3D Marine Seismic Survey	2012/6699	Not Controlled Action (Particular Manner)	Post-Approval
Harpy 1 exploration well	2001/183	Not Controlled Action (Particular Manner)	Post-Approval
Honeycombs MC3D Marine Seismic Survey	2012/6368	Not Controlled Action (Particular Manner)	Post-Approval
Huzzas MC3D Marine Seismic Survey (HZ-13) Carnarvon Basin, offshore WA	2013/7003	Not Controlled Action (Particular Manner)	Post-Approval
Huzzas phase 2 marine seismic survey, Exmouth Plateau, Northern Carnarvon Basin, WA	2013/7093	Not Controlled Action (Particular Manner)	Post-Approval
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval
John Ross & Rosella Off Bottom Cable Seismic Exploration Program	2008/3966	Not Controlled Action (Particular Manner)	Post-Approval
Judo Marine 3D Seismic Survey within and adjacent to WA-412-P	2008/4630	Not Controlled Action (Particular Manner)	Post-Approval
Judo Marine 3D Seismic Survey within and adjacent to WA-412-P	2009/4801	Not Controlled Action (Particular Manner)	Post-Approval
Julimar Brunello Gas Development Project	2011/5936	Not Controlled Action (Particular Manner)	Post-Approval
Klimt 2D Marine Seismic Survey	2007/3856	Not Controlled Action (Particular Manner)	Post-Approval
Laverda 3D Marine Seismic Survey and Vincent M1 4D Marine Seismic Survey	2010/5415	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Leopard 2D marine seismic survey	2005/2290	Not Controlled Action (Particular Manner)	Post-Approval
Lion 2D Marine Seismic Survey	2007/3777	Not Controlled Action (Particular Manner)	Post-Approval
Macedon Gas Field Development	2008/4605	Not Controlled Action (Particular Manner)	Post-Approval
Marine Geotechnical Drilling Program	2008/4012	Not Controlled Action (Particular Manner)	Post-Approval
Marine reconnaissance survey	2008/4466	Not Controlled Action (Particular Manner)	Post-Approval
Moosehead 2D seismic survey within permit WA-192-P	2005/2167	Not Controlled Action (Particular Manner)	Post-Approval
Munmorah 2D seismic survey within permits WA-308/9-P	2003/970	Not Controlled Action (Particular Manner)	Post-Approval
Ocean Bottom Cable Seismic Program, WA-264-P	2007/3844	Not Controlled Action (Particular Manner)	Post-Approval
Ocean Bottom Cable Seismic Survey	2005/2017	Not Controlled Action (Particular Manner)	Post-Approval
Offshore Canning Multi Client 2D Marine Seismic Survey	2010/5393	Not Controlled Action (Particular Manner)	Post-Approval
Offshore Drilling Campaign	2011/5830	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Offshore Fibre Optic Cable Network Construction & Operation, Port Hedland WA to Darwin NT	2014/7223	Not Controlled Action (Particular Manner)	Post-Approval
Orcus 3D Marine Seismic Survey in WA-450-P	2010/5723	Not Controlled Action (Particular Manner)	Post-Approval
Osprey and Dionysus Marine Seismic Survey	2011/6215	Not Controlled Action (Particular Manner)	Post-Approval
Palta-1 exploration well in Petroleum Permit Area WA-384-P	2011/5871	Not Controlled Action (Particular Manner)	Post-Approval
Phoenix 3D Seismic Survey, Bedout Sub-Basin	2010/5360	Not Controlled Action (Particular Manner)	Post-Approval
Pomodoro 3D Marine Seismic Survey in WA-426-P and WA-427-P	2010/5472	Not Controlled Action (Particular Manner)	Post-Approval
Port Headland Outer Harbour Pre-construction Pilling program	2012/6341	Not Controlled Action (Particular Manner)	Post-Approval
Port of Port Hedland channel marker replacement project, WA	2017/8010	Not Controlled Action (Particular Manner)	Post-Approval
Port Walcott upgrade, dredging & spoil disposal, & channel realignment	2006/2806	Not Controlled Action (Particular Manner)	Post-Approval
Pyrenees 4D Marine Seismic Monitor Survey, HCA12A	2012/6579	Not Controlled Action (Particular Manner)	Post-Approval
Pyrenees-Macedon 3D marine seismic survey	2005/2325	Not Controlled Action (Particular Manner)	Post-Approval
Quiberon 2D Seismic Survey, permit area WA-385P, offshore of Carnarvon	2009/5077	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Reindeer gas reservior development, Devil Creek, Carnarvon Basin - WA	2007/3917	Not Controlled Action (Particular Manner)	Post-Approval
Rose 3D Seismic Program	2008/4239	Not Controlled Action (Particular Manner)	Post-Approval
Rydal-1 Petroleum Exploration Well, WA	2012/6522	Not Controlled Action (Particular Manner)	Post-Approval
Salsa 3D Marine Seismic Survey	2010/5629	Not Controlled Action (Particular Manner)	Post-Approval
Santos Winchester three dimensional seismic survey - WA-323-P & WA-330-P	2011/6107	Not Controlled Action (Particular Manner)	Post-Approval
Scarborough Development nearshore component, NWS, WA	2018/8362	Not Controlled Action (Particular Manner)	Post-Approval
Skorpion Marine Seismic Survey WA	2001/416	Not Controlled Action (Particular Manner)	Post-Approval
Sovereign 3D Marine Seismic Survey	2011/5861	Not Controlled Action (Particular Manner)	Post-Approval
Stag 4D & Reindeer MAZ Marine Seismic Surveys, WA	2013/7080	Not Controlled Action (Particular Manner)	Post-Approval
Stag Off-bottom Cable Seismic Survey	2007/3696	Not Controlled Action (Particular Manner)	Post-Approval
Stybarrow 4D Marine Seismic Survey	2011/5810	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Stybarrow Baseline 4D marine seismic survey	2008/4530	Not Controlled Action (Particular Manner)	Post-Approval
Tantabiddi Boat Ramp Sand Bypassing	2015/7411	Not Controlled Action (Particular Manner)	Post-Approval
The Dampier Heavy Load Out Facility Berth and Swing Basin Expansion	2012/6271	Not Controlled Action (Particular Manner)	Post-Approval
Tidepole Maz 3D Seismic Survey Campaign	2007/3706	Not Controlled Action (Particular Manner)	Post-Approval
Tortilla 2D Seismic Survey, WA	2011/6110	Not Controlled Action (Particular Manner)	Post-Approval
Triton 3D Marine Seismic Survey, WA-2-R and WA-3-R	2006/2609	Not Controlled Action (Particular Manner)	Post-Approval
Undertake a 3D marine seismic survey	2010/5695	Not Controlled Action (Particular Manner)	Post-Approval
Undertake a three dimensional marine seismic survey	2010/5715	Not Controlled Action (Particular Manner)	Post-Approval
Undertake a three dimensional marine seismic survey	2010/5679	Not Controlled Action (Particular Manner)	Post-Approval
upgrade of 3 community recreation sites	2005/2349	Not Controlled Action (Particular Manner)	Post-Approval
Vincent M1 and Enfield M5 4D Marine Seismic Survey	2010/5720	Not Controlled Action (Particular Manner)	Post-Approval
Warramunga Non-Inclusive 3D Seismic Survey	2008/4553	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
West Anchor 3D Marine Seismic Survey	2008/4507	Not Controlled Action (Particular Manner)	Post-Approval
West Panaeus 3D seismic survey	2006/3141	Not Controlled Action (Particular Manner)	Post-Approval
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone 3D MAZ Marine Seismic Survey	2011/6058	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone Iago Appraisal Well Drilling	2007/3941	Not Controlled Action (Particular Manner)	Post-Approval
Wheatstone Iago Appraisal Well Drilling	2008/4134	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
3D Marine Seismic Survey in the offshore northwest Carnarvon Basin	2011/6175	Referral Decision	Completed
3D Seismic Survey	2008/4219	Referral Decision	Completed
Bianchi 3D Marine Seismic Survey, Carnavon Basin, WA	2013/7078	Referral Decision	Completed
CVG 3D Marine Seismic Survey	2012/6270	Referral Decision	Completed
Enfield 4D Marine Seismic Surveys, Production Permit WA-28-L	2005/2370	Referral Decision	Completed
Outer Harbour Development and associated marine and terrestial infrastructure	2008/4148	Referral Decision	Completed
Rose 3D Seismic acquisition survey	2008/4220	Referral Decision	Completed
Stybarrow Baseline 4D Marine Seismic Survey (Permit Areas WA-	2008/4165	Referral Decision	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Referral decision			
255-P, WA-32-L, WA-			
Two Dimensional Transition Zone Seismic Survey - TP/7 (R1)	2010/5507	Referral Decision	Completed
Varanus Island Compression Project	2012/6698	Referral Decision	Completed

Key Ecological Features [Resource Information]

Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.

Name	Region
Ancient coastline at 125 m depth contour	North-west
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	North-west
Commonwealth waters adjacent to Ningaloo Reef	North-west
Continental Slope Demersal Fish Communities	North-west
Exmouth Plateau	North-west
Glomar Shoals	North-west
Mermaid Reef and Commonwealth waters surrounding Rowley Shoals	North-west

Biologically Important Areas [Resource Information]

Scientific Name	Behaviour	Presence
Dugong		
Dugong dugon		
Dugong [28]	Breeding	Known to occur
Dugong dugon		
Dugong [28]	Calving	Known to occur
Dugong dugon		
Dugong [28]	Foraging (high density seagrass beds)	Known to occur
Dugong dugon		
Dugong [28]	Nursing	Known to occur
Marine Turtles		

Scientific Name	Behaviour	Presence
Caretta caretta Loggerhead Turtle [1763]	Foraging	Known to occur
Caretta caretta Loggerhead Turtle [1763]	Internesting buffer	Known to occur
Caretta caretta Loggerhead Turtle [1763]	Nesting	Known to occur
Chelonia mydas Green Turtle [1765]	Aggregation	Known to occur
Chelonia mydas Green Turtle [1765]	Basking	Known to occur
Chelonia mydas Green Turtle [1765]	Foraging	Known to occur
Chelonia mydas Green Turtle [1765]	Internesting	Known to occur
Chelonia mydas Green Turtle [1765]	Internesting buffer	Known to occur
Chelonia mydas Green Turtle [1765]	Mating	Known to occur
Chelonia mydas Green Turtle [1765]	Migration corridor	Known to occur
Chelonia mydas Green Turtle [1765]	Nesting	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Foraging	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting buffer	Known to occur

Scientific Name	Behaviour	Presence
Eretmochelys imbricata Hawksbill Turtle [1766]	Mating	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Migration corridor	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Nesting	Known to occur
Natator depressus Flatback Turtle [59257]	Aggregation	Known to occur
Natator depressus Flatback Turtle [59257]	Foraging	Known to occur
Natator depressus Flatback Turtle [59257]	Internesting	Known to occur
Natator depressus Flatback Turtle [59257]	Internesting buffer	Known to occur
Natator depressus Flatback Turtle [59257]	Mating	Known to occur
Natator depressus Flatback Turtle [59257]	Migration corridor	Known to occur
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur
Seabirds		
Ardenna pacifica Wedge-tailed Shearwater [84292]	Breeding	Known to occur
Fregata ariel Lesser Frigatebird [1012]	Breeding	Known to occur
Onychoprion fuscata Sooty Tern [82847]	Foraging	Known to occur
Phaethon lepturus White-tailed Tropicbird [1014]	Breeding	Known to occur

Scientific Name	Behaviour	Presence
Sterna dougallii Roseate Tern [817]	Breeding	Known to occur
Sternula albifrons sinensis Little Tern [82850]	Resting	Known to occur
Sternula nereis Fairy Tern [82949]	Breeding	Known to occur
Sula leucogaster Brown Booby [1022]	Breeding	Known to occur
Thalasseus bengalensis Lesser Crested Tern [66546]	Breeding	Known to occur
Sharks		
Rhincodon typus Whale Shark [66680]	Foraging	Known to occur
Rhincodon typus Whale Shark [66680]	Foraging (high density prey)	Known to occur
Whales		
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Foraging	Known to occur
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Migration	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Migration (north and south)	Known to occur
Megaptera novaeangliae Humpback Whale [38]	Resting	Known to occur

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data is available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on the contents of this report.

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions when time permits.

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded breeding sites; and
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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Appendix E Aboriginal Cultural Heritage Inquiry System (ACHIS)

Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Register

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Search Criteria

35 Aboriginal Cultural Heritage (ACH) Register in Shapefile - P100564_S00_WandooFacilityEP_HydrocarbonArea_GDA2020MGAZ50. Warning: Search area complex so results may be inaccurate. Contact DPLH for assistance.

Disclaimer

Aboriginal heritage holds significant value to Aboriginal people for their social, spiritual, historical, scientific, or aesthetic importance within Aboriginal traditions, and provides an essential link for Aboriginal people to their past, present and future. In Western Australia Aboriginal heritage is protected under the *Aboriginal Heritage Act 1972*.

All Aboriginal cultural heritage in Western Australia is protected, whether or not the ACH has been reported or exists on the Register.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Planning, Lands and Heritage by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you provide the details to the Department via https://achknowledge.dplh.wa.gov.au/ach-enquiry-form and we will make every effort to rectify it as soon as possible.

Copyright

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Location information data licensed from Western Australian Land Information Authority (WALIA) trading as Landgate. Copyright in the location information data remains with WALIA. WALIA does not warrant the accuracy or completeness of the location information data or its suitability for any particular purpose.

Terminology

ID: ACH on the Register is assigned a unique ID by the Department of Planning, Lands and Heritage using the format: ACH-00000001. For ACH on the former Register the ID numbers remain unchanged and use the new format. For example the ACH ID of the place Swan River was previously '3536' and is now 'ACH-00003536'.

Access and Restrictions:

- **Boundary Reliable (Yes/No):** Indicates whether to the best knowledge of the Department, the location and extent of the ACH boundary is considered reliable.
- **Boundary Restricted = No:** Represents the actual location of the ACH as understood by the Department..
- **Boundary Restricted = Yes:** To preserve confidentiality the exact location and extent of the place is not displayed on the map. However, the shaded region (generally with an area of at least 4km²) provides a general indication of where the ACH is located. If you are a landowner and wish to find out more about the exact location of the place, please contact the Department of Planning, Lands and Heritage.
- **Culturally Sensitive = No:** Availability of information that the Department of Planning, Lands and Heritage holds in relation to the ACH is not restricted in any way.
- **Culturally Sensitive = Yes:** Some of the information that the Department of Planning, Lands and Heritage holds in relation to the ACH is restricted if it is considered culturally sensitive information. This information will only be made available if the Department of Planning, Lands and Heritage receives written approval from the people who provided the information. To request access please contact via https://achknowledge.dplh.wa.gov.au/ach-enquiry-form.
- **Culturally Sensitive Nature:**
  - **No Gender / Initiation Restrictions:** *Anyone* can view the information.
  - **Men only:** Only *males* can view restricted information.
  - **Women only:** Only *females* can view restricted information.

Status:

- **Register:** Aboriginal cultural heritage places that are assessed as meeting Section 5 of the *Aboriginal Heritage Act 1972*.
- **Lodged:** Information which has been received in relation to an Aboriginal cultural heritage place, but is yet to be assessed under Section 5 of the *Aboriginal Heritage Act 1972.*
- **Historic:** Aboriginal heritage places assessed as not meeting the criteria of Section 5 of the *Aboriginal Heritage Act 1972*. Includes places that no longer exist as a result of land use activities with existing approvals.

Place Type: The type of Aboriginal cultural heritage place. For example an artefact scatter place or engravings place.

Legacy ID: This is the former unique number that the former Department of Aboriginal Sites assigned to the place.

Coordinates

Map coordinates are based on the GDA 2020 Datum.

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Aboriginal Cultural Heritage Inquiry System

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ID	Name	Boundary Restricted	Boundary Reliable	Culturally Sensitive	Culturally Sensitive Nature	Status	Place Type	Knowledge Holders	Legacy ID
873	MONTEBELLO IS: NOALA CAVE.	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden; Rock Shelter	*Registered Knowledge Holder names available from DPLH	P07287
926	MONTEBELLO IS: HAYNES CAVE.	No	Yes	No	No Gender / Initiation Restrictions	Register	Sub surface cultural material; Artefacts / Scatter; Midden; Rock Shelter	*Registered Knowledge Holder names available from DPLH	P07286
966	ROSEMARY IS.11: CHOOKIE BAY	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07219
967	ROSEMARY IS.12: CHOOKIE BAY	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Quarry	*Registered Knowledge Holder names available from DPLH	P07220
968	ROSEMARY IS.13	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Grinding areas / Grooves; Midden	*Registered Knowledge Holder names available from DPLH	P07221
969	ROSEMARY IS.14	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Grinding areas / Grooves; Midden	*Registered Knowledge Holder names available from DPLH	P07222
970	ROSEMARY IS.15: AIRSTRIP	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Grinding areas / Grooves; Midden	*Registered Knowledge Holder names available from DPLH	P07223
971	ROSEMARY IS.16: AIRSTRIP	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden; Quarry	*Registered Knowledge Holder names available from DPLH	P07224
972	ROSEMARY IS.17: AIRSTRIP	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Quarry	*Registered Knowledge Holder names available from DPLH	P07225
973	ROSEMARY IS.18: DEEP WATER	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07226
974	ROSEMARY IS.19: CHITON	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07227
978	ROSEMARY IS.23: WADJURU R/H	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Engraving; Grinding areas / Grooves; Traditional Structure; Midden; Water Source	*Registered Knowledge Holder names available from DPLH	P07231
979	ROSEMARY IS.24: HUNGERFORD	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07232
6757	BLOODWOOD CREEK MIDDEN 1	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06168
6758	BLOODWOOD CREEK MIDDEN 2	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06169
6759	BLOODWOOD CREEK MIDDEN 3	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06170
6760	BLOODWOOD CREEK SHORELINE	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06171

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ID	Name	Boundary Restricted	Boundary Reliable	Culturally Sensitive	Culturally Sensitive Nature	Status	Place Type	Knowledge Holders	Legacy ID
6764	CAMP 17 SOUTH MIDDENS	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06175
6765	CAMP 17 NORTH MIDDENS	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06176
6782	28 MILE CREEK NORTH 1	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06140
6784	MANDU MANDU CREEK SOUTH	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06142
6785	MANDU MANDU CREEK NORTH	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06143
6790	YARDIE CREEK SOUTH 1	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06148
6800	OYSTER STACKS MIDDEN	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06158
7126	MESA CAMP	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P05792
7254	SANDY BAY NORTH	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P05652
7299	YARDIE CREEK	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P05645
7300	MANDU MANDU CK ROCKSHELTERS	Yes	Yes	Yes	No Gender / Initiation Restrictions	Register	Artefacts / Scatter	*Registered Knowledge Holder names available from DPLH	P05646
7303	TULKI WELL MIDDEN	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P05649
7304	PILGRAMUNNA BAY MIDDEN	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P05650
11328	GAP WELL	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00836
11772	ROSEMARY ISLAND 09	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P00369
11773	ROSEMARY ISLAND 08	No	No	No	No Gender / Initiation Restrictions	Register	Engraving; Grinding areas / Grooves; Traditional Structure	*Registered Knowledge Holder names available from DPLH	P00370
11775	ROSEMARY ISLAND 06	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00372

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ID	Name	Boundary Restricted	Boundary Reliable	Culturally Sensitive	Culturally Sensitive Nature	Status	Place Type	Knowledge Holders	Legacy ID
11789	ROSEMARY ISLAND 01	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Engraving; Midden; Quarry	*Registered Knowledge Holder names available from DPLH	P00386

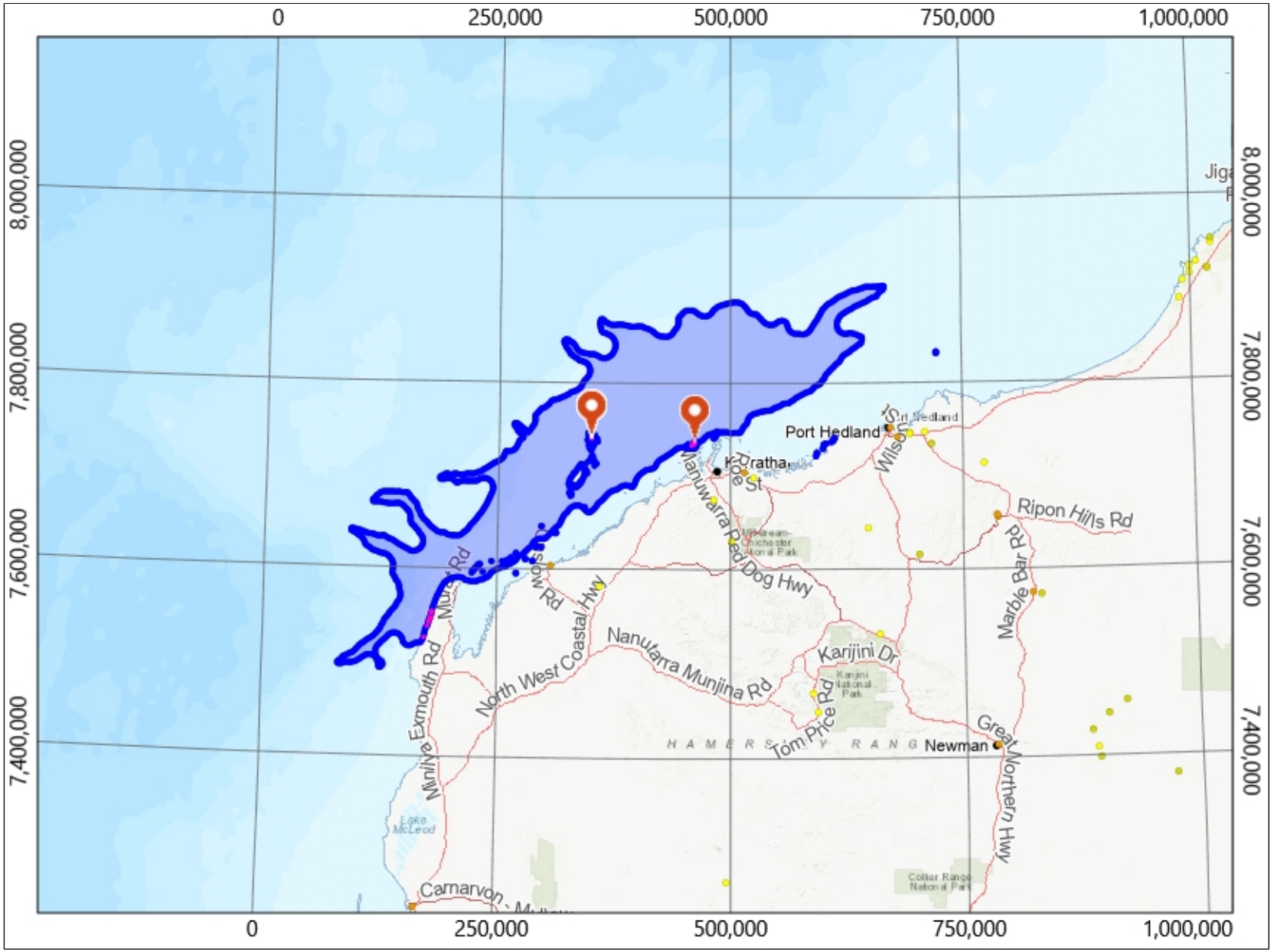
Department of **Planning, Lands and Heritage**

GOVERNMENT OF WESTERN AUSTRALIA

Aboriginal Cultural Heritage Inquiry System

Map of Aboriginal Cultural Heritage (ACH) Register

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Legend

- Aboriginal Cultural Heritage (ACH) Register
- Search Area
- Aboriginal Community
  - *Permanent*
  - *Seasonal*
  - *Town Based*
- Town
- Road
- River
- Local Government Authority

219.60 kilometres

Map Scale 1 : 6,650,000

MGA Zone 50 (GDA2020)

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Coordinates

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Topographic basemap sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community.

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ID	Name	Boundary Restricted	Boundary Reliable	Culturally Sensitive	Culturally Sensitive Nature	Status	Place Type	Knowledge Holders	Legacy ID
508	POINT MURAT 03	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07503
563	POINT MURAT 01	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07501
564	POINT MURAT 02	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07502
628	CAMP THIRTEEN BURIAL	No	Yes	No	No Gender / Initiation Restrictions	Register	Burial	*Registered Knowledge Holder names available from DPLH	P07434
873	MONTEBELLO IS: NOALA CAVE.	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden; Rock Shelter	*Registered Knowledge Holder names available from DPLH	P07287
919	ENDERBY IS.27: GOODWYN VIEW	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07279
926	MONTEBELLO IS: HAYNES CAVE.	No	Yes	No	No Gender / Initiation Restrictions	Register	Sub surface cultural material; Artefacts / Scatter; Midden; Rock Shelter	*Registered Knowledge Holder names available from DPLH	P07286
937	ENDERBY IS.26: NORTH POINT	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden; Quarry	*Registered Knowledge Holder names available from DPLH	P07243
966	ROSEMARY IS.11: CHOOKIE BAY	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07219
967	ROSEMARY IS.12: CHOOKIE BAY	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Quarry	*Registered Knowledge Holder names available from DPLH	P07220
968	ROSEMARY IS.13	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Grinding areas / Grooves; Midden	*Registered Knowledge Holder names available from DPLH	P07221
969	ROSEMARY IS.14	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Grinding areas / Grooves; Midden	*Registered Knowledge Holder names available from DPLH	P07222
970	ROSEMARY IS.15: AIRSTRIP	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Grinding areas / Grooves; Midden	*Registered Knowledge Holder names available from DPLH	P07223
971	ROSEMARY IS.16: AIRSTRIP	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden; Quarry	*Registered Knowledge Holder names available from DPLH	P07224
972	ROSEMARY IS.17: AIRSTRIP	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Quarry	*Registered Knowledge Holder names available from DPLH	P07225
973	ROSEMARY IS.18: DEEP WATER	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07226
974	ROSEMARY IS.19: CHITON	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07227

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ID	Name	Boundary Restricted	Boundary Reliable	Culturally Sensitive	Culturally Sensitive Nature	Status	Place Type	Knowledge Holders	Legacy ID
978	ROSEMARY IS.23: WADJURU R/H	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Engraving; Grinding areas / Grooves; Traditional Structure; Midden; Water Source	*Registered Knowledge Holder names available from DPLH	P07231
979	ROSEMARY IS.24: HUNGERFORD	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07232
1062	LEGENDRE 11	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter	*Registered Knowledge Holder names available from DPLH	P07204
1103	LEGENDRE HILL	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P07193
1106	LEGENDRE 03.	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Shell	*Registered Knowledge Holder names available from DPLH	P07196
1109	LEGENDRE 06.	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Shell	*Registered Knowledge Holder names available from DPLH	P07199
1110	LEGENDRE 07.	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Shell	*Registered Knowledge Holder names available from DPLH	P07200
1112	LEGENDRE 09.	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Shell	*Registered Knowledge Holder names available from DPLH	P07202
1113	LEGENDRE 10.	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Rock Shelter; Shell	*Registered Knowledge Holder names available from DPLH	P07203
6023	WRECK POINT, DEPUCH ISLAND	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Engraving; Traditional Structure; Midden	*Registered Knowledge Holder names available from DPLH	P07121
6044	DEPUCH IS: NARROW GORGE.	No	No	No	No Gender / Initiation Restrictions	Register	Engraving; Grinding areas / Grooves; Shell; Water Source	*Registered Knowledge Holder names available from DPLH	P07091
6079	ENDERBY ISLAND 12	No	Yes	No	No Gender / Initiation Restrictions	Register	Traditional Structure	*Registered Knowledge Holder names available from DPLH	P07020
6080	ENDERBY ISLAND 13	No	Yes	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P07021
6186	ENDERBY ISLAND 11: NE.	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Camp; Ritual / Ceremonial; Engraving; Grinding areas / Grooves; Traditional Structure	*Registered Knowledge Holder names available from DPLH	P06919
6227	MALUS ISLAND.	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Camp; Engraving; Grinding areas / Grooves; Traditional Structure	*Registered Knowledge Holder names available from DPLH	P06908
6229	WEST LEWIS ISLAND: NW ARM 1	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Ritual / Ceremonial; Engraving; Grinding areas / Grooves; Traditional Structure	*Registered Knowledge Holder names available from DPLH	P06910

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ID	Name	Boundary Restricted	Boundary Reliable	Culturally Sensitive	Culturally Sensitive Nature	Status	Place Type	Knowledge Holders	Legacy ID
6230	WEST LEWIS ISLAND: NW ARM 2	Yes	Yes	Yes	Men only	Register	Artefacts / Scatter; Ritual / Ceremonial; Engraving; Grinding areas / Grooves; Traditional Structure	*Registered Knowledge Holder names available from DPLH	P06911
6231	WEST LEWIS ISLAND: NE	No	Yes	No	No Gender / Initiation Restrictions	Register	Engraving; Fish Trap; Grinding areas / Grooves; Traditional Structure	*Registered Knowledge Holder names available from DPLH	P06912
6232	WEST LEWIS ISLAND: N	No	Yes	No	No Gender / Initiation Restrictions	Register	Engraving; Traditional Structure	*Registered Knowledge Holder names available from DPLH	P06913
6311	POINT MURAT.	No	Yes	No	No Gender / Initiation Restrictions	Register	Burial; Artefacts / Scatter; Camp; Midden; Other	*Registered Knowledge Holder names available from DPLH	P06628
6325	COWERIE WELL	Yes	No	Yes	No Gender / Initiation Restrictions	Register	Burial	*Registered Knowledge Holder names available from DPLH	P06642
6334	MUNDA STATION BURIAL 1	No	No	No	No Gender / Initiation Restrictions	Register	Burial	*Registered Knowledge Holder names available from DPLH	P06651
6376	MUD FLATS 2	No	Yes	No	No Gender / Initiation Restrictions	Register	Midden	*Registered Knowledge Holder names available from DPLH	P06587
6754	OSPREY BAY 6	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06165
6755	OSPREY BAY INTERDUNAL 1	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06166
6757	BLOODWOOD CREEK MIDDEN 1	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06168
6758	BLOODWOOD CREEK MIDDEN 2	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06169
6759	BLOODWOOD CREEK MIDDEN 3	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06170
6760	BLOODWOOD CREEK SHORELINE	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06171
6761	LOW POINT MIDDEN	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06172
6762	MILYERING MIDDEN	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06173
6764	CAMP 17 SOUTH MIDDENS	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06175
6765	CAMP 17 NORTH MIDDENS	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06176

Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Register

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ID	Name	Boundary Restricted	Boundary Reliable	Culturally Sensitive	Culturally Sensitive Nature	Status	Place Type	Knowledge Holders	Legacy ID
6782	28 MILE CREEK NORTH 1	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06140
6784	MANDU MANDU CREEK SOUTH	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06142
6785	MANDU MANDU CREEK NORTH	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06143
6790	YARDIE CREEK SOUTH 1	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06148
6798	YARDIE INTERDUNAL SWALE	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06156
6799	YARDIE BEACH MIDDEN	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06157
6800	OYSTER STACKS MIDDEN	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06158
6801	NORTH T-BONE BAY	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06159
6802	OSPREY BAY 1	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06160
6803	OSPREY BAY 2	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06161
6804	OSPREY BAY 3	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06162
6805	OSPREY BAY 4	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06163
6806	OSPREY BAY 5	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06164
6827	CORAL BAY SKELETON	No	No	No	No Gender / Initiation Restrictions	Register	Burial	*Registered Knowledge Holder names available from DPLH	P06132
6833	WEST MOORE ISLAND	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06138
7126	MESA CAMP	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P05792
7206	WEALJUGOO MIDDEN.	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Camp; Hunting Place; Midden	*Registered Knowledge Holder names available from DPLH	P05710

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7254	SANDY BAY NORTH	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P05652
7265	LAKE SIDE VIEW	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P05664
7299	YARDIE CREEK	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P05645
7300	MANDU MANDU CK ROCKSHELTERS	Yes	Yes	Yes	No Gender / Initiation Restrictions	Register	Artefacts / Scatter	*Registered Knowledge Holder names available from DPLH	P05646
7303	TULKI WELL MIDDEN	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P05649
7304	PILGRAMUNNA BAY MIDDEN	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P05650
7305	MANGROVE BAY.	No	Yes	No	No Gender / Initiation Restrictions	Register	Burial; Artefacts / Scatter; Hunting Place; Midden	*Registered Knowledge Holder names available from DPLH	P05651
7899	MALUS ISLAND	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter	*Registered Knowledge Holder names available from DPLH	P04947
7906	DELAMBRE ISLAND SOUTH.	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Water Source	*Registered Knowledge Holder names available from DPLH	P04954
10381	VLAMING HEAD	Yes	No	Yes	No Gender / Initiation Restrictions	Register	Ritual / Ceremonial; Creation / Dreaming Narrative	*Registered Knowledge Holder names available from DPLH	P01799
11328	GAP WELL	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00836
11458	NINGALOO (near)	No	No	No	No Gender / Initiation Restrictions	Register	Painting	*Registered Knowledge Holder names available from DPLH	P00701
11624	HUNTERS POOL	No	Yes	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00541
11625	DEPUCH ISLAND	No	Yes	No	No Gender / Initiation Restrictions	Register	Engraving; Other	*Registered Knowledge Holder names available from DPLH	P00542
11627	JANE CREEK	No	Yes	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00544
11628	ANCHOR HILL, DEPUCH ISLAND	No	Yes	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00545
11648	DOLPHIN ISLAND	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00512

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ID	Name	Boundary Restricted	Boundary Reliable	Culturally Sensitive	Culturally Sensitive Nature	Status	Place Type	Knowledge Holders	Legacy ID
11667	ENZOS LANDING	No	No	No	No Gender / Initiation Restrictions	Register	Engraving; Midden	*Registered Knowledge Holder names available from DPLH	P00479
11715	RIM ROCK GORGE.	No	No	No	No Gender / Initiation Restrictions	Register	Camp; Engraving	*Registered Knowledge Holder names available from DPLH	P00475
11729	NGARLUMA POINT, GIDLEY IS.	No	Yes	No	No Gender / Initiation Restrictions	Register	Engraving; Traditional Structure	*Registered Knowledge Holder names available from DPLH	P00434
11767	FISH POINT, GIDLEY ISLAND	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00418
11771	ENDERBY ISLAND 05	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00368
11772	ROSEMARY ISLAND 09	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P00369
11773	ROSEMARY ISLAND 08	No	No	No	No Gender / Initiation Restrictions	Register	Engraving; Grinding areas / Grooves; Traditional Structure	*Registered Knowledge Holder names available from DPLH	P00370
11775	ROSEMARY ISLAND 06	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00372
11789	ROSEMARY ISLAND 01	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Engraving; Midden; Quarry	*Registered Knowledge Holder names available from DPLH	P00386
11820	ENDERBY ISLAND 01	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00364
12071	SOUTH WEST CREEK 4.	Yes	Yes	Yes	No Gender / Initiation Restrictions	Register	Sub surface cultural material; Artefacts / Scatter; Camp; Ritual / Ceremonial; Engraving; Traditional Structure; Midden; Other	*Registered Knowledge Holder names available from DPLH	P00090
17193	Ningaloo Station	No	No	No	No Gender / Initiation Restrictions	Register	Burial	*Registered Knowledge Holder names available from DPLH	
37522	Mindurru (Ashburton River)	Yes	Yes	Yes		Register	Creation / Dreaming Narrative	*Registered Knowledge Holder names available from DPLH	
38533	Cape Bruguieres Channel	No	Yes	No		Register	Artefacts / Scatter	*Registered Knowledge Holder names available from DPLH	

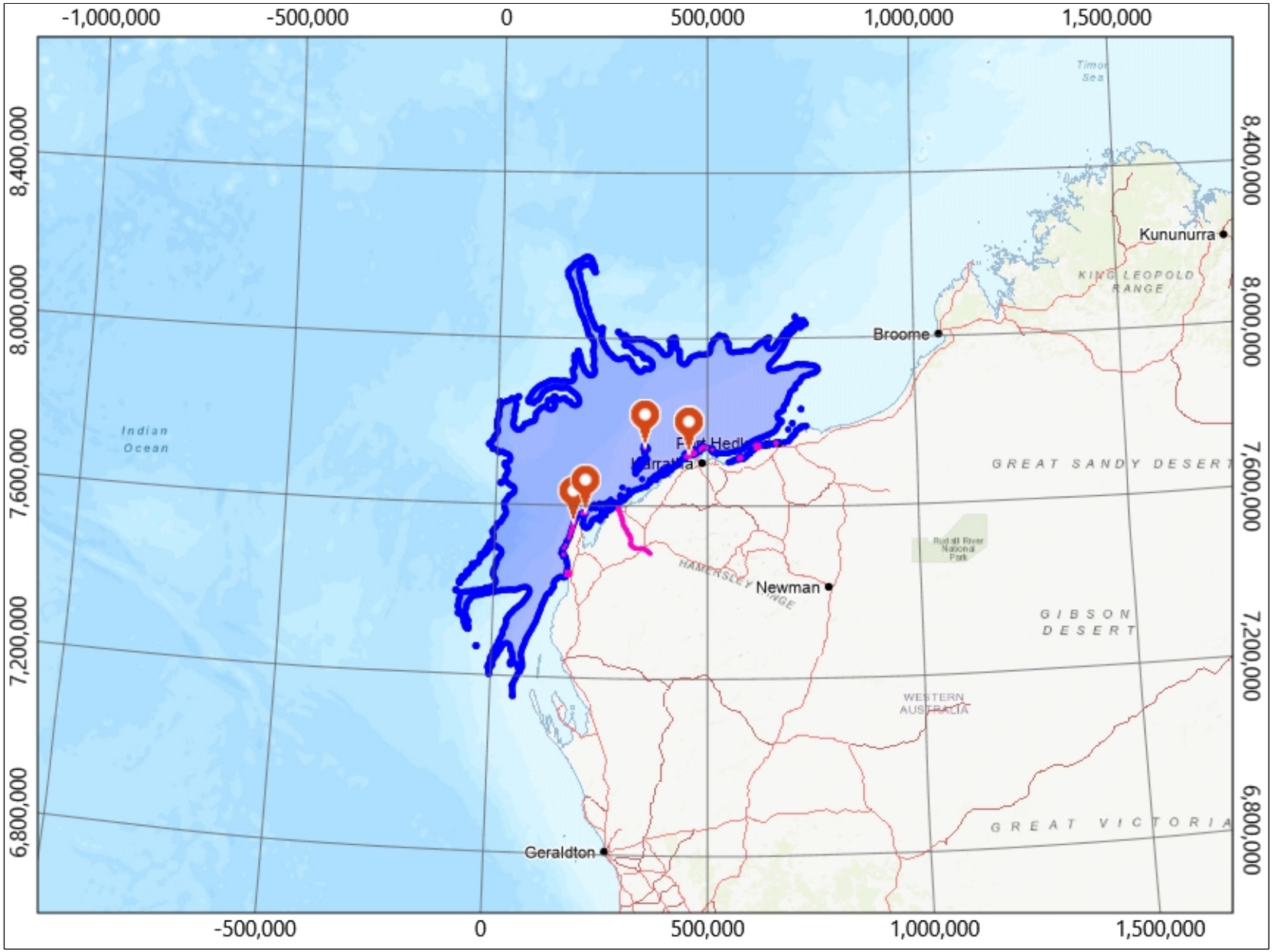
Department of **Planning, Lands and Heritage**

GOVERNMENT OF WESTERN AUSTRALIA

Aboriginal Cultural Heritage Inquiry System

Map of Aboriginal Cultural Heritage (ACH) Register

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Legend

- Aboriginal Cultural Heritage (ACH) Register
- Search Area
- Aboriginal Community
  - *Permanent*
  - *Seasonal*
  - *Town Based*
- Town
- Road
- River
- Local Government Authority

485.35 kilometres

Map Scale 1 : 14,710,000

MGA Zone 50 (GDA2020)

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Appendix F Consultation Summary and Report

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Appendix F Consultation Summary and Report

1.1 Environment that may be affected

The Environment that May Be Affected (EMBA) is the largest spatial extent where unplanned events could have an environmental consequence on the surrounding environment.

VOGA's identification and assessment of relevant persons is based on the Operational Area and the EMBA.

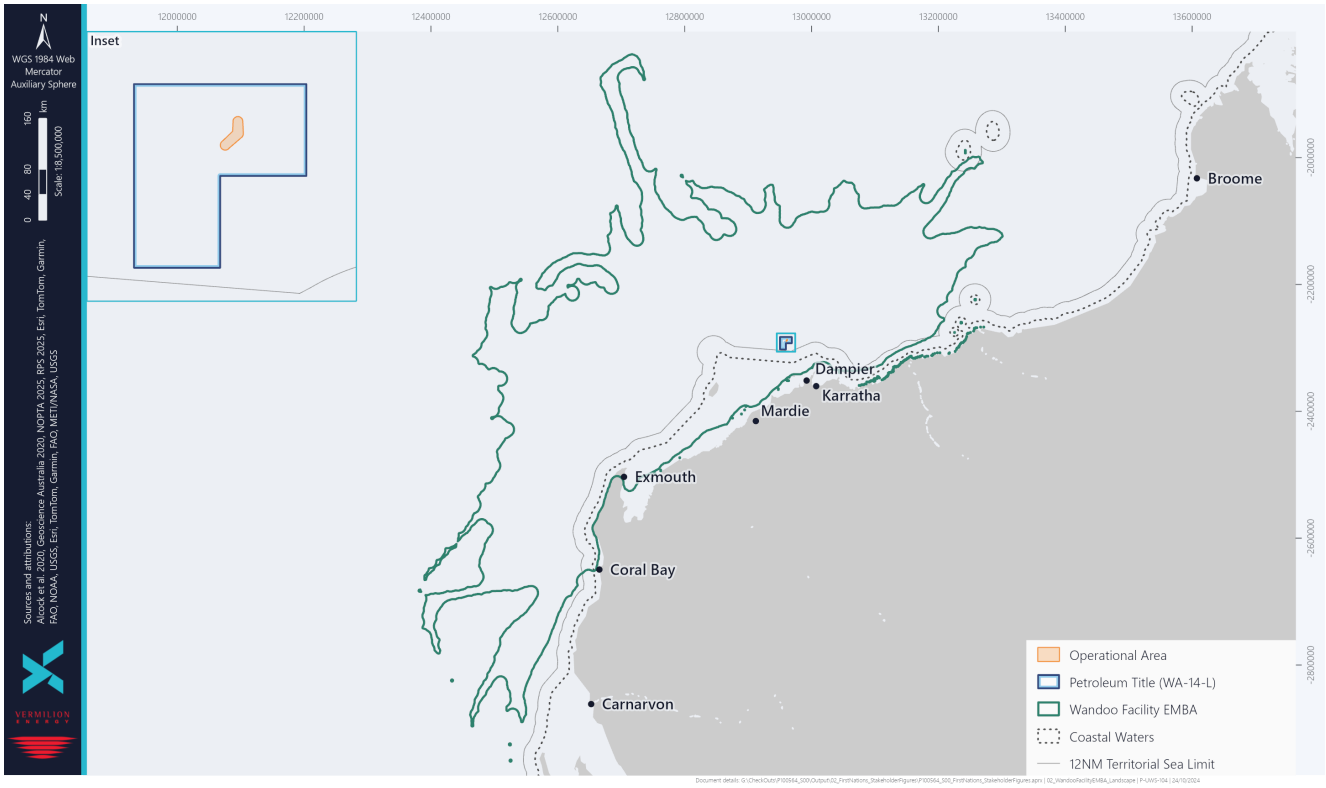


Figure 1-1: VOGA's consultation methodology and process

1.2 Relevancy Assessment

VOGA undertook an assessment of identified relevant persons based on the Operational Area and EMBA. The result of this assessment is outlined in Table 1.

Table 2: Assessment of relevant persons

Person or Organisation	Description	Functions, interests or activities	Assessment of Relevance or Rationale	Relevant Person
Section 25(1)(a) of the OPGGS(E)R: Departments or agencies of the Commonwealth to which the activities to be carried out under the environment plan may be relevant				
Commonwealth Government Departments and Agencies				
Australian Border Force (ABF) (Maritime Border Command)	Responsible for coordinating maritime security	Exercises maritime security functions, has an interest in protecting national borders and preventing illegal activities at sea, and undertakes patrols, inspections, and enforcement operations in offshore waters.	ABF's responsibilities, functions and activities may be relevant to the activity as there are proposed vessel activities.	Yes
Australian Fisheries Management Authority (AFMA)	Government agency responsible for managing and sustaining the use of Commonwealth fisheries to ensure the fishing industry are viable.	Manages and regulates commercial fisheries, is interested in sustainable fisheries and compliance with marine regulations, and conducts licensing, monitoring, and enforcement activities across Australian waters.	AFMA's functions may be relevant to the activity as the Southern Bluefin Tuna Fishery, Western Skipjack Tuna Fishery, and Western Tuna and Billfish Fishery management areas overlap the Operational Area, however no fishing activity is expected.	Yes
Australian Hydrographic Office (AHO)	Responsible for maritime safety and Notices to Mariners, and provides charting service under the terms of SOLAS and the Navigation Act 2012 (Cth).	Produces and maintains nautical charts and hydrographic data, is interested in safe navigation and accurate maritime information, and undertakes	AHO's responsibilities, functions and activities may be relevant to the activity as there are proposed vessel activities.	Yes

		surveys, data collection, and dissemination of navigational products.		
Australian Maritime Safety Authority (AMSA) – maritime safety	Statutory agency for vessel safety and navigation, implementation of marine orders, maritime safety information and shipping data.	Application and implementation of marine orders and provision of maritime safety information.	AMSA – Marine Safety's responsibilities, functions and activities may be relevant to the activity as there are proposed vessel activities.	Yes
Australian Maritime Safety Authority (AMSA) – marine pollution	Statutory agency to combat pollution in the marine environment and maritime aviation search and rescue. The control agency for marine vessel spills.	Protection of the marine environment and maritime aviation search and rescue.	AMSA – Marine Pollution's responsibilities, functions, and activities may be relevant to the activity as the proposed activity has a hydrocarbon spill risk which may require AMSA response in Commonwealth waters.	Yes
Department of Agriculture, Forestry and Fisheries (DAFF) – Biosecurity (marine pests) (vessels, aircraft and personnel)	Responsible for the management of marine pest risks.	DAFF administers, implements and enforces the Biosecurity Act 2015. The Department requests to be consulted where an activity has the potential to transfer marine pests. DAFF also has inspection and reporting requirements to ensure that all conveyances (vessels, installations and aircraft) arriving in Australian territory comply with international health regulations and that any biosecurity risk is managed. The Department requests to be consulted where an	DAFF administers the Biosecurity Act 2015 (Cth) which is designed to contain and/or deal with diseases and pests that may cause harm to human, animal or plant health or the environment in Australia. DAFF is a relevant agency for consultation because the activity involves the movement of vessels into Australian territory and/or between Australian ports and offshore petroleum facilities which concerns DAFF's functions.	Yes

		activity involves the movement of aircraft or vessels between Australia and offshore petroleum activities either inside or outside Australian territory.		
Department of Agriculture, Forestry and Fisheries (DAFF) – Fisheries	Responsible for implementing Commonwealth policies and programs to support agriculture, fishery, food and forestry industries.	Responsible for fisheries strategies, projects and research.	DAFF Fisheries' responsibilities may be relevant to the activity as the Southern Bluefin Tuna Fishery, Western Skipjack Tuna Fishery, and Western Tuna and Billfish Fishery management areas overlap the Operational Area, however no fishing activity is expected.	Yes
Department of Climate Change, Energy, the Environment and Water (DCCEEW) – Underwater Cultural Heritage (UCH)	Responsible for implementing Commonwealth policies and programs to support climate change, sustainable energy use, water resources, the environment and our heritage. Administers the Underwater Cultural Heritage Act 2018 in collaboration with the States, Northern Territory and Norfolk Island, which is responsible for the protection of shipwrecks, sunken aircraft and other types of underwater heritage and their associated artefacts in Commonwealth waters.	Responsible for the regulation of activities to protect underwater cultural heritage, including shipwrecks, aircraft or other underwater cultural heritage.	DCCEEW protects Australia's natural environment and heritage sites, helps Australia respond to climate change and carefully manages water and energy resources. The Underwater Cultural Heritage branch at DCCEEW is responsible for administering the UCH Act. It is a relevant agency where an activity has the potential to directly or indirectly adversely impact protected UCH.	Yes

Department of Defence (DoD)	Responsible for defending Australia and its national interests.	Responsible for the management of Australian defence-based national interests.	DoD's responsibilities may be relevant to the activity because the proposed activity may impact DoD training and operational requirements, in that the EMBA overlaps DoD training areas.	Yes
Department of Industry, Science and Resources (DISR)	Department of the relevant Commonwealth Minister	Responsible for the development and implementation of resource and industry policy. Focus on sustainable development and industry regulation.	Required to be consulted under regulation 25(1)(a) of the Environment Regulations. DISR is a relevant agency for consultation because its responsibilities include offshore oil and gas development, safety, and GHG storage.	Yes
Director of National Parks (DNP)	Responsible for the management of Commonwealth parks and conservation zones.	Responsible for the management of Commonwealth marine parks and protected areas.	DNP's responsibilities may be relevant to the activity as DNP requires an awareness of activities that occur within AMPs, and an understanding of potential impacts and risks to the values of parks (NOPSEMA guidance note: N-04750- GN1785 A620236, June 2020). Titleholders are required to consult DNP on offshore petroleum and greenhouse gas exploration activities if they occur in, or may impact on the values of marine parks, including where potential spill response activities may occur in the event of a spill (i.e. scientific monitoring). The EMBA overlaps AMPs.	Yes
Section 25(1)(a) and (b) of the OPGGS(E)R: Departments or agencies of Western Australia to which the activities to be carried out under the environment plan may be relevant.				
State Government Departments and Agencies				
Department of Planning, Lands and Heritage (DPLH)	Responsible for state-level land use planning and management, and oversight of Aboriginal cultural heritage and built heritage matters.	Department responsible for the management of land use, planning and heritage protection, with a focus on sustainable development and cultural heritage	There is a known maritime cultural heritage overlapping the EMBA, which concerns DPLH's functions, activities and interests.	Yes

		preservation, and the undertaking of approvals, assessments and regulatory oversight.		
Department of Mines, Petroleum and Exploration (DMPE)	Department of relevant State Minister	Department of the Minister responsible for Offshore Petroleum Joint Authority, and is required to be notified of drilling and seismic activities occurring in offshore waters.	Required to be consulted under regulation 25(1)(c) of the Environment Regulations.	Yes
Department of Primary Industries and Regional Development (DPIRD) – Fisheries	Responsible for managing State fisheries	Responsible for the management of fisheries resources and aquaculture, including research, licensing and monitoring activities.	The Mackerel Managed Fishery Area 2, Onslow Prawn Limited Entry Fishery, Pilbara Crab Managed Fishery, Pilbara Line Fishery, Pilbara Fish Trawl Interim Managed Fishery, and Pilbara Trap Managed Fishery are active in the Operational Area. The Mackerel Managed Fishery, Area 2, Onslow Prawn Limited Entry Fishery, Pilbara Crab Managed Fishery, Pilbara Line Fishery, Pilbara Fish Trawl Interim Managed Fishery, and Pilbara Trap Managed Fishery have been active in the EMBA within the last 5 years. DPIRD's functions, interests or activities and responsibilities may be relevant to the activity as the government department responsible for State fisheries.	Yes
Department of Biodiversity, Conservation and Attractions (DBCA)	Responsible for managing WA's parks, forests and reserves to achieve wildlife conservation and provide sustainable recreation and tourism opportunities.	Responsible for the management of conservation areas and marine parks. Undertakes monitoring, planning and enforcement activities.	The DBCA's functions and responsibilities may be relevant to the activity as the EMBA overlaps WA parks, forests or reserves. Activities have the potential to impact marine tourism in the EMBA.	Yes

Department of Transport and Major Infrastructure (DTMI) – marine pollution	Legislated responsibility for oil pollution response in State waters	Management of marine oil pollution in Western Australia, and lead communication and consultation in the event of an oil spill.	The proposed activity has a hydrocarbon spill risk, which may require DoT response in State waters.	Yes
Ningaloo Coast World Heritage Advisory Committee (NCWHAC)	Supports the DBCA to manage the Ningaloo Coast World Heritage Area.	The Committee guides World Heritage management and undertakes advisory, consultative, and stakeholder engagement.	The NCWHAC's functions and activities may be relevant to the activity as the EMBA overlaps the Ningaloo Marine Park.	Yes
Pilbara Development Commission (PDC)	Statutory authority of the WA Government that partners with communities, government, business and industry to identify and support projects.	The Commission is responsible for the promotion of regional economic development and the undertaking of planning coordination and stakeholder engagement.	The PDC's functions or interests may be relevant to the activity as the EMBA overlaps with its area of responsibilities.	Yes
Pilbara Ports Authority (PPA)	Encompasses the Ports of Ashburton, Dampier, Port Hedland and Varanus Island. PPA oversees the Shipping and Pilotage Act 1967 (SPA) ports of Barrow Island, Cape Preston, Onslow and Port Walcott.	Management of port operations in the Pilbara region.	The proposed activity has the potential to impact PPA's activities, as the EMBA overlaps the Pilbara Ports Authority's area of responsibility.	Yes
Section 25(1)(d) of the OPGGS(E)R: Persons or organisations whose functions, interests or activities may be affected by the activities to be carried out under the environment plan				
Commonwealth commercial fishing - representative bodies				

Australian Southern Bluefin Tuna Fishery Association (ASBITA)	Represents the Australian Southern Bluefin Tuna (SBT) industry and interests of the Southern Bluefin Tuna Fishery and the Western Skipjack Tuna Fishery.	Fishing industry association represents their members who may actively fish in or have fish resources (stocks & spawning habitat) within the Operational Area or EMBA. Is interested in sustainable tuna stocks and industry viability.	The Southern Bluefin Tuna Fishery and the Western Skipjack Tuna Fishery have been assessed as not relevant to the proposed activity under this EP. As the representative body for the Southern Bluefin Tuna Fishery and the Western Skipjack Tuna Fishery, the ASBITA has also been assessed as not relevant as their functions are not affected by the activities to be carried out under this EP. VOGA has assessed ASBITA's interests as not affected by the activities to be carried out under this EP as any impacts to SBT are expected to be short-term, localised, and not harmful to fish populations or ecosystem function. VOGA chose to contact ASBITA at its discretion.	No
Commonwealth Fisheries Association (CFA)	Represents the interests of commercial fishers license holders in Commonwealth waters.	Fishing industry association who represents their members who may actively fish within the Operational Are or EMBA. Interested in sustainable fisheries and regulatory compliance.	There are Commonwealth commercial fisheries with management areas overlapping the Operational Area and EMBA, however the fisheries have not been active in the Operational Area or EMBA within the last 5 years and have been assessed as not relevant. As the representative body for commercial fishers and licence holders in Commonwealth waters, CFA has been assessed as not relevant as their functions are not affected by the activities to be carried out under this EP. VOGA has assessed CFA's interests are not affected by the activities to be carried out under this EP as any impacts to fish are expected to be short-term, localised, and not harmful to fish populations or ecosystem function. CFA was recommended for consultation by the Australian Fisheries Management Authority. VOGA chose to contact CFA at its discretion.	No

Pearl Producers Association (PPA)	Represents the Australian South Sea Pearling Industry.	The peak body representing members from WA and the NT pearling industry. Is interested in commercial operations and industry viability.	The Pearl Oyster Managed Fishery has been assessed as not relevant to the proposed activity. As the representative body for the Pearl Oyster Managed Fishery, the PPA has also been assessed as not relevant as their functions, interests or activities are not affected by the activities to be carried out under the environment plan. VOGA chose to contact PPA at its discretion.	No
Tuna Australia	Represents the interests of the Western Tuna and Billfish Fishery.	Fishing industry association represents their members from the Eastern and Western Tuna and Billfish and Western Skipjack fisheries of Australia. Interested in management of fisheries, market access and undertakes industry advocacy and stakeholder consultation.	The Western Tuna and Billfish Fishery has been assessed as not relevant to the proposed activity. As the representative body for the Western Tuna and Billfish Fishery, Tuna Australia has also been assessed as not relevant as their functions, interests or activities are not affected by the activities to be carried out under the environment plan. Tuna Australia was recommended for consultation by the Australian Fisheries Management Authority. VOGA chose to contact Tuna Australia at its discretion. VOGA acknowledges Tuna Australia's Industry Position Statement which states it wishes to be contacted when any proposed activity has the potential to impact vessel navigation, fishing activities, and/or the conservation of fish resources and where potential effects exist to member interests, there is a need for a service agreement. VOGA determines no potential effects to member interests. Specifically, impacts to fish are expected to be short-term, localised, and not harmful to fish populations or ecosystem function.	No

Seafood Industry Australia (SIA)	Represents the interests of Australian seafood industry as a whole.	Industry association represents their members from the wildcatch, aquaculture and post-harvest sectors of the Australian seafood industry. Interested in sustainability and market access and development.	SIA was recommended for consultation by the Australian Fisheries Management Authority. SIA has been assessed as not relevant to the proposed activity as VOGA determines no impact to SIA's functions, interests or activities. VOGA chose to contact SIA at its discretion.	No
Western Rock Lobster Council	Represents the interests of the West Coast Rock Lobster Managed Fishery	Industry association representing their members from the Western Rock Lobster commercial fishing industry. Interested in sustainable stocks and fishery management.	The West Coast Rock Lobster Managed Fishery has been assessed as relevant to the proposed activity. As the representative body for the West Coast Rock Lobster Managed Fishery, the Western Rock Lobster Council has also been assessed as relevant.	Yes
Commonwealth commercial fisheries				
Southern Bluefin Tuna Fishery	Commonwealth commercial fishery	The Southern Bluefin Tuna Fishery operates around Australia and extends to the high seas fishing zone, out to 200 nm from the coast. The fishery targets southern bluefin tuna only. SBT is a highly migratory species with a single known spawning ground in the Indian Ocean, between Java and northern Western Australia.	Fishing activity is focused in southern Australian waters with no activity expected in the Operational Area. No impact to the fishery is expected. Although the fishery overlaps the Operational Area and EMBA, the fishery has not been active in the Operational Area or EMBA within the last 5 years and has therefore been assessed as not relevant. VOGA chose to contact Southern Bluefin Tuna Fishery at its discretion.	No
Western Skipjack Tuna Fishery	Commonwealth commercial fishery	The Western Skipjack Tuna Fishery extends west from	Little fishing activity has been undertaken in this fishery since 2008. No fishing activity associated with this fishery	No

		Cape York Peninsula and around Australia to the South Australian/Victorian border, out to the edge of the Australian Fishing Zone.	is expected to occur within the Operational Areas. Although the fishery overlaps the Operational Area and EMBA, the fishery has not been active in the Operational Area or EMBA within the last 5 years and has therefore been assessed as not relevant.	
Western Tuna and Billfish Fishery	Commonwealth commercial fishery	The Western Tuna and Billfish Fishery management area extends over a large area westward from Cape York Peninsula off Queensland, around the west coast of Western Australia and eastward, across the Great Australian Bight to 141°E at the South Australian/Victorian border. Target species include albacore, bigeye tuna, yellow fin tuna, swordfish and striped marlin.	The fishery has operated at low levels of effort since the early 2000's due to economic conditions. No fishing activity associated with this fishery is expected to occur within the Operational Areas. Although the fishery overlaps the Operational Area and EMBA, the fishery has not been active in the Operational Area or EMBA within the last 5 years and has therefore been assessed as not relevant.	No
State commercial fishing - representative bodies				
Western Australian Fishing Industry Council (WAFIC)	WAFIC represents the interests of the WA commercial fishing, pearling and aquaculture sector.	WAFIC represents their members who may actively fish in the Operational Area. WAFIC is interested in sustainable fisheries, industry development, and regulatory compliance and undertakes stakeholder consultation.	There are active State commercial fisheries in the Operational Area. WAFIC's functions may be relevant to the activity as the representative body for State fisheries. VOGA acknowledges WAFIC's consultation guidance and has applied this by consulting, via WAFIC, fisheries that are assessed as having a potential for interaction in the Operational Area. As per WAFIC's Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector and Consultation Approach for unplanned Events,	Yes

			consultation with State fisheries relevant to the EMBA of the proposed activity would be undertaken only in the event of an unplanned emergency scenario. WAFIC issued consultation material on behalf of VOGA to relevant commercial fisheries licence holders having potential for interaction in the Operational Area under a services agreement.	
State commercial fisheries				
Mackerel Managed Fishery - Area 2	State commercial fishery	A commercial fishery targeting Spanish mackerel through near-surface trolling around reefs and shoals in the Pilbara region, operating seasonally from April to September. Interested in sustainable mackerel stocks and seasonal fishing access.	The fishery overlaps the Operational Area and has been active in the Operational Area within the last 5 years. The fishery overlaps the EMBA and has been active in the EMBA within the last 5 years. Under an agreement, WAFIC recommended consultation with this fishery and distributed consultation information on behalf of VOGA.	Yes
Onslow Prawn Limited Entry Fishery	State commercial fishery	A trawl fishery harvesting prawn species along the western part of the North West Shelf, managed under limited entry and seasonal effort controls. Interested in sustainable prawn stocks and fishing operations.	The fishery overlaps the Operational Area and has been active in the Operational Area within the last 5 years. The fishery overlaps the EMBA and has been active in the EMBA within the last 5 years. Under an agreement, WAFIC recommended consultation with this fishery and distributed consultation information on behalf of VOGA.	Yes
Pilbara Crab Managed Fishery	State commercial fishery	Targets blue swimmer crabs using traps and other gear across coastal embayments between Geographe Bay and Port Hedland, managed to maintain sustainable stocks and is interested in	The fishery overlaps the Operational Area and has been active in the Operational Area within the last 5 years. The fishery overlaps the EMBA and has been active in the EMBA within the last 5 years. Under an agreement, WAFIC recommended consultation with this fishery and distributed consultation information on behalf of VOGA.	Yes

		sustainable crab populations and operations.		
Pilbara Line Fishery (Condition)	State commercial fishery	Comprises nine licensed vessels permitted to commercially fish under exemption conditions for nominated five-month periods each year, primarily targeting demersal and pelagic species and interested in. Is interested in sustainable catch and vessel operations.	The fishery overlaps the Operational Area and has been active in the Operational Area within the last 5 years. The fishery overlaps the EMBA and has been active in the EMBA within the last 5 years. Under an agreement, WAFIC recommended consultation with this fishery and distributed consultation information on behalf of VOGA.	Yes
Pilbara Fish Trawl (Interim) Managed Fishery	State commercial fishery	A demersal trawl fishery operating off the Pilbara coast, targeting a range of finfish species on the continental shelf under controlled effort and spatial management zones. Is interested in sustainable catch and vessel operations.	The fishery overlaps the Operational Area and has been active in the Operational Area within the last 5 years. The fishery overlaps the EMBA and has been active in the EMBA within the last 5 years. Under an agreement, WAFIC recommended consultation with this fishery and distributed consultation information on behalf of VOGA.	Yes
Pilbara Trap Managed Fishery	State commercial fishery	A commercial fishery using baited traps to harvest demersal scalefish species in offshore Pilbara waters, managed through limited entry, gear restrictions and catch controls. Is interested in sustainable catch and vessel operations.	The fishery overlaps the Operational Area and has been active in the Operational Area within the last 5 years. The fishery overlaps the EMBA and has been active in the EMBA within the last 5 years. Under an agreement, WAFIC recommended consultation with this fishery and distributed consultation information on behalf of VOGA.	Yes

West Coast Rock Lobster Managed Fishery	State commercial fishery	A commercial fishery using baited pots to harvest western rock lobster in coastal waters off Western Australia, managed through limited entry, quota-based catch controls, seasonal restrictions and gear regulations, with a strong focus on sustainable harvest and vessel operations.	The fishery does not overlap the Operational Area and has not been active in the Operational Area within the last 5 years. The fishery overlaps the EMBA and has been active in the EMBA within the last 5 years. Under an agreement, WAFIC recommended consultation with this fishery and distributed consultation information on behalf of VOGA.	Yes
Recreational fishers and marine users and peak representative bodies				
WA Game Fishing Association (WAGFA)	Represents the interests of game fishers in WA.	The peak body representing game fishing clubs across Western Australia, is interested in sustainable game fish populations and recreational fishing access, and undertakes club coordination, tournaments, and stakeholder engagement.	Activities have the potential to impact game fishers' functions, interests or activities due to the location offshore and there has been recorded charter effort in the EMBA in the past 5 years.	Yes
Recfishwest	Represents the interests of recreational fishers in WA.	The state's peak recreational fishing organisation, advocating for sustainable fishing access, habitat protection and community access and participation.	Activities have the potential to impact game fishers' functions, interests or activities due to the location offshore and there has been recorded charter effort in the EMBA in the past 5 years.	Yes
Marine Tourism WA	Represents the interests of marine tourism in WA.	Represents the interests of marine-based tourism operators across Western	Activities have the potential to impact game fishers' functions, interests or activities due to the location	Yes

		Australia, including those dependent on coastal and offshore environments. Is interested in the use of coastal and offshore environments.	offshore and there has been recorded charter effort in the EMBA in the past 5 years.	
Ashburton Anglers	Represents the interests of recreational fishers in Ashburton	A regional recreational fishing club representing local fishing interests along the Ashburton coast.Is interested in local fish stocks and community fishing opportunity.	Activities have the potential to impact game fishers' functions, interests or activities.	Yes
Exmouth Game Fishing Club (EGFC)	Represents the interests of recreational fishers in Exmouth	A regional game fishing organisation based in Exmouth, representing local and visiting recreational fishers. Is interested in sportsfishing and regional fishery access.	Activities have the potential to impact game fishers' functions, interests or activities.	Yes
King Bay Game Fishing Club (KBFC)	Represents the interests of recreational fishers in King Bay	A Pilbara-based game fishing club representing recreational fishing interests in the Dampier and King Bay areas. Interested in fishing access.	Activities have the potential to impact game fishers' functions, interests or activities.	Yes
Nickol Bay Sportsfishing Club (NBSC)	Represents the interests of recreational fishers in Nickol Bay	A Pilbara-based recreational fishing club focused on sportfishing interests in the Nickol Bay area. Interested in sportsfishing access.	Activities have the potential to impact game fishers' functions, interests or activities.	Yes

Pilbara / Kimberley Recreational Marine Users	Pilbara & Kimberley-based dive, tourism and charter operators	Represents the interests of recreational marine users across the Pilbara and Kimberley regions in relation to coastal and offshore access. Interested in access to offshore areas.	Activities have the potential to impact Pilbara/Kimberley-based dive, tourism and charter operator's functions, interests or activities due to the location of activities and there has been recorded charter effort in the EMBA in the past 5 years. [redacted], Willie Creek Pearl Farm Pty Ltd, [redacted] Trading As One Tide Charters, Super Yachts Perth Pty Ltd, Silverado Charters Pty Ltd, Alltric Pty Ltd & Bluecity Enterprises Pty Ltd, [redacted], Wongs Way Out Pty Ltd, G. C. Bass Nominees Pty Ltd, [redacted] & [redacted] Trading As Shikari Charters, [redacted], Bloor Street Investments Pty Ltd, Reel Force Charters Pty Ltd, [redacted], Redgate Agricultural Pty Ltd, [redacted], D & N Nominees Pty Ltd, [redacted], [redacted], [redacted], Western Wave Marine Pty Ltd, Seafresh Holdings Pty Ltd, Eco-Abrolhos Pty Ltd, [redacted] | [redacted] & [redacted], C Emery Fishing Pty Ltd, [redacted] and [redacted] Trading As North Star Cruises Australia, Riverblitz Pty Ltd, [redacted], [redacted] & [redacted], [redacted] & [redacted], [redacted], Discovery Holiday Parks Pty Limited, Royal Boats Pty Ltd, Third Reef Pty Ltd, Kimberley Marine Pty Ltd, On Strike Charters (WA) Pty Ltd, Coral Princess Cruises (NQ) Pty Ltd, Marine Agents Australia Pty Ltd, No Limitts Pty Ltd, Image Dive Pty Ltd, [redacted] & [redacted] Family Trust, [redacted], [redacted], Keshi Mer Pty Ltd, [redacted], [redacted], [redacted] and [redacted], [redacted], Melkit Pty Ltd, [redacted] and [redacted], Maritime Engineering	Yes

			Services Pty Ltd, Kempton Fisheries Pty Ltd, [redacted], [redacted], Latitude Fisheries Pty Ltd, Sea West WA Pty Ltd, Coastway Investments Pty Ltd, KCC Group Pty Ltd, CM Ventures Pty Ltd, Lombadina Aboriginal Corporation, [redacted] T/As Looksea Tours, [redacted], Australian Port and Marine Services Pty Ltd, [redacted], [redacted] and [redacted] & [redacted], Hartley Motorcycles Pty Ltd, Meridian Venture Group Pty Ltd, Humbug Fishing Pty Ltd, [redacted], Brefjen Nominees Pty Ltd, Boarbarrell Pty Ltd, Kimberly Pearl Tours Pty Ltd, W.A Maritime Investments Pty Ltd, [redacted], [redacted] & [redacted], Oceanic Delights Pty Ltd, Crensot Nominees Pty Ltd, [redacted] i, [redacted], Blue Juice Tours Pty Ltd, Makalee Pty Ltd, [redacted], Pearl Expeditions Pty Ltd, [redacted], L & S Family Holdings Pty Ltd, Bondall Pty Ltd, Lake Argyle Cruises Pty Ltd, KW Marine Pty Ltd, Viency Pty Ltd, Pine Dene Nominees Pty Ltd, [redacted], Sealife Charters Pty Ltd, [redacted] & [redacted], Perth Diving Academy Hillarys Pty Ltd, R & J Glass Pty Ltd, Mal Miles Adventures Pty Ltd, Mackerel Islands Pty Ltd, Sharkbay Charters Pty Ltd, [redacted], Austanley Pty Ltd, Diversity Charter Company WA Pty Ltd, [redacted], Biwal Pty Ltd Trading As Wallabi Carting, [redacted], Capricorn Mist Pty Ltd, Oceaneer Marine Brokers Pty Ltd, Split Tide Pty Ltd, Broome Tours Pty Ltd, [redacted], North Star Cruises Australia Pty Ltd, [redacted] Compagnie Du Ponant Pty Ltd, [redacted], [redacted] and [redacted] & [redacted], Scuba Kev Pty Ltd, Charter Express Pty Ltd, [redacted] and [redacted], El Alauron	

			Pty Ltd, Sea 2 Pty Ltd, Jostan Holdings Pty Ltd, Fortitude Investments Australia Pty Ltd, [redacted] & [redacted], Monkey Mia Yacht Charters Pty Ltd, [redacted] Trading As Esperance Diving And Fishing, [redacted], Avanova Pty Ltd, Hotel And Resort Investments Pty Ltd, [redacted], [redacted], [redacted], Broome Chiropractic Pty Ltd, [redacted], [redacted], [redacted], [redacted], T/As Ultimate Adventures, [redacted], [redacted], Kingfisher Island Resort Pty Ltd, [redacted], RSTG Pty Limited, [redacted] & [redacted] f, [redacted] Trading As Exmouth Fly Fishing, KM Charters Pty Ltd, Discovery III Pty Ltd, Abbey Bay Pty Ltd, [redacted] & Red Dust WA Pty Ltd, Petara Pty Ltd, Rogue Seas Pty Ltd, CM Marine Pty Ltd, Monster Sportfishing Adventures Pty Ltd, Ocean Charters Pty Ltd, Lulamanzi Investments Pty Ltd, Jayson Fishing Company (WA) Pty Ltd, [redacted], [redacted] & [redacted], Reefwalker Pty Ltd, Millennial Charters Pty Ltd, [redacted], Chapel Nominees Pty Ltd, [redacted] & [redacted], Atgni Super Pty Ltd, Fawesome Expeditions Pty Ltd, Aquatic Adventures (WA) Pty Ltd, The Great Escape Charter Company Pty Ltd, AOA International Pty Ltd, [redacted] & [redacted], [redacted], Fire Tiger Pty Ltd, [redacted], [redacted] & [redacted] T/As Coral Bay Ocean Game Fishing Charters, Punchline Pty Ltd Trading As Karma Charters & Dorre Island Fishing Company, [redacted], Go Beyond Broome Pty Ltd, Kimberley Getaway Cruises Pty Ltd, Hulson Pty Ltd, King Sound Resort Hotel Pty Ltd, [redacted] and [redacted], Kybret Pty Ltd, [redacted], [redacted] & [redacted]	

Gascoyne Recreational Marine Users	Gascoyne-based dive, tourism and charter operators	Represents recreational marine users in the Gascoyne region, including interests related to access and use of nearshore and offshore waters. Interested in access to offshore areas.	Activities have the potential to impact Gascoyne-based dive, tourism and charter operator's functions, interests or activities due to the location of activities and there has been recorded charter effort in the EMBA in the past 5 years. Silverado Charters Pty Ltd, [redacted], Eco-Abrolhos Pty Ltd, [redacted] & [redacted], C Emery Fishing Pty Ltd, [redacted] And [redacted] Trading As North Star Cruises Australia, [redacted] & [redacted] Family Trust, Maritime Engineering Services Pty Ltd, G. C. Bass Nominees Pty Ltd, Brefjen Nominees Pty Ltd, Melkit Pty Ltd, W.A Maritime Investments Pty Ltd, [redacted], Blue Juice Tours Pty Ltd, [redacted], L & S Family Holdings Pty Ltd, Bondall Pty Ltd, Kw Marine Pty Ltd, North Star Cruises Australia Pty Ltd, [redacted] And [redacted], Monster Sportfishing Adventures Pty Ltd, Lulamanzi Investments Pty Ltd, Millennial Charters Pty Ltd, Chapel Nominees Pty Ltd, Fawesome Expeditions Pty Ltd, The Great Escape Charter Company Pty Ltd, Aoa International Pty Ltd, [redacted], Reel Force Charters Pty Ltd, D & N Nominees Pty Ltd, Lyons Family Super Pty Ltd, [redacted], Seafresh Holdings Pty Ltd, On Strike Charters (Wa) Pty Ltd, [redacted], [redacted], Bluecity Enterprises Pty Ltd & Alltric Pty Ltd, Makalee Pty Ltd, [redacted], [redacted], [redacted] & [redacted], Sharkbay Charters Pty Ltd, [redacted], Austanley Pty Ltd, [redacted] & [redacted] ,Jostan Holdings Pty Ltd, Monkey Mia Yacht Charters Pty Ltd, [redacted], [redacted], [redacted], [redacted] & [redacted], [redacted] Trading As	Yes

			Exmouth Fly Fishing, Km Charters Pty Ltd, [redacted], Atgni Super Pty Ltd, [redacted] & [redacted], [redacted] & [redacted], [redacted], [redacted] & [redacted] T/As Coral Bay Ocean Game Fishing Charters, [redacted], Fire Tiger Pty Ltd	
Energy industry titleholders and operators				
3D Energi Limited	Titleholder or Operator	The titleholder may have a commercial interest in offshore title(s), either for petroleum or GHG activities, within proximity to their permits and the EMBA.	Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Beagle No. 1 Pty Ltd / Longreach Capital Investment	Titleholder or Operator	The titleholder may have a commercial interest in offshore title(s), either for petroleum or GHG activities, within proximity to their permits and the EMBA.	Titleholder or Operator's permit areas overlaps the EMBA.	Yes
BP Developments Australia	Titleholder or Operator	The titleholder may have a commercial interest in offshore title(s), either for petroleum or GHG activities, within proximity to their permits and the EMBA.	Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Chevron Australia	Titleholder or Operator	The titleholder may have a commercial interest in offshore title(s), either for petroleum or GHG activities, within proximity to their permits and the EMBA.	Titleholder or Operator's permit areas overlaps the EMBA.	Yes

Finder No 16 Pty Ltd	Titleholder or Operator	The titleholder may have a commercial interest in offshore title(s), either for petroleum or GHG activities, within proximity to their permits and the EMBA.	Titleholder or Operator's permit areas overlaps the EMBA.	Yes
INPEX Browse E&P Pty Ltd	Titleholder or Operator	The titleholder may have a commercial interest in offshore title(s), either for petroleum or GHG activities, within proximity to their permits and the EMBA.	Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Jadestone Energy (Australia) Pty Ltd	Titleholder or Operator	The titleholder may have a commercial interest in offshore title(s), either for petroleum or GHG activities, within proximity to their permits and the EMBA.	Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Kato Energy (WA) Pty Ltd	Titleholder or Operator	The titleholder may have a commercial interest in offshore title(s), either for petroleum or GHG activities, within proximity to their permits and the EMBA.	Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Kufpec (Perth) Pty Ltd	Titleholder or Operator	The titleholder may have a commercial interest in offshore title(s), either for petroleum or GHG activities, within proximity to their permits and the EMBA.	Titleholder or Operator's permit areas overlaps the EMBA.	Yes

MEO International Pty Ltd	Titleholder or Operator	The titleholder may have a commercial interest in offshore title(s), either for petroleum or GHG activities, within proximity to their permits and the EMBA.	Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Mobil Australia Resources Company Pty Limited	Titleholder or Operator	The titleholder may have a commercial interest in offshore title(s), either for petroleum or GHG activities, within proximity to their permits and the EMBA.	Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Santos Offshore Pty Ltd	Titleholder or Operator	The titleholder may have a commercial interest in offshore title(s), either for petroleum or GHG activities, within proximity to their permits and the EMBA.	Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Shell Australia Pty Ltd	Titleholder or Operator	The titleholder may have a commercial interest in offshore title(s), either for petroleum or GHG activities, within proximity to their permits and the EMBA.	Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Western Gas (474 P) Pty Ltd	Titleholder or Operator	The titleholder may have a commercial interest in offshore title(s), either for petroleum or GHG activities, within proximity to their permits and the EMBA.	Titleholder or Operator's permit areas overlaps the EMBA.	Yes

Woodside Energy (Australia) Pty Ltd	Titleholder or Operator	The titleholder may have a commercial interest in offshore title(s), either for petroleum or GHG activities, within proximity to their permits and the EMBA.	Titleholder or Operator's permit areas overlaps the EMBA.	Yes
Peak industry representative bodies and associations				
Australian Energy Producers (AEP)	Represents the interests of oil and gas explorers and producers in Australia.	The peak national body representing companies involved in Australia's oil, gas and emerging low-carbon energy industries, providing policy and advocacy leadership on energy development and regulation.	AEP's responsibilities are identified as having an intersect with the EMBA.	Yes
Infrastructure operators				
Vocus Communications	Owner and operator of an offshore fibre network	A telecommunications infrastructure provider operating subsea and terrestrial cable networks that support connectivity to offshore and remote resource operations across northern Australia. Is interested in reliable connectivity and service delivery for its network operations.	Vocus is relevant as its offshore fibre network intersects the EMBA.	Yes
Traditional Custodians and First Nations nominated representative corporations				

Buurabalayji Thalanyji Aboriginal Corporation (BTAC)	Representative Aboriginal Corporation	Represents Thalanyji Traditional Owners, and represent their communal interests including, among other things, management and protection of cultural values.	The Thalanyji native title claim does not overlap the EMBA. The claim is coastally adjacent to the EMBA, for which BTAC is the Registered Native Title Body Corporate.	Yes
Karajarri Traditional Lands Association Aboriginal Corporation (KTLA)	Representative Aboriginal Corporation	Represents Karajarri Traditional Owners and its members and represent their communal interests including, among other things, management and protection of cultural values. It is interested in the protection of cultural heritage and land and sea country and safeguarding cultural and environmental values.	The Karajarri People (Area A) and Karajarri People (Area B) native title claim, which the Karajarri Traditional Lands Association (Aboriginal Corporation) is the Registered Native Title Body Corporate for does not overlaps the EMBA. The Karajarri and parties to the Karajarri Indigenous Protected Area (IPA), dedicated in 2014, lies south of Broome and includes 130 kilometres of coastline. On the basis of this assessment and the engagement undertaken to date, KTLA is not considered to have a direct function, interest or activity that would be affected by the proposed activities. Given our ongoing engagement VOGA has contacted KTLA separately at its discretion to advise its assessment and seek guidance and did not receive a response.	No
Kariyarra Aboriginal Corporation (KAC)	Representative Aboriginal Corporation	Represents Kariyarra Traditional Owners and its members and represent their communal interests including, among other things, management and protection of cultural values. It is interested in the protection of cultural	The Kariyarra native title claim does not overlap the EMBA. The claim is coastally adjacent to the EMBA, for which the Kariyarra Aboriginal Corporation is the Registered Native Title Prescribed Body Corporate.	Yes

		heritage and land and sea country and safeguarding cultural and environmental values.		
Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC), Yinggarda Aboriginal Corporation	Representative Aboriginal Corporation	The NTGAC and YAC are the Registered Native Title Body Corporates holding native title on behalf of the Baiyungu, Thalanyji and Yinggarda people. They represent their communal interests including, among other things, management and protection of cultural values.	The Gnulli, Gnulli #2 and Gnulli #3 - Yinggarda, Baiyungu and Thalanyji Peoples' native title claim overlaps the EMBA. The NTGAC is also party, with the WA State Government, to the Ningaloo Conservation Estate Indigenous Land Use Agreement (ILUA), which overlaps the EMBA. The NTGAC's nominated representative is YMAC and VOGA has consulted with NTGAC via YMAC.	Yes
Ngarluma Aboriginal Corporation (NAC)	Representative Aboriginal Corporation	NAC represents the the Ngarluma Traditional Owners and represent their communal interests including, among other things, management and protection of cultural values.	The Ngarluma People native title claim overlaps the EMBA, which the Ngarluma Aboriginal Corporation is the Registered Native Title Prescribed Body Corporate.	Yes
Wanparta Aboriginal Corporation (WAC)	Representative Aboriginal Corporation	WAC represents the Ngarla Traditional Owners and represent their communal interests including, among other things, management and protection of cultural values. Wanparta also jointly manages the 80 Mile Beach Marine Park.	The Ngarla and Ngarla #2 (Determination Area 2) determined native title claim does not overlap the EMBA. The determined native title claim is coastally adjacent to the EMBA, which the Wanparta Aboriginal Corporation is the Registered Native Title Prescribed Body Corporate.	Yes

Wirrawandi Aboriginal Corporation (WAC)	Aboriginal Representative Corporation	Aboriginal	WAC represents the Yaburara and Mardudhunera Traditional Owners and represent their communal interests including, among other things, management and protection of cultural values.	The Yaburara and Mardudhunera People determined native title claim overlaps the EMBA, which the Wirrawandi Aboriginal Corporation is the which the Wirrawandi Aboriginal Corporation is the Registered Native Title Prescribed Body Corporate.	Yes
Yindjibarndi Aboriginal Corporation (YAC)	Representative Corporation	Aboriginal	YAC represents the e Yindjibarndi Traditional Owners. YAC advised that it has no interest in offshore oil and that Ngarluma manages all interest. VOGA has identified Ngarluma for consultation on this EP.	The Ngarluma/Yindjibarndi People determined native title claim overlaps the EMBA, which the Yindjibarndi Aboriginal Corporation is the Registered Native Title Prescribed Body Corporate. The YAC's nominated representative is Ngarluma and VOGA has consulted with YAC via Ngarluma.	Yes
Murujuga Aboriginal Corporation (MAC)	Representative Corporation	Aboriginal	Murujuga Aboriginal Corporation (MAC) is made up of members from five traditional custodial groups: the Ngarluma, Mardudhunera, Yaburara, Yindjibarndi, and Wong-Goo-Tt-Oo peoples. MAC brings together the five groups and is the approved corporate body for the Burrup and Maitland Industrial Estates Agreement (BMIEA). MAC administers the implementation of	MAC, while not a PBC, is a representative body responsible for managing cultural heritage, community development, and engagement in the region. MAC holds the freehold title to Murujuga National Park which overlaps the EMBA, potentially affecting its functions and interests.	Yes

		contractual obligations under the terms of the BMIEA. MAC owns and co-manages the Murujuga National Park, is responsible for the Dampier Archipelago National Heritage Place and the World Heritage listing of the Murujuga Cultural Landscape. MAC is the cultural authority for Murujuga and is responsible for the management and protection of its cultural values. It is interested in preserving cultural and sacred sites in the region.		
Malgana Aboriginal Corporation (MAC) (Part A)	Representative Aboriginal Corporation		The Malgana Part A native title claim does not overlap the EMBA, for which the Malgana Aboriginal Corporation is the Registered Native Title Body Corporate. On the basis of this assessment and the engagement undertaken to date, MAC (Part A) is not considered to have a direct function, interest or activity that would be affected by the proposed activities. Given our ongoing engagement VOGA has contacted MAC (Part A) separately at its discretion to advise its assessment and seek guidance and did not receive a response.	No

Malgana Aboriginal Corporation RNTBC, Nanda Aboriginal Corporation RNTBC (Part B)	Representative Aboriginal Corporation		The Nanda People Part B, Malgana 2 and Malgana 3 native title claim does not overlap the EMBA, for which the Malgana Aboriginal Corporation and Nanda Aboriginal Corporation are the Registered Native Title Body Corporates. On the basis of this assessment and the engagement undertaken to date, MAC, Nanda (Part B) is not considered to have a direct function, interest or activity that would be affected by the proposed activities. Given our ongoing engagement VOGA has contacted MAC, Nanda (Part B) separately at its discretion to advise its assessment and seek guidance and did not receive a response.	No
Nanda Aboriginal Corporation RNTBC (NAC)	Representative Aboriginal Corporation		The Nanda People and Nanda #2 native title claim does not overlap the EMBA, for which the Nanda Aboriginal Corporation is the Registered Native Title Body Corporate. On the basis of this assessment and the engagement undertaken to date, NAC is not considered to have a direct function, interest or activity that would be affected by the proposed activities. Given our ongoing engagement VOGA has contacted NAC separately at its discretion to advise its assessment and seek guidance and did not receive a response.	No
Nyangumarta Karajarri Aboriginal Corporation RNTBC (NKAC)	Representative Aboriginal Corporation		The Nyangumarta Karajarri People native title claim, which the Nyangumarta Karajarri Aboriginal Corporation RNTBC (NKAC) is the Registered Native Title Body Corporate for, does not overlap the EMBA.	No

			On the basis of this assessment and the engagement undertaken to date, NKAC is not considered to have a direct function, interest or activity that would be affected by the proposed activities. Given our ongoing engagement VOGA has contacted NKAC separately at its discretion to advise its assessment and seek guidance and did not receive a response.	
Nyangumarta Warrarn Aboriginal Corporation RNTBC (NWAC)	Representative Aboriginal Corporation		The Nyangumarta People (Part A) native title claim, which the Nyangumarta Warrarn Aboriginal Corporation RNTBC (NKAC) is the Registered Native Title Body Corporate for, does not overlap the EMBA. On the basis of this assessment and the engagement undertaken to date, NWAC is not considered to have a direct function, interest or activity that would be affected by the proposed activities. Given our ongoing engagement VOGA has contacted NWAC separately at its discretion to advise its assessment and seek guidance and did not receive a response.	No
Yawuru Native Title Holders Aboriginal Corporation RNTBC (Yawuru)	Representative Aboriginal Corporation		The Rubibi Community native title claim does not overlap the EMBA, for which the Yawuru Native Title Holders Aboriginal Corporation RNTBC is the Registered Native Title Body Corporate. On the basis of this assessment and the engagement undertaken to date, Yawuru is not considered to have a direct function, interest or activity that would be affected by the proposed activities.	No

			Given our ongoing engagement VOGA has contacted Yawuru separately at its discretion to advise its assessment and seek guidance and did not receive a response.	
Native Title representative bodies				
Kimberley Land Council (KLC)	Native Title Representative Body	KLC is the Native Title Representative Body for the Kimberley region of Western Australia. As such, they are not a Prescribed or Registered Native Title Body Corporate but exist to assist native title claimants and holders.	KLC is a Native Title Representative Body that provides administrative and legal assistance to native title groups in the Kimberley region. VOGA contacted KLC previously on several occasions to seek guidance with respect to its relevance for consultation but has not received a response. Based on a review of publicly available information regarding KLC's functions, interests and activities, and having regard to the nature and scope of the proposed activities, KLC's role is understood to be limited to providing representative and support services to native title groups. On the basis of this assessment and the engagement undertaken to date, KLC is not considered to have a direct function, interest or activity that would be affected by the proposed activities. VOGA has contacted KLC at its discretion to advise its assessment and seek guidance and did not receive a response.	No
Yamatji Marlpa Aboriginal Corporation (YMAC)	Native Title Representative Body	YMAC is the Native Title Representative Body for the Yamatji and Pilbara regions of Western Australia. As such, they are not a Prescribed or Registered	YMAC provides administrative and legal assistance to NTGAC, a group identified as a relevant person for this EP. VOGA has engaged with YMAC in this capacity. VOGA contacted YMAC previously on several occasions to seek guidance with respect to its relevance for consultation but has not received a response.	No

		Native Title Body Corporate but exist to assist native title claimants and holders.	Based on a review of publicly available information regarding the functions, interests and activities of YMAC, and having regard to the nature and scope of the proposed activities, YMAC's role is understood to be that of a Native Title Representative Body providing administrative and legal assistance to native title groups. On the basis of this assessment and the engagement undertaken to date, YMAC is not considered to have a direct function, interest or activity that would be affected by the proposed activities. VOGA has contacted YMAC separately at its discretion to advise its assessment and seek guidance and did not receive a response.	
Historical heritage groups or organisations				
Western Australian Museum (WAM)	Manages 200 shipwreck sites of the 1,500 known to be located off the Western Australian coast.	The State's museum authority responsible for managing and conserving Western Australia's cultural, maritime and natural heritage, including marine collections and heritage sites. Is interested in preserving and interpreting cultural, maritime, and natural assets.	There are known shipwrecks overlapping the EMBA which the Western Australian Museum may be responsible for, potentially affecting its functions and interests.	Yes
Local government and recognised local business and community reference/liaison groups or organisations				
City of Karratha	Local government governed by the Local Government Act 1995 representing the suburbs and localities of	The local government authority for the Karratha region, responsible for land use planning, community	The City of Karratha's area of responsibility overlaps the EMBA.	Yes

	Baynton, Baynton West, Bulgarra, Cossack, Dampier, Gap Ridge, Karratha, Karratha Industrial Estate, Jingarri, Madigan, Millars Well, Nickol, Pegs Creek, Point Samson, Roebourne, Whim Creek, and Wickham.	infrastructure and coastal management.		
Town of Port Hedland	Local government governed by the Local Government Act 1995 representing the suburbs and localities of Cooke Point, Port Hedland, Pretty Pool, Redbank, South Hedland, Wedgefield, and Yandeyarra.	The local government authority for Port Hedland, with responsibilities for community development, environmental management and local infrastructure.	The Town of Port Hedland's area of responsibility overlaps the EMBA.	Yes
Shire of Ashburton	Local government governed by the Local Government Act 1995 representing the suburbs and localities of Onslow, Pannawonica, Paraburdoo, and Tom Price.	The local government authority for the Ashburton region, encompassing coastal and inland areas that support resource and marine industries.	The Shire of Ashburton's area of responsibility overlaps the EMBA.	Yes
Shire of Exmouth	Local government governed by the Local Government Act 1995 representing the suburbs and localities of Exmouth, Learmonth, and North West Cape.	The local government authority for Exmouth, responsible for local planning and management of areas adjacent to the Ningaloo Coast and Exmouth Gulf.	The Shire of Exmouth's area of responsibility overlaps the EMBA.	Yes
Shire of Carnarvon	Local government governed by the Local Government Act 1995 representing the suburbs and localities of	The local government authority for Carnarvon, responsible for local planning.	The Shire of Carnarvon’s area of responsibility overlaps the EMBA.	Yes

	Babbage Island, Brockman, Browns Range, Carnarvon, Coral Bay, East Carnarvon, Greys Plain, Ingaarda, Kingsford, Morgantown, North Plantations, South Carnarvon, and South Plantations.			
Shire of East Pilbara	Local government governed by the Local Government Act 1995 representing the suburbs and localities of Jigalong, Kiwirrkurra, Kunawarritji, Marble Bar, Newman, Nullagine, Parngurr, Punmu, and Warralong.	The local government authority for the East Pilbara, region, responsible for local planning.	The Shire of East Pilbara's area of responsibility overlaps the EMBA.	Yes
Port Hedland Chamber of Commerce and Industry	Independent not-for-profit organisation responsible for promoting the interests of its members in the business community in the town of Port Hedland and surrounding areas	Represents the interests of businesses operating in the Port Hedland area, including those engaged in port, logistics and resource-related activities.	The Port Hedland Chamber of Commerce and Industry's interests have the potential to be impacted by the proposed activities.	Yes
Onslow Chamber of Commerce and Industry	Independent not-for-profit organisation responsible for promoting the interests of its members in the business community in the town of Onslow and surrounding areas	Represents local business interests in the Onslow area, including sectors supporting oil, gas and marine operations.	The Onslow Chamber of Commerce and Industry's interests have the potential to be impacted by the proposed activities.	Yes

Western Australian Local Government Association (WALGA)	Independent non-for-profit organisation responsible for promoting the interests of the WA local government sector.	The peak body representing local governments across Western Australia, providing advocacy and policy input on state and regional matters.	The WALGA's interests have the potential to be impacted by the proposed activities.	Yes
Karratha and Districts Chamber of Commerce and Industry (KDCCI)	Independent not-for-profit organisation responsible for promoting the interests of its members in the business community in the city of Karratha and surrounding areas	Represents business and industry interests in Karratha and surrounding districts, including those linked to resource and marine sectors.	The Karratha and Districts Chamber of Commerce and Industry's interests have the potential to be impacted by the proposed activities.	Yes
Regional Development Australia (Pilbara) Karratha WA	Federal Government initiative responsible for supporting local governments and non-for-profits.	A regional development body based in Karratha that promotes economic growth, investment and community development across the Pilbara region.	The Regional Development Australia (Pilbara) Karratha WA's interests have the potential to be impacted by the proposed activities.	Yes
Research institutes				
Curtin University (Centre for Marine Science and Technology)	Marine Research Organisation	The Western Australian University conducts research in marine science, environmental monitoring, and technology development, undertaking field studies, surveys, and collaborative and research initiatives.	There may be research being undertaken by Curtin University that intersects within the EMBA, potentially affecting its interests and activities.	Yes
University of Western Australia (UWA)	Marine Research Organisation	Undertakes marine science and oceanography research, is interested in	There may be research being undertaken by University of Western Australia that intersects within the EMBA, potentially affecting its interests and activities.	Yes

		understanding and protecting coastal and offshore ecosystems, and undertakes research projects and environmental monitoring.		
Commonwealth Scientific and Industrial Research Organisation (CSIRO)	Marine Research Organisation	Conducts scientific research on marine ecosystems and biodiversity, and undertakes research and monitoring.	There may be research being undertaken by the Commonwealth Scientific and Industrial Research Organisation that intersects within the EMBA, potentially affecting its interests and activities.	Yes
Western Australian Marine Science Institution (WAMSI)	Marine Research Organisation	Conducts research on marine ecosystems and biodiversity.	There may be research being undertaken by the Western Australian Marine Science Institution that intersects within the EMBA, potentially affecting its interests and activities.	Yes
Australian Institute of Marine Science (AIMS)	Marine Research Organisation	Conducts research on marine ecosystems and biodiversity.	There may be research being undertaken by Australian Institute of Marine Science that intersects within the EMBA, potentially affecting its interests and activities.	Yes
Australian Marine Sciences Association (WA Branch)	Marine Research Organisation	Represents marine scientists in Western Australia and conducts research in the region.	There may be research being undertaken by Australian Marine Sciences Association that intersects within the EMBA, potentially affecting its interests and activities.	Yes
Local environment and conservation groups or organisations				
Project Ningaloo	Non-government organisation	Focused on preserving ecological values and sustainable marine use.	Protect Ningaloo's conservation activities have the potential to intersect with the EMBA as the EMBA overlaps North West Cape and Ningaloo Reef, potentially affecting its interests and activities.	Yes
Australian Conservation Foundation (ACF)	Non-government organisation	National environmental organisation with a focus on biodiversity, ecosystems and environmental outcomes,	Australian Conservation Foundation has been assessed as not relevant to the proposed activity. VOGA has assessed that ACF does not have a publicly available statement (or purpose), website or social media material that	No

		with a focus on advocacy, research, policy submissions and public education.	demonstrates its functions, interests or activities are relevant to the potential risks and impacts associated with planned activities in accordance with the intended outcome of consultation. VOGA chose to contact ACF at its discretion.	
The Conservation Council of WA (CCWA)	Non-government organisation	Environmental advocacy body which undertakes policy advocacy and conservation programs.	The Conservation Council of WA has a publicly available statement (or purpose), website or social media material that demonstrates that it's functions, interests or activities may be relevant to the potential risks and impacts associated with planned activities in accordance with the intended outcome of consultation.	Yes
Care for Hedland	Non-government organisation	Community based environmental group with a focus on community education, conservation activities and environmental advocacy.	Care for Hedland has a publicly available statement (or purpose), website or social media material that demonstrates that it's functions, interests or activities may be relevant to the potential risks and impacts associated with planned activities in accordance with the intended outcome of consultation.	Yes
Greenpeace Australia Pacific (GAP)	Non-government organisation	International environmental group focused on climate change and fossil fuel campaigns.	Greenpeace Australia Pacific (GAP) has been assessed as not relevant to the proposed activity. VOGA has assessed that GAP does not have a publicly available statement (or purpose), website or social media material that demonstrates its functions, interests or activities are relevant to the potential risks and impacts associated with planned activities in accordance with the intended outcome of consultation. VOGA chose to contact GAP at its discretion.	No
Wilderness Society (WS)	Non-government organisation	National environmental NGO campaigning on biodiversity, forest protection, and fossil fuel phase-out.	Wilderness Society (WS) has been assessed as not relevant to the proposed activity. VOGA has assessed that WS does not have a publicly available statement (or purpose), website or social media material that demonstrates its functions, interests or activities are relevant to the potential risks and impacts associated	No

			with planned activities in accordance with the intended outcome of consultation. VOGA chose to contact WS at its discretion.	

1.3 Consultation Activities

VOGA has been consulting with relevant individuals and other interested parties for this EP from October through to February 2026. This included a planned and considered approach to engaging identified relevant persons and interested parties on VOGA's proposed activities. The company undertook a broad consultation process to raise public awareness, encourage feedback and prompt respectful two-way consultation.

VOGA conveyed its planned activities through a variety of media forums that included advertisements in print media such as national, state and local newspapers, and social media platforms.

Local community centres were also contacted and asked to print and display information flyers within and adjacent to the Operational Area and EMBA to raise awareness.

VOGA's consultation webpage provided fact sheets and other publicly available materials.

Table 2: Summary of Consultation Activities

Consultation Activity	Purpose	Timing
Initial consultation (22 October 2025 – 21 November 2025)		
Consultation materials Email to identified relevant persons with a link to project information on the VOGA website, a map of the title area, and seeking their preferred method of consultation.	Raise awareness of the proposed activities and existing operations and seek input from relevant persons on their preferred method for engaging in consultation.	22 October 2025
Website Website content and resources developed and made available: https://www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities/	Provided: • Information about VOGA's consultation obligations, approach and promoting self-identification. • Information about the proposed activities, including potential impacts and risks. • Information on the consultation process and how to self-identify. • Contact information to enable relevant persons to provide feedback. • Resources such as fact sheets, frequently asked questions and NOPSEMA guidelines.	From 20 October 2025
Consultation period (22 October 2025 – 18 December 2025)		
Consultation materials Consultation communication material included:	Advising identified relevant persons of the proposed activities, the consultation period dates, and providing an opportunity for feedback on the EP.	From 22 October 2025

• An email to identified relevant persons advising of the commencement of consultation. • Letter to identified relevant persons advising of the commencement of consultation. • Community flyers. • Consultation Information Sheets and stakeholder-specific fact sheets for commercial fisheries and First Nations groups. • Additional targeted information about the proposed activities was provided to relevant persons in respect to their functions interests and activities.		
Consultation meetings Where indicated as the preferred consultation method, VOGA hosted in-person and virtual meetings. This included providing a presentation specific to the relevant person or organisation.	Providing information to relevant persons about the proposed activities, the consultation period dates, and providing an opportunity for feedback on the EP.	From 22 October 2025
Print media advertising Print advertisements in the following publications: • The West Australian • Koori Mail • Mid-West Times • North-West Telegraph • Broome Advertiser • Pilbara Times.	Promote awareness of the proposed activities, encourage self-identification and seek feedback from relevant persons. A staggered approach was taken for placing advertisements, ensuring they were displayed throughout the consultation period.	From 28 October 2025 to 19 November 2025.
Social media advertising Geo-targeted social media advertising was deployed, aimed at communities within the EMBA.	Promote awareness of the proposed activities, consultation period and how to provide feedback on the EP.	From 22 October 2025 to 24 November 2025

1.3.1 Consultation Correspondence

VOGA used a variety of methods to correspond and consult with identified relevant persons such as email, letters, phone calls, and face-to-face and virtual meetings. Where appropriate, targeted follow-up correspondence was made to relevant persons who had not responded before the close of the feedback period. Consultation activities undertaken with relevant

persons are summarised in Table 6 and consultation activities undertaken with persons or organisations VOGA assessed as not relevant but chose to consult are summarised in Table 7.

An information sheet was provided to relevant persons contacted by VOGA. The information sheet was available on VOGA's consultation website from 20 October 2025. It included an overview of the proposed activity, maps, key risks and impacts, management measures, and contact details for relevant persons to provide feedback to VOGA (see Record of Consultation, reference 1.1).

Additional targeted information was provided to relevant marine users in a commercial fishing information sheet. This included maps, key information for the commercial fishing sector regarding the EP activities, coordinates for the operational areas, an activity summary, potential impacts, an assessment of commercial fishing VOGA's impact assessment, and contact details for relevant persons to provide feedback to VOGA (see Record of Consultation, reference 1.2).

1.3.2 Advertising of the proposed activity

Traditional media advertising

VOGA advertised the planned activities under the proposed EP in national, regional and local newspapers selected because of their coverage area servicing potentially relevant communities and persons across Western Australia (Figure 1-21). Newspaper advertisements were published (Figure 1-5 to Figure 1-17) for the duration of the consultation period between 22 October 2025 and 21 November 2025 with a closing date of 21 November 2025.

Table 3 lists local newspapers used for advertising. These publications do not require subscriptions and are available directly to households within the publication's coverage area. Koori Mail, an Indigenous-focused publication, published the advertisement nationally. All communities within or adjacent to the EMBA had access to this information.

Table 3: Advertisement summary

Publication date	Advertisement type	Coverage
28 October 2025	Quarter-page print ad in The West Australian	State-wide - Western Australia
5 November 2025	Quarter-page print ad in The Koori Mail	National - focused on First Nations
5 November 2025	Quarter-page print ad in The Mid-West Times	Regional - Coral Bay, Geraldton, Meekatharra, Shark Bay, and Carnarvon
5 November 2025	Quarter-page print ad in The North-West Telegraph	Regional - Marble Bar, Newman, Nullagine, Port Hedland, and Wedgefield
10 November 2025	Quarter-page print ad in The West Australian	State-wide - Western Australia

12 November 2025	Quarter-page print ad in The Mid-West Times	Regional - Coral Bay, Geraldton, Meekatharra, Shark Bay, and Carnarvon
30 October 2025	Quarter-page print ad in The Broome Advertiser	Regional - Broome, Derby, Fitzroy Crossing, Karratha, and Kununurra
19 November 2025	Quarter-page print ad in The Koori Mail	National - focused on First Nations
29 October 2025	Quarter-page print ad in The Pilbara News	Regional - Karratha, Dampier, Wickham, Roebourne, Point Samson, Tom Price, Pannawonica, Paraburdoo and Onslow
12 November 2025	Quarter-page print ad in The North-West Telegraph	Regional - Marble Bar, Newman, Nullagine, Port Hedland, and Wedgefield
13 November 2025	Quarter-page print ad in The Broome Advertiser	Regional - Broome, Derby, Fitzroy Crossing, Karratha, and Kununurra
19 November 2025	Quarter-page print ad in The Pilbara News	Regional - Karratha, Dampier, Wickham, Roebourne, Point Samson, Tom Price, Pannawonica, Paraburdoo and Onslow

Geotargeted social media campaign

Between 22 October 2025 and 24 November 2025, VOGA conducted a geotargeted social media campaign across Facebook (Figure 1-19 and Table 4). The campaign focused on locations within or adjacent to the EMBA. Table 4 lists the localities identified for this campaign. The campaign reached 93,327 users on Facebook generating 4,576 link clicks to the consultation information page of VOGA's website.

The campaign focused on bringing the proposed activity to the attention of persons who may be affected. It directed interested persons or organisations to VOGA's consultation website (Figure 1-18) which displayed further information about the proposed activities and consultation and contact details for VOGA.

Table 4: Localities and geographical reach of targeted social media advertising campaign

Platform	Geotargeted Reach	Campaign Dates	Impact
Facebook	Users located within VOGA's EMBA including: Balla Balla + 40 km, Bernier Island, Broome + 40 km, Cape Range National Park + 40 km, Carnarvon + 40 km, Coburn + 65 km, Coral Bay + 40 km, Dampier Peninsula + 40 km, Denham + 80 km, Dorre Island, Eighty Mile Beach + 40 km, Eurardy + 40 km, Exmouth + 40 km, Geraldton + 40 km, Houtman Abrolhos, Karratha + 62 km, Lagrange + 40 km, Macleod + 50 km, Mardie + 40 km, Minilya + 40 km, Mundabullangana + 40 km, Nerren Nerren + 40 km, Ningaloo, Northampton + 40 km, Onslow + 4km, Pannawonica + 40 km, Pardoo + 40 km, Port Hedland + 58 km, Sherlock + 40 km, Tamala + 40 km, Waterbank + 40 km, Wooramel + 40 km and Zuytdorp + 40 km	22 October – 24 November 2025	Reach[1]: 98,327 Frequency[2]: 6.16 Impressions[3]: 574,581 Clicks: 4,576 CTR%[4]: 0.80

1.3.3 Community Flyer

To complement the print and social media advertising campaigns, VOGA developed a community flyer (Figure 1-20). The company asked community centres in relevant communities to display the flyer, increasing the visibility of information in regional communities adjacent to the EMBA.

Table 5: The community centres contacted to display VOGA community flyer

Town/Region	Community Centre
Karratha	Dampier Community Hub
	Frank Butler Community Centre
	Karratha Library

[1] The number of unique users who see the advertisement

[2] The average number of times a user sees an advertisement

[3] The number of times the advertisement was seen, including multiple views from individual users

[4] Click-through rate measures the number of clicks an advertisement receives divided by the number of times the advertisement is shown.

	Dampier Library
	Wickham Library
	Roebourne Library
	Karratha and Districts Chamber of Commerce and Industry
	Mawarnkarra Health Service – located in Roebourne
	Pilbara Community Legal Service
	Aboriginal Legal Services of Western Australia
	Karratha Business Centre
	Pilbara Development Commission
	Karratha Family Centre
	Pam Buchanan Family Centre
	Karratha Leisureplex
	Roebourne Aquatic Centre
	Wickham Recreation Precinct
Shark Bay	Shark Bay Community Resource Centre
	Shark Bay Library
East Pilbara	Newman Library
	Marble Bar Library
	Nullagine Library
	The Square
	Newman Putukurnu Aboriginal Medical Service
	Newman Newman Recreation Centre
	Tom Price Nintirri Centre
	Tom Price Community Recreation Centre
	Tom Price Civic Centre
Ashburton	Libraries in Onslow, Pannawonica, Paraburdoo and Tom Price

Port Hedland	Port Hedland Community Centre
	Port Hedland Library
	South Hedland Library
	Port Hedland Chamber of Commerce
Carnarvon	Carnarvon Civic Centre
	Carnarvon Medical Service Aboriginal Corporation
	Gwoonwardu Mia Cultural Centre
	Aboriginal Legal Services of Western Australia
	Aboriginal Family Legal Services
	Carnarvon Library
Exmouth	Ningaloo Centre (includes the library)
Onslow	Onslow Chamber of Commerce and Industry

1.3.4 Consultation with First Nations people and organisations

Additional consultation activities were undertaken with relevant Traditional Custodians and First Nations people and organisations. These activities were specifically developed to encourage effective engagement and ensure information was provided in a form that was accessible and appropriate.

Consultation undertaken specifically with First Nations people and organisations for this EP included:

- Direct correspondence and engagement with nominated representative bodies through the contact list on the ORIC website. To encourage respectful, two-way dialogue VOGA requested advice on how they would like to be engaged. This included an early reach out on 25 August 2025, advising of upcoming consultation regarding the Wandoo Offshore Field Well Construction Environment Plan. VOGA advised that consultation with the representative bodies regarding these activities was welcome.

- The reach out resulted in meetings with representatives, requests for resourcing to enable consultation, providing information on the proposed activities, and exchanging written correspondence.

- A Summary Information Sheet was developed to ensure the content was appropriate and accessible for the intended recipients and provided to them (Figure 1-4).

- Consultation meetings were held between First Nations groups, VOGA representatives, and advisers with experience in First Nations community engagement. These meetings were held based on the principles of a co-designed approach and that two-way communication was encouraged to ensure information was shared effectively. This included proposing a mutually agreed agenda, visual aids, emphasis on risks and

impacts, opportunity for feedback and questions, discussion about ongoing relationship development, and meeting all costs such as sitting fees, travel and other support required.

- VOGA researched relevant First Nations groups and representative bodies to better understand their values and interests. This included desktop research and reviewing precedent engagement by other titleholders and resulted in the development of special interest material that could provide relevant information to the group's functions, interests and activities. This collateral was used during meetings.
- Ongoing efforts were made to engage with First Nations groups to develop relationships via different channels and methods such as email, phone calls, text messages, and by seeking alternative appropriate contacts.
- VOGA also ran a geo-targeted social media campaign (Table 4) and print media advertising campaign (Table 3), reaching communities adjacent to the EMBA of the proposed activities. The campaign was wide-reaching and brought the proposed activities to the attention and was developed with accessible language appropriate for Indigenous audiences. The campaigns directed any interested parties to VOGA's consultation website (Figure 1-18) where further information, contact details and resources were made available.

1.3.5 Consultation Material

Included below are copies of the consultation material deployed during consultation activities and VOGA's public awareness campaign.

Figure 1-2: Wandoo Field Well Construction Environment Plan Information Sheet

VERMILION ENERGY

INFORMATION SHEET

Wandoo Field

Wandoo Facility Environment Plan

October 2025

About Vermilion Energy

Vermilion Energy is an international energy producer with a 30-year track record. It has operations in North America, Europe and Australia.

Vermilion Oil and Gas Australia (Vermilion) is a subsidiary of Vermilion Energy and has operated in Australia for 20 years. Our Australian operations focus on producing and developing oil at the Wandoo Field, off the shore of Western Australia.

About Wandoo Field

The Wandoo Field was discovered in 1991 and the extraction of oil started in 1993. Vermilion has been the operator since November 2005 and the sole titleholder since 2007.

The Wandoo Field is located within the Permit Area WA-14-L in Commonwealth waters within the Carnarvon Basin, approximately 80 km northwest of the port of Dampier and 110 km northeast of Barrow Island (**Figure 1**). The water depth at the field location is in the range from 50–60 m.

Operational Area

The Operational Area for the activities detailed in the Wandoo Facility Environment Plan (EP) is defined as the area within the existing 500 m Petroleum Safety Zone (PSZ) within the Permit Area of WA-14-L, surrounding the Wandoo Production Facilities (see **Table 1**).

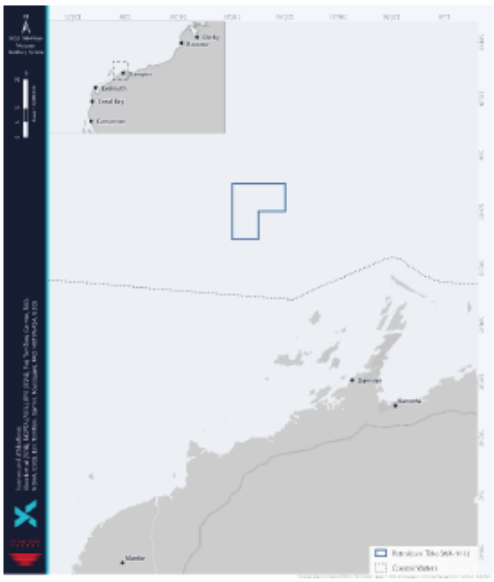


Figure 1. Location of WA-14-L

Activity overview

The Wandoo Field currently operates under an approved EP for production at the facility. The Wandoo Facility EP is updated and reassessed every 5 years, as per Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023.

Vermilion currently operates the Wandoo Facility within the production licence area WA-14-L under the Wandoo Facility EP. The purpose of this EP is to document the potential environmental impacts and risks and planned mitigation measures associated with the operation of the Wandoo Production Facilities. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field.

The well fluids produced from Wandoo A are piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform (see **Figure 2**). A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.

Total field production is currently in the order of 5,000 bbls/day.



Pictured: Wandoo Production Facilities, Wandoo A (left) and Wandoo B (right)

Produced Formation Water

Like all offshore oil platforms, the Wandoo Production Facility recovers fluids that are then treated to remove water, known as Produced Formation Water (PFW). Once the oil and water have been separated, the PFW is treated to further maximise oil recovery, before being discharged to the ocean. This is standard industry practice and is done in line with the accepted Wandoo Facility Environment Plan, which meets the requirements of the offshore environmental regulations.

Wandoo may discharge up to 36,000 m³/day of PFW into the ocean. Over the years, it has been extensively analysed and found to contain trace quantities of organic compounds (liquid hydrocarbons), dissolved and suspended salts and minerals from the reservoir (heavy metals, ammonia) and production process chemicals.

Vermilion has undertaken extensive research to improve the performance of the water treatment system and reduce the concentration of hydrocarbons in the PFW discharge. Sensitivity analysis confirms this provides a more effective environmental impact reduction compared to other solutions such as reinjection back into the reservoir.

On discharge to the ocean, the PFW is diluted rapidly, however, it can cause a visible plume on the ocean surface, particularly on calm days. Dilution reduces hydrocarbons concentrations to levels below which they could possibly cause environmental harm. Over a longer timeframe hydrocarbons are reduced to their constituent parts through microbial biodegradation and will not accumulate in the environment.

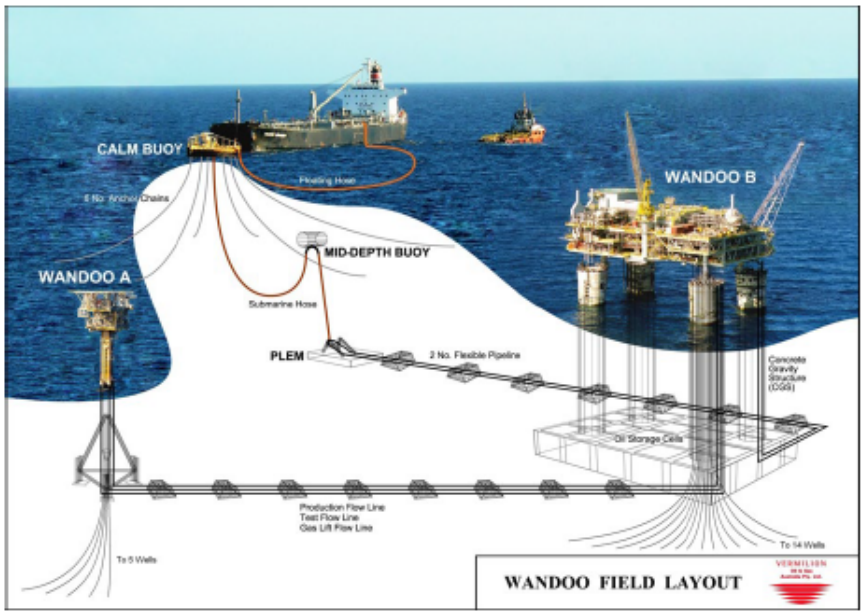


Figure 2. Schematic of the Wandoo Production

Table 1. Coordinates of the Wandoo Production Facilities (GDA2020/MGA2020)

Facility	Latitude	Longitude
Wandoo A	20° 08' 14.61" S	116° 25' 22.43" E
Wandoo B	20° 07' 37.12" S	116° 26' 08.23" E
CALM Buoy	20° 06' 57.43" S	116° 26' 06.51" E

Communications with mariners

A 500 m PSZ applies around the Wandoo Production Facilities. Commercial fishers and other marine users are not permitted to enter the Operational Area.

Environment that may be affected

As part of our environmental assessment and consultation process, Vermilion create an environment that may be affected (EMBA) map to provide geographical context for stakeholders to determine if their functions, interests or activities may be affected by an offshore activity during operations or in an emergency scenario.

Figure 3 shows the EMBA, which is based on a worst-case environmental scenario, which in this case is an unplanned release (oil spill) from the Wandoo Production Facility.

The EMBA has been defined through combining 100 simulations for each unplanned release scenario under different weather and ocean conditions. This means that in the highly unlikely event an unplanned release does occur, a geographical area much smaller than the EMBA would be affected.

The majority of the impacts or risks directly arising from planned activities would occur within close proximity of the operational area.

Vermilion has systematic control measures to prevent and mitigate emergencies and to reduce the impact of planned activities on the environment, including ecological, social and cultural sensitivities.

Tables 2 and **3** summarises the key impacts or risks and proposed control measures to manage these to levels that are as low as reasonably practicable (ALARP) and acceptable.

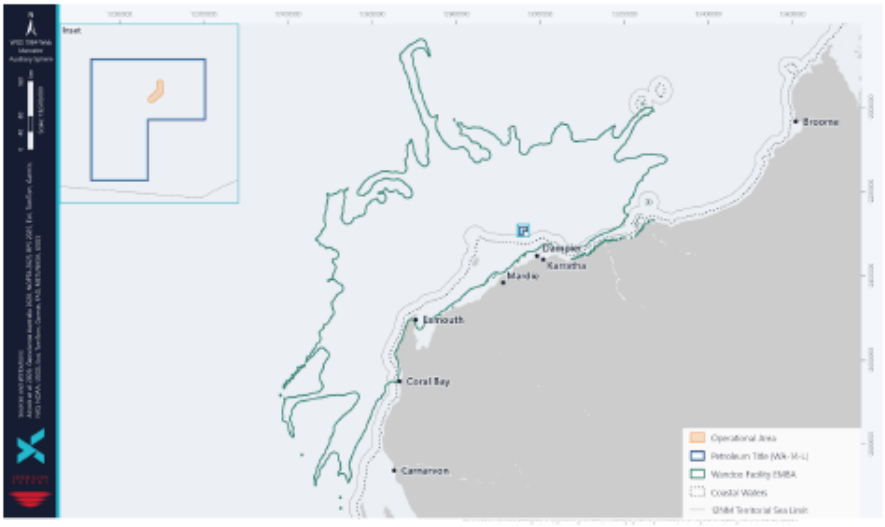


Figure 3. Operational area and environment that may be affected

Assessment

Vermilion has undertaken an assessment of the potential impacts and risks to the environment as well as potential risks to relevant persons arising from the planned activities and unplanned events. This assessment considers the timing, duration and location of the activities. A number of mitigation and management measures will be implemented and are summarised in **Tables 2** and **3**. Further details will be provided in the Wandoo Facility EP.

In preparing the EP, Vermilion's intent is to minimise environmental, social and cultural risks and impacts associated with the proposed activities, and Vermilion seeks your feedback to inform our decision making.

Mitigation and management measures

Vermilion has undertaken an assessment to identify potential impacts and risks to the environment arising from the activity. A number of mitigation and management measures for the activity are outlined in **Tables 2** and **3.** Further details will be provided in the Wandoo Facility EP.

Table 2. Summary of key risks and/or impacts and preliminary management measures

Potential impact/risk	Source of potential impact/risk	Description of potential impact/risk	Preliminary draft mitigation and/or management measure
Planned activities (routine and non-routine)			
Light emissions	Wandoo Production Facilities and support vessels	• Navigation and operational lighting from the operational area may result in a localised change in ambient light. • Change in ambient light may result in the temporary attraction or deterrence of light-sensitive species.	• Potential impacts from lighting are assessed as occurring within 20 km of a vessel or facility based on the National Light Pollution Guidelines for Wildlife (Commonwealth of Australia, 2019). • Facility and vessel navigation lights are compliant with the *Navigation Act 2012*.
Acoustic emissions	Wandoo Production Facilities, support vessels and helicopters	• Offshore activities within the operational area may result in a localised and temporary change to ambient underwater sound.	• Vessels and helicopters comply with relevant parts of Environment Protection and Biodiversity Conservation (EPBC) Regulation (2000) Part 8. • Vessel and machinery are maintained in accordance with Flag State certification requirements. • All engines, compressors and machinery on the facilities are maintained via a maintenance management system.
Atmospheric and greenhouse gas emissions	Wandoo Production Facilities, support vessels and helicopters	• Combustion of fuel may result in a localised and temporary reduction in air quality. • Greenhouse gas emissions within the operational area may result in contribution to the reduction of the global atmospheric carbon budget.	• Reduced sulphur content fuel will be used. • Flag State Certificate and/or IAPP certifies measures are in place to manage air emissions. • All engines, compressors and machinery on the facilities are maintained via a maintenance management system.
Routine discharges	Wandoo Production Facilities and support vessels	• Planned discharges from operations (e.g. sewage, food waste) may result in a localised and temporary change in water and/or sediment quality, and subsequent impacts to marine life.	• Emissions and discharges of liquid waste to sea are in accordance with legislative requirements. • Compliance with Vermilion Waste Management Plan. • Produced water discharges are monitored and recorded, with adaptive management processes applied if significant changes are identified.
Discharge of produced water	Wandoo Production Facilities	• Planned discharges from operations (e.g. sewage, food waste, produced water) may result in a localised and temporary change in water and/or sediment quality, and subsequent impacts to marine life.	• Routine external laboratory testing to ensure produced water chemistry is within assumed levels. • Produced water discharge flow rates are monitored. • Oil in water concentrations are monitored and alarmed. • Compliance with chemical assessment and selection process.

Potential impact/risk	Source of potential impact/risk	Description of potential impact/risk	Preliminary draft mitigation and/or management measure
Interaction with other marine users	Wandoo Production Facilities and support vessels	• Potential displacement of commercial fishing activities and commercial shipping vessels.	• A pre-existing 500 m PSZ is in place around the Wandoo Production Facilities and will remain in place for Wandoo Production Facilities the duration of operations under the proposed EP. No vessels are to enter this zone. • Consultation is undertaken with all relevant persons.
Disturbance to seabed	Wandoo Production Facilities	• Localised increase in turbidity. • Potential impacts to benthic habitat and communities.	• Seabed disturbance limited to planned activities and defined locations.

Table 3. Summary of potential risks and management measures associated with unplanned events

Potential risk	Source of potential risk	Description of potential risk	Preliminary draft mitigation and/or management measure
Unplanned events (accidents/incidents)			
Unplanned release from wells	Production wells	• A release of hydrocarbons (e.g. oil, fuel) may result in marine pollution, change to water quality, smothering of subtidal and intertidal habitats and subsequent impacts to marine life, indirect impacts to fisheries, and reduction in amenity.	• Well control shall be maintained at all times during well construction and intervention operations. • Well Control and Pressure Control Equipment shall be appropriate for providing control of the well. • Casing and other well equipment shall be designed to contain any anticipated pressure during the lifecycle of the well.
Unplanned release from export system	Offtake tanker station keeping failure or failure of floating hose assembly		• Structural integrity of CALM Buoy mooring. • Weather restrictions apply to offtake activities. • Wandoo Mooring Master on board tanker during offtake. • Marine breakaway coupling on floating hose assembly.
Unplanned release from Wandoo B shaft 2	Structural damage to shaft 2		• Asset integrity management. • Management of change processes for changes to structural loading. • Structural design of the Wandoo B facility.
Unplanned release from vessel collision	Support vessels		• Wandoo Production Facilities are marked on marine charts and any changes notified via Notices to Mariners. • 500 m PSZ surrounding the Wandoo Production Facilities. • Vessel operations restricted in adverse weather. • Dynamic positioning requirements. • Navigation aids. • Emergency communications.
Invasive marine pests	Support vessels	• Planned discharge of ballast water or the presence of biofouling on vessels may result in the introduction of an invasive marine pest.	Support vessels will comply with: • Australian Ballast Water Management Requirements consistent with the International Convention for the Control and Management of Ships' Ballast Water and

Potential risk	Source of potential risk	Description of potential risk	Preliminary draft mitigation and/or management measure
			Sediments (Ballast Water Management Convention). • Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships. • National Biofouling Guidelines for the Petroleum Production and Exploration Industry and IMO Guidelines for the control and management of a ship's biofouling to minimise the transfer of invasive aquatic species.
Vessel collision or disturbance of fauna	Support vessels	• Potential injury of marine fauna.	• Vessels contracted by Vermilion operating in the Operational Areas must have procedures that adhere to Part 8 of EPBC Regulation 2000 to minimise exposure of marine fauna.
Unplanned release during handling/ storage of hazardous materials or wastes	Wandoo Production Facilities and support vessels	• A release of hazardous material or waste (e.g. fuel, sewage) may result in change to water quality, marine pollution and subsequent impacts to marine fauna, potentially resulting in injury or mortality.	Work procedures for lifts, bulk transfers and cargo loading will require: • The security of loads to be checked prior to commencing lifts • Loads to be covered if there is a risk of losing loose materials • Lifting operations to consider weather and sea state.
Hydrocarbon spill response activities	Spill response	• Potential impacts to marine fauna from dispersants, disturbance to benthic habitat, scouring of sediments, and decrease in water quality.	• Vermilion maintains contracts with oil spill response organisations, operational and scientific monitoring providers, and logistics operators for support in the event of a hydrocarbon spill. • Vermilion tests response arrangements annually to ensure preparedness for unplanned hydrocarbon spills. • Where required, implementation of response strategies will be undertaken as per the NOPSEMA-accepted Oil Pollution Emergency Plan (OPEP) and in consultation with or under direction of the Commonwealth or State Control Agency.

Consultation

Consultation provides Vermilion with an opportunity to receive feedback from authorities, persons and organisations whose functions, interests or activities may be affected by proposed petroleum activities. This feedback helps us to refine or change the management measures we are planning to address potential activity impacts and risks. Vermilion's objective for the proposed activities is to ensure the activity is carried out in a manner that is consistent with the principles of Ecologically Sustainable Development (ESD) and reduce environmental impacts and risks to a level that is As Low As Reasonably Practicable (ALARP) and acceptable over the life of the activity.

Consultation also helps us to identify values and sensitivities where information is not publicly available, such as spiritual and cultural connection to land and sea country, as well as first-hand feedback on commercial and recreational fishing, tourism and local community activities and interests.

Feedback

If you consider you may be a relevant person, please contact us as soon as possible if you require any further information or if you think you are not on our consultation list.

We are asking for relevant persons to provide feedback by **21 November 2025.**

Feedback provided by relevant persons will be considered in an addendum to the Wandoo Facility EP and through the life of the activity. Feedback from relevant persons will be included in the EP submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

Please let us know if you would like your personal/organisational details or any part of your feedback to remain private and we will ensure this remains confidential to NOPSEMA.

Contact us

Website: www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities

Email: abu.consultation@vermilionenergy.com

Phone: (08) 9217 5858

To visit our website, scan the QR code

Figure 1-3: Commercial fisher information sheet

VERMILION ENERGY

COMMERCIAL FISHER INFORMATION SHEET

Wandoo Field

Wandoo Facility Environment Plan

October 2025

More information is available in the general Wandoo Facility Environment Plan Consultation Information Sheet

Information overview

This Commercial Fisher Information Sheet provides supplementary information to the Vermilion Oil and Gas Australia (Vermilion) general information sheet about the production operations in the Wandoo Field.

This Information Sheet provides supplementary information for the needs of commercial fishers who may be active around the Wandoo Field.

It summarises the ongoing assessment of potential impacts and risks to the commercial fishing industry and provides information for the needs of commercial fishers, who may be around the operational area, about the proposed activities.

Activity overview

Vermilion currently operates the Wandoo Facility within the production licence area WA-14-L under the Wandoo Facility EP. The purpose of this EP is to document the potential environmental impacts and risks and planned mitigation measures associated with the operation of the Wandoo Production Facilities. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field.

The well fluids produced from Wandoo A are piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform (see **Figure 2**). A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.

Total field production is currently in the order of 5,000 bbls/day.

About Vermilion Energy

Vermilion Energy is an international energy producer with a 30-year track record. It has operations in North America, Europe and Australia.

Vermilion is a subsidiary of Vermilion Energy and has operated in Australia for 20 years. Our Australian operations focus on producing oil at the Wandoo Field, off the coast of Western Australia.

About Wandoo Field

The Wandoo Field was discovered in 1991 and the extraction of oil started in 1993. Vermilion has been the operator of Wandoo Field since November 2005 and the sole titleholder since 2007.

The Wandoo Facility operates under existing accepted EPs in place for production and well construction.



Pictured: Wandoo B (left) and a Wandoo A (right)

Key information

- **Location:** The Wandoo Field is located in Commonwealth waters within the Carnarvon Basin, approximately 80 km northwest of the port of Dampier and 110 km northeast of Barrow Island (**Figure 1**).
- **Exclusion zone:** A 500 m Petroleum Safety Zone (PSZ) is currently in place around the Wandoo production facilities. This defines the operational area.
- **Operational area:** Commercial fishers and other marine users are **not** permitted to use the operational area and should take care around operations by adhering to standard navigation rules.
- **Vessels:** One support vessel typically visits the Wandoo Field every week.

Wandoo Field location

The Wandoo Field is located in Commonwealth waters within the Carnarvon Basin, approximately 80 km northwest of the port of Dampier and 110 km northeast of Barrow Island (**Figure 1**). The water depth at the field location is in the range from 50–60 m.

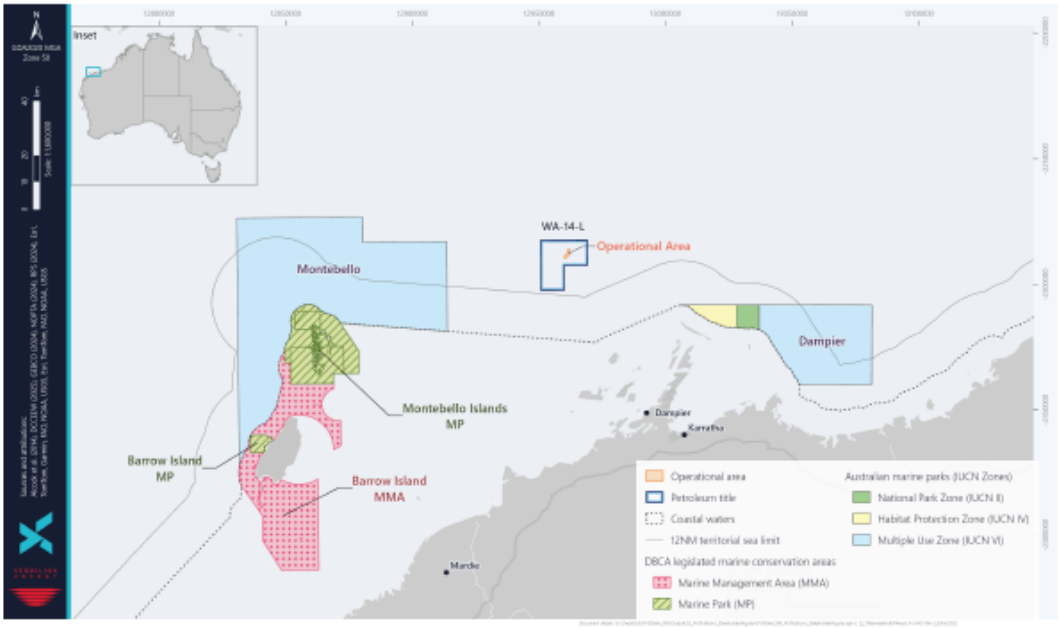


Figure 1. Location of WA-14-L and operational area

Operational area

The operational area for the activities outlined in the Wandoo Facility EP is defined as the area within the existing 500 m Petroleum Safety Zone (PSZ), surrounding the Wandoo Production Facilities (**Table 1**).

Table 1. Coordinates of the Wandoo Production Facilities (GDA2020/MGA2020)

Facility	Latitude	Longitude
Wandoo A	20° 08' 14.61" S	116° 25' 22.43" E
Wandoo B	20° 07' 37.12" S	116° 26' 08.23" E
CALM Buoy	20° 06' 57.43" S	116° 26' 06.51" E

Assessment of commercial fishing, potential effects and impacts

Commonwealth managed fisheries

There are three Commonwealth managed commercial fisheries that have a defined management area overlapping the operational area (**Table 2**).

Table 2. Commonwealth managed fisheries

Commonwealth managed fisheries	Summary of fishery in relation to operational area	Assessment of potential impacts
Southern Bluefin Tuna Fishery	The Southern Bluefin Tuna Fishery operates around Australia and extends to the high seas fishing zone (out to 200 nm from the coast). The fishery targets southern bluefin tuna only. Fishing activity is focused in southern Australian waters with no activity expected surrounding the operational area.	No impact to the fishery expected.
Western Skipjack Tuna Fishery	The Western Skipjack Tuna Fishery extends west from Cape York Peninsula and around Australia to the South Australian/Victorian border, out to the edge of the Australian Fishing Zone. Little fishing activity has been undertaken in this fishery since 2008. No fishing activity associated with this fishery is expected to occur surrounding the operational area.	No impact to the fishery expected.
Western Tuna and Billfish Fishery	The Western Tuna and Billfish Fishery management area extends over a large area westward from Cape York Peninsula off Queensland, around the west coast of Western Australia and eastward, across the Great Australian Bight to 141°E at the South Australian/Victorian border. The fishery has operated at low levels of effort since the early 2000's. Target species include albacore, bigeye tuna, yellowfin tuna, swordfish and striped marlin. No fishing activity associated with this fishery is expected to occur surrounding the operational area.	No impact to the fishery expected.

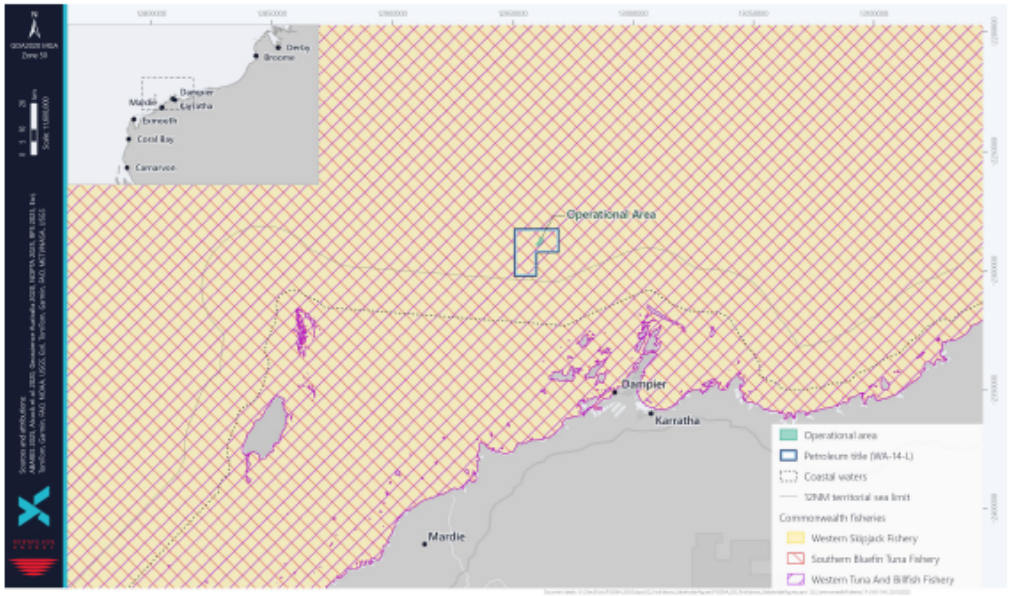


Figure 2. Commonwealth managed fisheries

State managed fisheries

State managed commercial fisheries that have historical fishing activity intersecting the operational area within the last 5 years include:

- Hermit Crab Fishery
- Mackerel Managed Fishery
- Marine Aquarium Managed Fishery
- Nickol Bay Prawn Fishery
- Onslow Prawn Limited Entry Fishery
- Pilbara Crab Managed Fishery
- Pilbara Line Fishery
- Pilbara Fish Trawl Interim Managed Fishery
- Pilbara Trap Managed Fishery
- Specimen Shell Managed Fishery, and
- Western Australian Sea Cucumber Fishery.

Figure 3 depicts the state managed commercial fisheries that had three or more vessels (per year) active around the operational area.

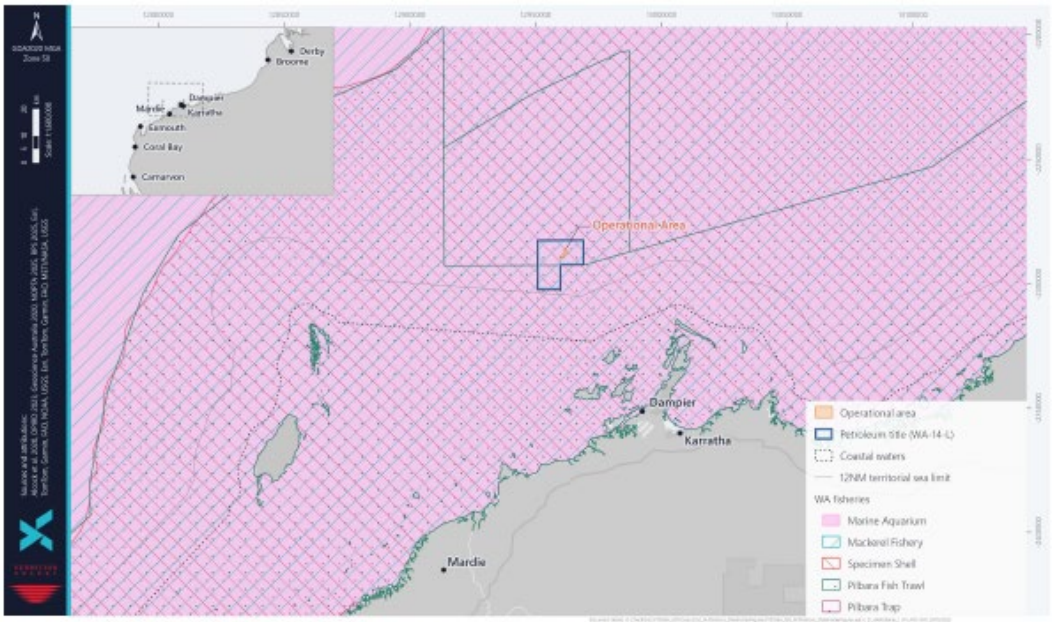


Figure 3. State managed fisheries

Vermilion impact assessment

Vermilion has undertaken an assessment to identify potential impacts and risks to commercial fishers from the activity. A number of mitigation and management measures for the activity are outlined in **Table 3.** Further details will be provided in the Wandoo Facility EP.

Table 3. Potential interactions with commercial fishing

Potential impact	Description of potential impact/risk	Proposed control measures
Interference with commercial fishing activities	Potential displacement of commercial fishing activities.	• Vessel communication equipment will be maintained to allow for communication with commercial fishing vessels. • The operational area will have an exclusion zone of 500 m.
Introduction and establishment of invasive marine species	Potential reduction in commercial species abundance due to competition or predation.	Vessels will comply with: • Australian Ballast Water Management Requirements consistent with the International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Management Convention). • Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships. • National Biofouling Guidelines for the Petroleum Production and Exploration Industry and IMO Guidelines for the control and management of a ship's biofouling to minimise the transfer of invasive aquatic species.
Vessel collision	Decrease in water quality. Potential toxic effects to commercial species.	• Vessels will have navigational lights. • Vessels will have dynamic positioning capability. • Vessels will be equipped and crewed in accordance with the *Navigation Act 2012* and Marine Orders. • Vessels will have a dedicated Ship Oil Pollution Prevention Plan (SOPEP). • An Oil Pollution Emergency Plan (OPEP) will be prepared and implemented as required.

Consultation

Consultation provides Vermilion with an opportunity to receive feedback from authorities, persons and organisations whose functions, interests or activities may be affected by proposed petroleum activities. This feedback helps us to refine or change the management measures we are planning to address potential activity impacts and risks. Vermilion's objective for the proposed activities is to ensure the activity is carried out in a manner that is consistent with the principles of Ecologically Sustainable Development (ESD) and reduce environmental impacts and risks to a level that is As Low As Reasonably Practicable (ALARP) and acceptable over the life of the activity.

Consultation also helps us to identify values and sensitivities where information is not publicly available, such as spiritual and cultural connection to land and sea country, as well as first-hand feedback on commercial and recreational fishing, tourism and local community activities and interests.

Feedback

Vermilion is committed to working together with the commercial fishing industry so that we can all proceed with business in a safe and efficient manner.

If you consider you may be a relevant person, please contact us as soon as possible if you require any further information or if you think you are not on our consultation list.

We are asking for relevant persons to provide feedback by **21 November 2025.**

Feedback provided by relevant persons will be considered in an addendum to the Wandoo Facility EP and through the life of the activity. Feedback from relevant persons will be included in the EP submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

Please let us know if you would like your personal/organisational details or any part of your feedback to remain private and we will ensure this remains confidential to NOPSEMA.

Contact us

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Figure 1-4: Summary Information Sheet

VERMILION ENERGY

SUMMARY INFORMATION SHEET
Wandoo Field
Wandoo Facility Environment Plan
October 2025

More information is available in the general Wandoo Facility Environment Plan Consultation Information Sheet

Introduction

Vermilion Energy is an international energy producer with 30 years of experience. It operates in North America, Europe and Australia. Vermilion Oil and Gas Australia (the Australian branch) has been in Australia for 20 years. Our Australian operations focus on producing oil from the Wandoo Field off the shore of Western Australia.

The Wandoo Field was discovered in 1991, and oil extraction started in 1993. Vermilion has managed the Wandoo Field since November 2005 and has been the sole titleholder since 2007.

The Wandoo Field currently operates under approved Environment Plans (EPs) for production and well construction at the facility. The Wandoo Facility EP is updated and reassessed every 5 years, as per Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023.

Location

The Wandoo Field is located within the Permit Area WA-14-L in Commonwealth waters within the Carnarvon Basin, approximately 80 km northwest of the port of Dampier and 110 km northeast of Barrow Island (**Figure 1**). The water depth at the field location is in the range from 50–60 m.

The Wandoo Facility EP Consultation Information Sheet lists the geographical coordinates of the Wandoo Production Facilities.

Operational Area

The Operational Area for the activities outlined in the Wandoo Facility EP is defined as the area within the existing 500 m Petroleum Safety Zone (PSZ) within the Permit Area of WA-14-L, surrounding the Wandoo Production Facilities.

Activity overview

Vermilion currently operates the Wandoo Facility within the production licence area WA-14-L. The purpose of the Wandoo Facility EP is to document the potential environmental impacts and risks and planned mitigation measures associated with the operation of the Wandoo facilities. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field.

The well fluids produced from Wandoo A and Wandoo B wells are piped to the Wandoo B platform. After treatment, the fluids are stored on Wandoo B and then, when sufficient volumes are available, offloaded to export tankers through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers. Export tankers are used to offload the oil and no pipeline to shore is required.

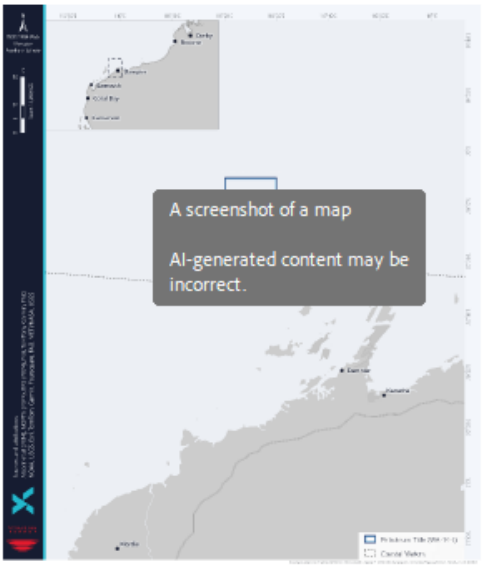


Figure 1. Location of WA-14-L



Pictured: Wandoo facilities, Wandoo A (left) and Wandoo B (right)

Environmental impacts and management

The operation of the Wandoo facilities includes planned activities, but may also result in unplanned activities. Both may potentially impact the environment.

A table showing all planned and unplanned activities, potential impacts, and management measures for each is included in the general Wandoo Facility EP Information Sheet. Further details will also be provided in the Wandoo Facility EP.

The objective is to manage the work program to reduce impacts and risks to as low as reasonably practicable.

The total area over which unplanned events could have an environmental impact is shown in **Figure 2**. This is referred to as the environment that may be affected (EMBA).

In the highly unlikely event that an unplanned activity, such as a hydrocarbon release from the Wandoo Production Facilities, the entire EMBA would not be affected. The area of the EMBA that may be affected would only be determined at the time of the event.

Consultation

Consultation provides Vermilion with an opportunity to receive feedback from those whose functions, interests or activities may be affected by proposed activities. This feedback helps us to refine the management measures to address potential activity impacts and risks.

Consultation also helps us to identify values and sensitivities where information is not publicly available.

Feedback

If you consider you may be a relevant person, please get in touch with us as soon as possible if you require any further information or if you think you are not on our consultation list.

Feedback provided by relevant persons will be considered in an addendum to the Wandoo Facility EP and throughout the life of the activities. Feedback from relevant persons will be included in the EP submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

Please let us know if you would like your personal/organisational details or any part of your feedback to remain private and we will ensure this remains confidential to NOPSEMA.



Figure 2. Operational area and environment that may be affected

Contact us

Website: www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities

Email: abu.consultation@vermilionenergy.com

Phone: (08) 9217 5858

Figure 1-5: The West Australian – 28 October 2025



18 WESTBUSINESS

The West Australian
Tuesday, October 28, 2025

Microsoft in AI scam case

Tech giant accused of rip-offs

ALEX MITCHELL

Tech giant Microsoft is facing hefty fines for allegedly misleading millions of Australian customers by trying to convince them to pay more than needed for an AI upgrade.

Australia's consumer watchdog has taken the US company to court for allegedly leading customers to believe they must either pay extra subscription fees when its AI assistant Copilot was integrated into their package or cancel altogether.

But subscribers also had the choice of maintaining their previous plan with the AI assistant at the same price, the Australian Competition and Consumer Commission said in the Federal Court case.

About 2.7 million Australians received the emails, which said a Microsoft 365 personal account would auto-renew at $159 for a one-year subscription if the customer did not cancel. "You will be charged the new price unless you cancel or turn off recurring billing," the email read.

ACCC chair Gina Cass-Gottlieb said a consumer would not have been aware that switching to a separate "classic" plan, with the existing product and at the same price, was available.

The watchdog alleged Microsoft deliberately omitted references to the plan to try to increase the number of customers moving to the more expensive plan.

"The Microsoft Office apps included in 365 subscriptions are essential in many people's lives and given there are limited substitutes to the bundled package, cancelling the subscription is a decision many would not make lightly," Ms Cass-Gottlieb said. "We're concerned that Microsoft's communications denied its customers the opportunity to make informed decisions about their subscription options, which included the possibility of retaining all the features of their existing plan without Copilot and at the lower price."

A Microsoft spokesperson said consumer trust and transparency were priorities and it was reviewing the consumer watchdog's claim in detail.

"We remain committed to working constructively with the regulator and ensuring our practices meet all legal and ethical standards," they said.

A second email, which did refer to the classic plan, was sent seven days before the auto-renewal date. Microsoft 365 provides access to the tech giant's Office products like Word, Excel and PowerPoint, along with services such as Outlook and Teams.

The 365 product including Copilot for a personal account went from $109 to $159, while family plans went from $139 to $179.

Wandoo Field
Environment Plans Consultation
SEEKING RELEVANT PERSONS

VERMILION ENERGY

Vermilion is seeking to consult with relevant persons whose functions, interests or activities may be affected by proposed activities in the Wandoo Field.

Vermilion Oil and Gas Australia is a subsidiary of Vermilion Energy and has operated in Australia for over 20 years. Our Australian operations focus on exploring for and developing oil and gas from the Wandoo Field off the shore of Western Australia.

The Wandoo field sits within the Petroleum Safety Zone (PSZ) WA-14-L and currently operates under approved EPs for production and well construction activities at the Wandoo Facility.

Our Activities

The Wandoo Field currently operates under approved EPs within the production licence area WA-14-L for production and well construction at the Wandoo Facility.

Vermilion is planning to submit a five-year revision of the Wandoo Facility EP as Vermilion plans to continue producing hydrocarbons at Wandoo.

The Well Construction EP is updated and resubmitted every 5 years, as per Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023.

Vermilion is preparing two Environment Plans for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

Project Location

Relevant Person Information

Learn more about who is a relevant person to be consulted, the environment that may be affected by the proposed activities, and the proposed control measures on our website.

Your Feedback

If you think you may be a relevant person, please contact us to discuss consultation or provide feedback at the below channels.

We are asking relevant persons to provide feedback by 21 November 2025.

For More Information

Email: abu.consultation@vermilionenergy.com

To visit our website, scan the QR code

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STOCKPILE

China has been desperate to Trump-proof its access to fuels, food and metals

The Economist

Seen from the sides, China's Dongliakou oil storage looks like a tray of god-sized cake tins. As fuel fills up the tanks, their floating roofs rise, turning the containers into panettone-shaped domes.

And lately the bakers have been busy. Some 10 million barrels of crude have been added since mid-January, taking the total to 24 million. The state-owned Qingdao Port Crude Oil Terminal — the largest facility of its kind on the Chinese coast — is two years old. It's already 56 per cent full.

China's craze for crude is part of a grander plan. Since early 2024, when it became clear that Donald Trump might return to the White House, officials have stockpiled fuel, food and metals to limit exposure to sanctions and tariffs. Those measures accelerated, and broadened, after the US President slapped high duties on Chinese goods in the spring. And they are continuing apace as the countries' leaders prepare to meet on October 30.

Some see China's scramble as a symptom of paranoia; perhaps even preparation for an invasion of Taiwan.

Whatever the motive, the campaign is making China harder to bully, giving it an edge in trade talks. Yet the effort also has drawbacks. As the world's largest importer of commodities transforms global markets, it is wasting money, creating dependencies and exposing itself to new risks.

Hard power

China does have reason to fret about its energy supply. Despite booming electric-vehicle sales, it will continue to need 16 million or so oil barrels a day (b/d) for years — three-quarters of which it must import. Its purchases of natural gas have trebled in the past 10 years as urban heating and fertiliser plants demand more. It imports half a billion tonnes a year of coal, which remains the fuel for 60 per cent of its power.

Although the country is one of the world's mineral refining centres, it imports 85 per cent of the iron it bakes into steel; is short of bauxite, the underlying ore for aluminium; and its smelters ship in 88 per cent of their raw copper.

China needs cobalt, nickel and lithium with which to make batteries. And, as incomes have risen and diets have changed, its food imports have soared, too. It buys four-fifths of the 100 to 120 million tonnes of soyabeans it feeds to its 430 million hogs and 70 per cent of the edible oil it blends into processed food. No other country imports so many cows.

Chinese officials, therefore, are discreetly pulling three levers to reduce these vulnerabilities. They are boosting domestic production, building stockpiles and diversifying imports. The domestic-production campaign began in 2019 when Xi Jinping, China's supreme leader, launched a seven-year scheme to develop domestic oil and gas resources.

This scrapped taxes and spurred investment.

Defying predictions of decline, China's oil output has risen from 3.8 million b/d in 2019 to 4.4 million b/d. Its gas production has jumped by half. This year, with oil prices low, Chinese energy firms have trimmed spending abroad. But not at home, where they are doubling down on ambitious projects. Gas production is expected to rise by 3-6 per cent this year and next.

Oil output will remain near record highs. Even coal, a filthy fuel, is back in fashion. In May China's energy-planning body called for a batch of new mines. And in September eight government bodies released a two-year plan calling for exploration to find greater supplies of 10 metals, including copper, lithium and cobalt.

New projects can take years to complete. In parallel, therefore, China is building bigger reserves — its second lever. This is clearest in oil. Since early February China's observable stocks grew by 110 million barrels, to a record 1.2 billion, reckons Kayrros, a data firm — treble the size of America's reserves.

A law passed in January requires all energy firms to hold strategic stocks. China has been a keen buyer from Iran, Russia and Venezuela, all subject to American sanctions; exports from the trio to Qingdao, Shandong's largest port, hit 890,000 b/d in September, a record. Alt
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Talent war hotting up for gold trad

Trading houses, hedge funds and banks are on a hiring spree for specialist gold traders as interest in the metal soars, creating a battle for talent that is driving up pay packages in what has historically been a niche market.

Major commodity traders Trafigura and Gunvor have hired teams of precious-metals traders this year, while rivals IXM and Mercuria Energy have also been looking to hire in the sector, according to people familiar with the matter.

Numerous hedge funds, banks and industrial companies such as refiners are also either trying to break into precious metals or expand their teams, according to headhunters and industry exe
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lean teams of traders.

Figure 1-6: Koori Mail – 5 November 2025

news

Uncomfortable conversations

By MARION WILLIAMS

NSW

TRUTH-TELLING involves starting uncomfortable conversations. It can be confronting. It can be very exhausting. Without truth-telling there cannot be reconciliation.

These were some of the messages from a truth-telling session held at Tathra's Headland Writers Festival on Djirringanj Country last month.

Djirringanj-Ngarigu Elders Ellen Mundy and David Dixon were joined by young leader and local teacher Marcus Mundy to discuss what truth-telling meant to them.

Historian Mark McKenna moderated the session. Tathra Hall was packed.



Aunty Ellen Mundy, Marcus Mundy and Uncle David Dixon speaking at the truth-telling session at the Headland Writers Festival. *Picture: Marion Williams.*

Lived experience

The three agreed racism persists in the Bega Valley. In the 1967 referendum Bega recorded one of Australia's highest rejection votes of 22%.

That compared with the national average of 9%.

"There is still a lot of racism. You can feel it. You still experience it," Aunty Ellen said.

Despite being some 30 years younger than the Elders, Mr Mundy recounted several experiences of racism.

"It makes you feel like crap," he said.

"They just look at your black face and make a judgment."

Uncle David's father died early.

Economically disadvantaged and a fringe-dweller, his mother raised 12 children under very difficult circumstances.

She experienced racism, discrimination and misogyny, but she had a lot of strength.

"Mum became a very large figure in my life," he said. "I modelled my life on her."

Generations

Uncle David is an activist.

He talked about how his people were moved off their traditional lands and put into reserves where colonists controlled them.

"We became cheap labour," he said. "Even in the 1990s we were picking beans. This has gone on for generations in plain sight of the community, working for Edgell and Heinz."

He has worked in dairy farming and the whaling and fishing industries, yet they were stereotyped as lazy people.

"We were the backbone of the local economy, but there was no recognition," Uncle David said.

"It wasn't just gunpowder they used on us, but psychology."

Start locally

Aunty Ellen is shocked that so many people don't know the local people and local history.

It is up to non-Kooris to learn that for themselves.

"The onus isn't on the Aboriginal people. It is like we are going around in circles, with media stereotyping Aboriginal people," she said.

"It doesn't start with politicians. It starts with local people. Truth-telling comes before treaty."

For Mr Mundy truth-telling is about communication between and across cultures. It means starting uncomfortable conversations and getting comfortable having uncomfortable conversations.

"We are working towards reconciliation," he said.

"We can't have reconciliation without truth-telling."

Uncle David said there needed to be a consolidated truth so they can communicate more effectively.

"It is lived truth," Uncle David said. "Truth can be very exhausting, but we continue on because what is the alternative to that?"

Long way to go

Given the racism out there, Aunty Ellen said clearly more education, discussion in communities and truth-telling sessions are needed.

"We should be going forwards, not backwards," she said.

Uncle David agreed.

While assimilation has been going for ages, it is the changes that Aboriginal people want, like treaty, that are so slow coming. For all governments' talk about treaty, the reality is quite different.

"It sends a narrative of doing something positive, but it is doing something actually opposite in the background," Uncle David said. "Just look at the pattern. It has been painfully slow."

From his perspective as a primary school teacher Mr Mundy is optimistic that change will come, but from the people, not government. Kids' minds are very open.

"They don't look at me like an Aboriginal person, but as a teacher," he said.

"All our classrooms have traditional names and every pupil loves that. They think it is very powerful."

Passion for dance

By ALF WILSON

QLD

PROUD Palm Islander Georgia Clay has formed an all-girls dance group called "Indigenous Sistas" which is already being praised by audiences.

Georgia had been a shy, softly spoken teenager and has transformed into a confident cultural leader at Townsville's NRL Cowboys House and is inspiring her peers and strengthening community connections.

From a big Palm Island family, Georgia has embraced every opportunity that's come her way since becoming a boarder at the award-winning Townsville-based House late last year.

Indigenous Sistas started out with a handful of participants and has increased to more than a dozen performers.

"We named the dance group Indigenous Sistas to celebrate our culture and connect us 'as one', I had the idea, and asked Miss Rae (NRL Cowboys House Education Manager) if she could help me get things started and then more girls kept wanting to join," Georgia said.

"There are a lot of girls from different communities from across Australia and through different movements and dance we can come together and share our culture with each other and audiences."

The Indigenous Sistas first performed in front of their NRL Cowboys House peers at the Sorry Day event, then before hundreds of family members and stakeholders at the NAIDOC celebration in September, before being invited to perform at Queensland Country Bank Stadium as part of NRL Indigenous Round.

"I feel very proud and happy that we did that, it felt powerful and I felt like a strong, young Indigenous woman representing her culture," she said.



Georgia Clay.

Georgia came to the House as a Year 10 student in late 2024 and began attending St Margaret Mary's College.

She completed work experience with Chempro Chemists, and by December had secured ongoing casual employment – all while growing into a proud ambassador for her culture.

"When Georgia first arrived, she was very, very quiet to start with but has definitely come out of her shell," said NRL Cowboys House Education Manager Raelene Frantz-Davis.

"At the start of this year, she was keen to start a female dance group to showcase Aboriginal culture, and she had some great ideas."

Raelene said Georgia was amazing at establishing the group and once she had two or three girls on board, next minute, there's 12 and it's growing every time we have a practice session.

"All of the young ladies in the dance group are amazing, but it wouldn't have come together if it wasn't for Georgia's passion and love for her culture," she said.

Wandoo Field
Environment Plans Consultation
SEEKING RELEVANT PERSONS

VERMILION ENERGY

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Project Location



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www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities

Figure 1-7: Mid-West Times – 5 November 2025

10 NEWS midwesttimes.com.au Mid-West Times Wednesday, November 5, 2025

Local doctor awarded national recognition

JOSEPHINE HINGST

Groundbreaking work to improve heart failure care in the Mid West has earned Revathy Carnagarin national recognition, with the Australian College of Rural and Remote Medicine presenting her with the 2025 rural health research award.

An ACRRM registrar and clinician-researcher, Dr Carnagarin had built an international career in hypertension and cardiometabolic medicine before turning her focus to rural innovation.

She now leads the Heart Failure Optimisation through Patient and Practitioner Education (HOPE) project across the Mid West GP Network, introducing pharmacist-led medication reconciliation and education to reduce hospital readmission and improve continuity of care.

Dr Carnagarin's academic record includes more than 82 peer-reviewed publications and more than 2200 citations, alongside leadership roles in mentorship and policy advocacy.

Her earlier career featured a PhD in Molecular Endocrinology at Curtin University, a Harvard-funded postdoctoral fellowship and a National Heart Foundation fellowship in cardiometabolic research.



Dr Revathy Carnagarin receives her award from Dr Rod Martin.

ACRRM president Rod Martin said Dr Carnagarin's achievements showcased the power of research grounded in clinical need.

"Revathy is redefining what rural health research can achieve," Dr Martin said.

"Her work is already transforming the way heart failure is managed in rural WA, and her leadership will continue to strengthen rural healthcare systems nationwide."

The Rural Health Research Award recognises innovation and excellence in research that improves healthcare delivery, access and outcomes for rural and remote Australians.

The award was announced at Rural Medicine Australia 2025 in Perth, co-hosted by ACRRM and the Rural Doctors Association of Australia.

Work begins on the $70m Sundrift site

PHOEBE SOLON

Work on 160 new homes for key workers has begun in Exmouth.

An official sod-turning ceremony was held at the site of the $70 million Sundrift residential and commercial development in the Exmouth Marina precinct last month.

Exmouth shire president Matthew Niikkula said the sod-turning represented a key milestone as development continued around the marina.

The project is expected to create 234 jobs over the next five years, both local and indirect, while home-building work is expected to generate an additional 864 jobs.

Fowler Group founder Bob Fowler, one of the project partners, said the sod-turning represented much more than the start of construction.

"This project is about securing a strong future for Exmouth. It creates jobs, attracts investment, and provides long-term housing for the town," he said. "As a business owner in Exmouth, I'm acutely aware of the housing shortage faced by the town.

"Today's sod-turning symbolises progress and delivering on the vision we have shared."



The official sod-turning ceremony.

WESTERN AUSTRALIAN Electoral Commission

Yugunga Nya People's Trust
ELECTION NOTICE

Fiduciary Administration Services Pty Ltd in its capacity as Trustee of the Yugunga Nya People's Trust invites all members of the Yugunga Nya People to a community meeting for the purposes of electing a new Advisory Committee.

To enable all members the opportunity to attend and vote on the election of a new Trust Advisory Committee, the Community Meeting will be convened at two locations:

	Perth venue	Meekatharra venue
Location:	Liberty at Westralia Square 2 Level 5 /143 St Georges Terrace Flame Tree Boardroom and the Lounge	Shire of Meekatharra Town Hall 75 Main Street
Date:	Tuesday 2 December 2025	Thursday 4 December 2025
Time:	11am - 2:30 pm	11am - 2:30 pm
Registration open:	10:30am	10:30am

At the community meeting, members will elect by secret ballot, 8 committee members from those members who have provided a written nomination form to the Western Australian Electoral Commission by 12 noon, Thursday 20 November 2025.

Members must be present at the venues to vote. **No proxy votes allowed.**

Members entitled to vote will be marked off the members list upon allocation of a ballot paper.
Members must not vote for more than two (2) nominees from each Apical.
The four Apicals are Wilba, Ward, Wheelbarrow and Dorizzi.

Voting will close at 2pm on Tuesday 2 December 2025 at the Perth Venue and 2pm on Thursday, 4 December 2025 at the Meekatharra Venue.

Votes taken from both venues will be counted immediately following the close of voting at the Meekatharra venue.

PROSPECTIVE CANDIDATES

Nominations are called from eligible members for the election of:

Member to the Trust Advisory Committee (8)

NOMINATIONS OPEN:

Nominations will be accepted from Thursday 6 November 2025

HOW TO LODGE NOMINATIONS

By Hand	By Post	By Email
Western Australian Electoral Commission Level 2, 66 St Georges Terrace PERTH WA 6000	GPO Box F316 PERTH WA 6841	nominationsnp@waec.wa.gov.au

NOMINATIONS CLOSE:

Nomination forms must reach the Returning Officer no later than **12 noon on Thursday, 20 November 2025.**

Garry Hawkes
RETURNING OFFICER

Phone: 13 63 06
Email: nominationsnp@waec.wa.gov.au

Wandoo Field
Environment Plans Consultation
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www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities

Figure 1-8: North-West Telegraph – 5 November 2025

4 NEWS
northwesttelegraph.com.au
NORTH WEST Telegraph
Wednesday, November 5, 2025

A road tragedy remembered

50 years since triple fatality

CAIN ANDREWS

The 50th anniversary of a tragic Pilbara road crash in which three young men died is shining a spotlight on the increasing road toll in WA.

On October 26, 1975, a devastating motor vehicle crash claimed the lives of three Australia Post employees from Port Hedland, sending shockwaves through the Pilbara community.

Michael James Hollins, 24, Daniel Morris Harnett, 21, and Timothy Stephen Kirk, 19, were killed when their Ford Falcon sedan left the North West Coastal Highway near Wedgefield.

The men had spent the day playing social cricket in Whim Creek and were on their way back home when their vehicle left the road, with the car coming to a stop upside down, trapping the men inside.

Another young man, Ian Atkins, 21, survived after being thrown from the car during the crash and was later taken to Port Hedland Hospital.

He attempted to free the other men from the wreck, according to one woman who arrived at the scene shortly after the crash.

"We could hear the moans from inside the car but it was burning and we tried to keep the man back," she told The Sunday Times in November 1975.

Suddenly, fuel spilled during the crash came into contact with an ignition source, and the car burst into flames, according to the woman. "Soon there was a big explosion as the petrol tank blew up and bits went flying everywhere," she said.

Port Hedland postmaster Buzz Beesley expressed Hedland's grief over the loss of the young men at the time.

"They were good lads who had a lot going for them. They were all nice fellows. One of them was due to be married in a month," he said.

Retired fire and emergency management consultant Phill Cribb, who was friends with Mr Harnett, said the crash remained one of the Pilbara's most tragic road accidents.

"While no positive can ever outweigh the human cost, the tragedy underscored the dangers of long-distance driving in remote regions and later contributed to greater awareness of first responder mental health and critical incident support systems in WA," he said.

The anniversary comes as regional WA's road toll continues to climb.

So far this year, 162 people have died on WA roads, compared to 153 total deaths in 2024, with 83 of them in regional WA.

RAC general manager external relations Will Golsby said in September that while some important initiatives had progressed, broader change was needed.

"Funding for the Regional Road Safety Programs, the introduction of P-plate passenger restrictions, and a review of the graduated licensing system are all good recent steps which RAC welcomed, but we need to see more action to address road trauma," he said.

"WA once had one of the best road safety records in the country, however since 2006, and under successive governments, we have consistently had one of the worst."

Last year, the WA Government convened a road safety roundtable in response to the State's worst road toll in a decade.



The crash occurred on North West Coastal Highway, near Wedgefield. Picture: Geoffrey Ellis

Wandoo Field
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MURUJUGA Aboriginal Corporation
Stories from the Stones

MURUJUGA ABORIGINAL CORPORATION
ICN: 4629
Annual General Meeting

Please be advised that an Annual General Meeting for the Members of Murujuga Aboriginal Corporation (MAC) will take place as follows:

Date: Friday 28 November 2025
Time: 10am
Place: Roebourne PCYC (50 Cent Hall), 1 Sholl Street, Roebourne, WA 6718

This Annual General Meeting is for current MAC Members only. Notices including the agenda, proxy forms and other details will be posted and emailed to all Members with current addresses.

Members who cannot attend in person may complete a form to appoint another Member as their proxy to attend and vote for them at the meeting. Submit your proxy form before 10am on Wednesday 26 November via email admin@murujuga.org.au, by post to PO Box 1544, Karratha WA 6714, or in-person at MAC, Lot 501 Griffin Road, Burrup Peninsula, WA 6713.

Figure 1-9: The West Australian – 10 November 2025

MORE NEWS INSIDE
SMSF advisers on notice PAGE 18
Six checks for healthy super PAGE 44

The West Australian
Monday, November 10, 2025
17
Edited by
Mark Mallabone
mark.mallabone@wanews.com.au

DON'T BE FOOLED BY HYPE



'US Champion' warns on rare earths

SPENCER KIMBALL

Pentagon-backed MP Materials has warned investors to approach other rare earths projects with caution, pointing to the industry's difficult economics.

Shares in US and Australian rare earth companies have swung wildly in recent months as investors speculated that the Trump administration and Australia might strike more funding deals to advance projects in both countries.

In a landmark agreement in July, the US Defence Department took an equity stake in MP, set a price floor for the company, and inked an offtake deal with the rare earths miner in an effort to roll back China's dominance of the industry.

But chief executive James Litinsky used an earnings call on Friday Australian time to warn he didn't want "people to get burned" amid the speculation.

He cautioned investors "to just be very clear-eyed about what the actual structural economics are".

"The vast majority of projects being promoted today simply will not work at virtually any price," he said on MP's third-quarter earnings call. MP viewed itself as "America's national champion", Mr Litinsky said, as the group was the only active rare earths miner in the US.

It has offtake agreements with Apple and General Motors in addition to the Pentagon. "We have structural advantage because we're fully vertically integrated," Mr Litinsky said. "We're years and billions ahead of others."

It took years for the best rare earth producers to ramp up and stabilise their output and economics "despite what some promoters might suggest", he said.

He noted that Australia's Lynas took about a decade and MP would reach normalised production in about three years from the start of commissioning.

Mr Litinsky described the rare earths industry as a "structural oligopoly", a system where there are just a few major players. The US Government investing in dozens of sites and businesses wouldn't necessarily set up a supply chain, he said.

The Trump administration should continue to encourage private capital to flow into the industry through loans, grants and other support, Mr Litinsky said. There was room for "a lot of other players and supply" but the market would require "materially higher prices" for the industry's structural challenges to change.

"If X dollars of capital can stimulate two or three X in private capital, they should be doing that as much as possible," he said. Mr Litinsky views MP as a forerunner that will help create the conditions for a broader market that is not dependent on China over time.

"In the very short term the administration has made sure that we have a successful national champion in MP," he said.

TRAINERS VALUED OVER ADVISERS

ROBERT FRANK

US millionaires are increasingly dissatisfied with their wealth managers and accountants, but they prize their personal trainers and therapists, according to a new survey.

Only a third of US millionaires use a wealth adviser for their financial planning and one in five plan to fire their adviser due to high costs and poor service, according to a new survey from Long Angle, the professional network for startup founders and CEOs.

Among those who do use an adviser, 26 per cent are considering switching and 18 per cent could stop using an adviser altogether.

By contrast, millionaires are highly satisfied with their personal trainers, therapists and other professionals who help with their overall wellness and family care, rather than financial issues.

The results highlight the growing importance of so-called "soft services" for the wealthy, as wealth managers, private banks and other firms look to attract and retain more high-net-worth clients.

Once considered superficial next to financial advice and tax planning, services for health and wellness, family and kids, and travel and self-improvement are becoming core competencies in the business of advising and helping wealthy families.

The poll showed personal services, child care and education ranked at the top for satisfaction. Out of a score of 10, millionaires surveyed gave their personal trainers an average score of 9.3.

The survey's satisfaction levels for wealth advisers was 7.2, with most of the respondents saying they don't even use an adviser.

Exxon gas project eyes revival

BLOOMBERG

Exxon Mobil is close to lifting the force majeure in Mozambique that's impeded progress on what will be one of the world's biggest liquefied natural gas projects.

Chief executive Darren Woods said the global energy giant would move ahead "fairly quickly" with a final investment decision on the Rovuma LNG project once the force majeure had ended.

The provision was put in place after Islamic State-linked militants carried out an attack on the nearby town of Palma, in north-east Mozambique in 2021, delaying the project for several years. TotalEnergies, which is working on a similar development nearby, is also lifting its suspension.

Together, the Exxon and TotalEnergies projects promise to transform the economy of one of the world's poorest nations while supplying gas globally for decades to come. Exxon expected to lift the force majeure "in the very near future", Mr Woods said.

"We took the time to focus really on the project development and refine the design and come up with what we thought was the best concept," he said.



Exxon is on the lookout for low-cost resources to replace the 4.7 million barrels of oil equivalent it produces every day as it plans to meet oil and gas demand at least through 2050.

Wandoo Field
Environment Plans Consultation
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Figure 1-10: Mid-West Times – 12 November 2025

Times
Wednesday, November 12, 2025
midwesttimes.com.au

Foundation finally poured


Health Infrastructure Minister John Carey at the Mullewa hospital site.

STUART QUINN

The long-awaited $19.6 million Mullewa community hospital redevelopment has reached a milestone with pouring of the concrete slabs complete and structural work soon to begin — with an expected end date in 2027.

Health Infrastructure Minister John Carey visited the Mid West site last Wednesday, touring the foundations of the soon-to-be built facility, with local MP Sandra Carr and staff from WA owned builder EMCO.

Following the current works, demolition of the ageing nursing quarters and preparation of that site will begin. The new purpose-built facilities will support a wide range of health services including 24/7 emergency care, ambulance bay, respite and palliative care, outpatient treatment and community health programs.

Mr Carey pointed to further health investments in the Mid West, including $190m for the Geraldton hospital upgrade set to be finished next year and $30m for an oncology unit in Geraldton.

"This tender was awarded in June, and already you can see . . . progress is well under way with the concrete slab poured but in addition, the steel frames coming in the next few weeks," he said.

Mr Carey said the Government understood the "critical importance" of this project to the local community and wider region, and anticipated it would be completed in 2027.


The old Mullewa Hospital entrance. Pictures: Stuart Quinn

"We understand the Geraldton hospital is the major hospital for the region, but that doesn't mean we should overlook smaller hospitals like Mullewa," Mr Carey said. "In effect, this is a supporting hospital, it does have an ED and outpatient services but ultimately it is feeding into the main Geraldton hospital."

This much-needed rebuild has been a long-time coming for Mullewa locals, with a new hospital promised for the town in 2016 under the previous Liberal-Nationals government.

When asked if the budget for this project could continue to escalate, Mr Carey said regional health projects were challenging to deliver and construction costs were rising.

He said while $30m was the advised budget, "we want to ensure we get value for WA taxpayers, but ultimately we do need to deliver this hospital".

Not everyone was so impressed with the visit, with Geraldton MLA Kirrilee Warr calling it an "announcement of an announcement".

She said "the minister must commit to a clear timeline for completion" and questioned the Government over its "failed" promise to deliver a new Royal Flying Doctor Service base in Geraldton.

City of Greater Geraldton mayor Jerry Clune said the project would result in a "big lift" for the community after many years of waiting and lobbying. "(Mullewa hospital) serves not only the township, but a lot of outlying areas of the community," he said.

Mr Clune said extra burden was being placed on local government to support the health sector and meet community needs, even though it was not in their charter.

Don't frack with Labor's base

JOE SPAGNOLO

Members of the Labor Party have sent the Cook Government a clear signal they want a fracking ban extended to all parts of WA.

At a State conference meeting in Fremantle on Saturday, a new clause inserted in the party's conservation, environment and climate-change platform was passed, demanding fracking is banned throughout State.

It's understood the AWU and the Progressive Labor faction did not support the clause.


Premier Roger Cook.

Currently, the fracking ban extends to 98 per cent of WA, with it still allowed in parts of the Kimberley and the Mid West. Although the clause was passed, any changes to WA's fracking laws would need to be passed by the WA Parliament.

In recent times, WA Premier Roger Cook has stood firm on the Government's policies on fracking, saying they are balanced and responsible.

Environs Kimberley executive director Martin Pritchard said on Saturday the Cook Government needed to listen to its members.

"The majority of West Australians don't want to see the Kimberley trashed so polluting, dangerous fracking can proceed and it's powerful to see ALP members elevating fracking into the party platform," he said.

Waddi
WIND FARM

The Waddi Wind Farm would help reduce Western Australia's carbon footprint by generating enough clean energy to power more than 68,000 homes per year.

We are preparing to start construction of the Waddi Wind Farm soon. To find out more and sign up for updates please visit www.waddiwindfarm.com.au

For any questions or feedback please contact the project team via 1800 WE TILT (938 458) or waddiwindfarm@tiltrenewables.com

PROJECT SNAPSHOT
Location: 15km north-west of Dandaragan
Number of turbines: 18
Blade tip height: 220m

Stay informed about construction activities by scanning the QR code

For more information, please visit the project website www.waddiwindfarm.com.au

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Figure 1-11: Broome Advertiser – 30 October 2025

Inquiries

27-29 Dampier Terrace, Chinatown, Broome
Postal PO Box 303 Broome WA 6725
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Cops ask for CCTV footage

CAIN ANDREWS

Police are asking Broome residents to check their CCTV and doorbell camera footage as they investigate a series of recent trespassing, stealing, and burglary incidents.

According to police, the incidents occurred between 11.30pm on Saturday, October 19, and 2am on Sunday, October 20 in Roebuck Estate and Sunset Park.

They allege a group of five juveniles were seen walking through the streets, entering unlocked vehicles and stealing items, also stealing a Toyota Prado from Goshawk Loop.

Police are asking residents on Planigale Loop, Sandpiper Avenue, Sanderling Drive and Goshawk Loop in Roebuck Estate and Challenor Drive, Paroo Place, Sanctuary Road, Oryx Road and Millington Road in Sunset Park to check CCTV or doorbell cameras from around the time of the incidents, and to forward any footage to them.

Police are also urging residents to make sure their homes, vehicles and valuables are locked up.

Crime Stoppers 1800 333 000 or crimestopperswa.com.au.

Wandoo Field
Environment Plans Consultation
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POLICING

FROM PAGE 1

"I knew it was happening because they knocked on my door where I was staying, so I understand how that can be pretty disconcerting," Judge Quail said. "I shouted out, and they ran away."

Footage that followed, of an allegedly stolen car being used to chase police, shocked WA. But statistics show that, Statewide, crime rates have fallen.

There were 5956 offenders aged between 10 and 17 in WA in 2023-24, according to the Australian Bureau of Statistics — down 5 per cent on the previous year.

But some Kimberley towns are faring better than others.

"The biggest challenge that we still face, across the board, is disengagement with high schooling," Judge Quail said.

"All the kids we're seeing (in court) finished primary school, and then they completely disengage at high school level. And the Department of Education has not solved this problem."

According to WA Police figures, total offences increased 6 per cent in Kununurra in 2024-25 and were up 25 per cent in Halls Creek.

In Fitzroy Crossing, however, the crime rate fell 22 per cent. The result is no accident says Judge Quail.

"Where you have, in a community, everybody working on the same page to address youth crime, the causes of it, and to provide services which step in to address the fundamental problem, which is failed parenting … you can make a difference almost overnight," he said.



Police being chased in Kununurra. Pic: Camilo Blanco

"But community policing in Halls Creek and in Kununurra does not exist in the way that it does in Fitzroy Crossing.

"And so we are seeing continuing and, in some places, increased youth crime in those towns. And that trend is apparent everywhere we went."

It's why former attorney-general John Quigley is backing the Marra Worra Worra Aboriginal Corporation's bid to expand it's Night Space program from Fitzroy Crossing to Halls Creek. And he's won support from the judicial benches.

"Where you deliver these programs, they work. So I would like to see something like this in every town," Judge Quail said.

"The reality is that in a lot of these communities, there are high levels of family domestic violence and alcohol abuse within the home.

"A lot of the kids are wandering around town trying to escape that.

"They haven't had a feed, and in some places steal cars, break into houses, sometimes to get food, sometimes for the thrill of it.

"Where you can, at night in particular, engage them, give them things to do, give them a feed, give them some positive feedback. That's where the crime rates are going down."

In Parliament, Premier Roger Cook has previously said he is "particularly fond" of the program.

But Marra Worra Worra's application to buy 20 transportable units, used during the recovery from the Kimberley floods in 2023, has stalled since July.

"There's a hostel in Derby and the Aboriginal corporation down there have got school attendance up to 85%. We want to replicate that in Fitzroy," Mr Quigley said.

"We're just saying our prayers that Premier Cook will see the way to sell us 20 units and we will make a huge difference.

"They'll then double-bunk to provide mid-week accommodation for up to 40 Aboriginal students, who can come in from the remote communities around Fitzroy and re-engage with education."

The Department of Housing and Works has 110 temporary units available to be repurposed, but said the process is yet to conclude and couldn't say when a decision will be made.

The State Budget included $8 million for a Night Space in Kununurra, aiming to open mid-next year.

A night patrol operates in



Peter Quinlan, Hylton Quail and John Quigley playing Uno with children in Fitzroy Crossing.

Murder charge over woman's death

JESSICA PAGE

Police have confirmed a woman stabbed to death in Broome was in a relationship with her accused killer, who was due to face court on Sunday.

An aggravated grievous bodily harm charge against a 56-year-old man was upgraded to murder, after the victim died in hospital on Saturday.

Police had been called to a house on Frederick Street on Friday night and found the 58-year-old seriously injured.

It is alleged neighbours heard a fight, minutes before emergency services arrived.

A police statement said officers believed the incident was family violence-related.

Crime statistics show that family-related assaults in WA have surged 47 per cent since 2017-18.

Figure 1-13 Koori Mail – 19 November 2025

news

Bail checks left brothers scared of the police

By KEIRA JENKINS

THE family of two Aboriginal children left frightened of police officers after experiencing more than 150 home bail checks in just under two years, have filed a racial discrimination case in the Federal Court.

Two brothers, aged 11 and 13 at the time, were on bail for being passengers in a stolen car when NSW police began to conduct home checks on them, often late at night or in the early hours of the morning.

Their mother, who is using the pseudonym Megan for legal reasons said multiple police officers would come to her home, knock on the doors, shine torches through and bang on the windows during these checks.

It got to the point where it was too much - her children were too tired to go to school, she lost her job and the experience has left her boys scared of the police.

"I'd have to wake (my sons) up to bring them to the door," she said.

"If they were sleeping and too tired to get up I'd have to let anywhere between two to four police officers come inside to see if they were in their bed and had their PJs on."

The family took their complaint to the Australian Human Rights Commission but it could not be settled through conciliation efforts with the police force.

Now the family is taking the matter to the federal court. Megan said she wants police to consider their approach with Aboriginal people, and draw attention to what has happened to her sons.

"Life was happy until police started to come and do that," she said.

"Now my young fellas they've limited even going to mates' places or a family member's place because they're too scared of police."

Megan's children are not alone, Justice and Equity Centre senior solicitor Grace Gooley, who is representing the family said these types of checks are common for young people on bail in NSW.

She raised concerns about how the checks have been conducted by police, saying they were carried out in an "unnecessarily disruptive" way.

Ms Gooley said police had also not been adhering to the process of getting court authorisation before conducting bail checks.

Analysis of NSW Police data, commissioned by the centre in July, revealed Aboriginal children were disproportionately subjected to home visits while on bail.

Aboriginal young people were subjected to 42 per cent more checks on average and were twice as likely to experience 'very frequent' checks – defined as more than 11 visits in 30 days.

"We have heard from many other Aboriginal young people who are experiencing the same level of disruption and harassment," she said.

"This anecdotal evidence is borne out in the data, which shows it's a New South Wales-wide issue and our clients' experience isn't an isolated incidence.

"It's time for NSW Police to look at what's going on and start to change these practices.

– AAP



Manager community strengthening and social planning Wambul Thirimu, and First Nations Lead, Uncle Shane Charles from Brimbank Council accepting the award.

Name awarded

AT the recent Geographic Names Victoria awards, Brimbank City Council was selected for a Geographic Naming Award for excellence in the re-naming of a local park to 'yaluk barring', meaning 'River Trail' in the Wol-wurrung language.

A much-loved green space in Melbourne's far north west, yaluk barring park is rich with cultural significance for the Wurundjeri Wol-wurrung people, with many Aboriginal archaeological places within the park.

The park is 231 hectares and includes grasslands and river valleys, and is where Jackson Creek, Deep Creek and the Maribyrnong River meet.

"This award recognises our commitment and work in honouring the importance of this beautiful park to the Traditional Custodians," Mayor Cr Thuy Dang said.

"I would like to thank the Wurundjeri Elders for their guidance, wisdom and generosity in helping us to rename this place to yaluk barring park.

"When searching for a name, Brimbank Council consulted the community on a preferred new name from a list provided by Wurundjeri, and a majority of 64.4% supported the Wol-wurrung name, 'yaluk barring park'.

"The Wurundjeri Wol-wurrung Cultural Heritage Aboriginal Corporation is pleased with this outcome as it reflects the involvement and collaboration with council on the renaming process.

The renaming of Sydenham Park follows a notice of motion at the July 2022 council meeting to change the park's name to an appropriate Aboriginal name suggested by local people.

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COOPER ENERGY
Amplitude energy *

RELEVANT PERSONS CONSULTATION ON ENVIRONMENT PLAN
BMG CLOSURE PHASE 2 - OFFSHORE MARLO, EAST GIPPSLAND

Amplitude Energy* is updating its accepted environment plan for the 2nd and final phase of decommissioning of the legacy Basker Manta Gummy (BMG) oil field in Commonwealth waters ~50kms offshore Marlo, Victoria.

Relevant persons consultation

If your functions, interests or activities may be affected by the proposed activities under this environment plan, then we invite you to consult with us. We consult with relevant persons to understand if you may have information that we might not otherwise be aware of which we can use to improve our environment plan.

For more information about our proposed project, please see our consultation page via the QR code, or at https://amplitudeenergy.com.au/consultation.

The consultation process

For information about our offshore environment plans and the consultation process, including our obligations, please visit: https://amplitudeenergy.com.au/consultation/why-we-consult

Please contact us by 8 December 2025 at stakeholder@amplitudeenergy.com.au or call 61 8 8100 4900 if you would like further information or to be consulted on this EP.

*Amplitude Energy is the name of the parent company of Cooper Energy Limited

Figure 1-14: Pilbara Times – 29 October 2025

Pilbara NEWS
Wednesday, October 29, 2025
pilbaranews.com.au

Access a barrier for tourists

SOPHIE GANNON

While more visitors are heading to the Pilbara, Karratha's wallets aren't feeling any heavier; but despite this, tourism experts remain confident in the future growth of the area.

Tourism WA's latest figures show international tourists spent a total of $82 million in the North West in the year to June 2025 which was exactly the same amount as the previous year.

Visitor numbers have risen by around 2000 compared to June 2024 but travellers are staying for shorter periods.

The data also revealed nights spent in the region dropped by 31,000, with the average stay falling from 39.2 nights to just 29. Despite this, tourists are spending slightly more per day, up $15 on average.

New data from tourism provider Big Red Grouprevealed that cost, access challenges and uncertainty on where to go were key reasons Australians weren't exploring more of their country.

Big Red Group president and chief growth officer John Boris said its new research showed there was an increasingly growing divide in domestic travel habits among Australians.

"This has led to perceptions of overtourism among the nation's major cities and coastal drawcards — while award-winning regional destinations are being largely overlooked," he said.

"There is an urgent need to rebalance domestic travel and drive greater dispersal to ensure Australia's smaller towns received their share in the tourism boom.



Dive tours in Dampier remain a popular option for tourists. Picture: Dampier Archipelago

"Big Red Group's latest research revealed that the biggest roadblock for visiting such destinations was the cost, with 43 per cent of Australians believing regional travel is simply too expensive."

The data revealed 64 per cent of Australians are inspired by ads, social media or friends to explore beyond the usual hotspots.

"However, this isn't enough to get them there," Mr Boris said.

"In addition to cost, close to a quarter (23.8 per cent) believe getting to regional Australia is too difficult and 13.9 per cent don't know where to start.

"What this says to us is that it's more a matter of helping improve access, affordability and awareness of these areas in order to boost tourism numbers — without which Aussies will continue missing out on the beauty of their own backyard."

A Tourism WA spokesperson said the growing tourist numbers from international market were attracted to the North West's "untamed natural beauty, and deep cultural history" with more than 76 per cent of hotel rooms across the North West fully occupied in June 2025.

"It's fantastic to see the local tourism industry again thriving over the traditionally busy winter period," they said. "The North West is sought out by many travellers to WA and remains a key priority in our long-term visitor strategy."

Acknowledging that visitor spend remained "steady" at $82m, the spokesperson described the 2000 increase in visitor numbers as a "great result" for the tourism industry, showing "stable, upward momentum for the region".

"Tourism WA continues to invest in the region and global marketing to sustain current activity levels and build resilience and long-term sustainable growth in the region," the spokesperson said.

"We are delivering targeted marketing and trade engagement across our 13 global markets to drive demand, with a number of co-operative marketing campaigns planned over the coming months that will promote the North West to travellers from markets including New Zealand, China, France, Germany, India, Italy, Malaysia and Switzerland.

"We are working closely with industry, stakeholders, and government to improve accessibility to the region, expand accommodation offerings and support new and enhanced visitor experiences."

The spokesperson said Tourism WA was also promoting areas like Broome to travellers through partnerships with Virgin Australia and Nexus Airlines by offering discounted flights into Broome from Perth, Geraldton, Karratha and Port Hedland.

"Our recent Broome Season Pass campaign was a sell-out success, offering travel discounts to support local tourism operators and drive bookings to Broome in partnership with the Broome Visitor Centre," they said.

City of Karratha's tourism services supervisor Bree Johnson said the statistics weren't necessarily concerning as travel behaviour was shifting.

"People are chasing authentic, nature-based experiences. Karratha is mostly a self-drive market, so international fluctuations don't have a big impact locally," she said.

Ms Johnson believes travellers are more "budget-conscious".

"Rising travel costs mean people are prioritising low-cost or free experiences like exploring natural and cultural sites so they can travel longer — but they'll still invest in unique, one-of-a-kind experiences," she said.

"Bookings are steady. Karratha doesn't have a huge amount of product, so the operators we do have are generally very busy during the season."



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Figure 1-15: North West Telegraph – 12 November 2025

Times
Wednesday, November 12, 2025
midwesttimes.com.au
NEWS 15

Foundation finally poured



Health Infrastructure Minister John Carey at the Mullewa hospital site.

STUART QUINN

The long-awaited $19.6 million Mullewa community hospital redevelopment has reached a milestone with pouring of the concrete slabs complete and structural work soon to begin — with an expected end date in 2027.

Health Infrastructure Minister John Carey visited the Mid West site last Wednesday, touring the foundations of the soon-to-be built facility, with local MP Sandra Carr and staff from WA owned builder EMCO.

Following the current works, demolition of the ageing nursing quarters and preparation of that site will begin. The new purpose-built facilities will support a wide range of health services including 24/7 emergency care, ambulance bay, respite and palliative care, outpatient treatment and community health programs.

Mr Carey pointed to further health investments in the Mid West, including $190m for the Geraldton hospital upgrade set to be finished next year and $90m for an oncology unit in Geraldton.

"This tender was awarded in June, and already you can see ... progress is well under way with the concrete slab poured but in addition, the steel frames coming in the next few weeks," he said.

Mr Carey said the Government understood the "critical importance" of this project to the local community and wider region, and anticipated it would be completed in 2027.



The old Mullewa Hospital entrance. Pictures: Stuart Quinn

"We understand the Geraldton hospital is the major hospital for the region, but that doesn't mean we should overlook smaller hospitals like Mullewa," Mr Carey said. "In effect, this is a supporting hospital, it does have an ED and outpatient services but ultimately it is feeding into the main Geraldton hospital."

This much-needed rebuild has been a long-time coming for Mullewa locals, with a new hospital promised for the town in 2016 under the previous Liberal-Nationals government.

When asked if the budget for this project could continue to escalate, Mr Carey said regional health projects were challenging to deliver and construction costs were rising.

He said while $20m was the advised budget, "we want to ensure we get value for WA taxpayers, but ultimately we do need to deliver this hospital".

Not everyone was so impressed with the visit, with Geraldton MLA Kirrilee Warr calling it an "announcement of an announcement".

She said "the minister must commit to a clear timeline for completion" and questioned the Government over its "failed" promise to deliver a new Royal Flying Doctor Service base in Geraldton.

City of Greater Geraldton mayor Jerry Clune said the project would result in a "big lift" for the community after many years of waiting and lobbying. "(Mullewa hospital) serves not only the township, but a lot of outlying areas of the community," he said.

Mr Clune said extra burden was being placed on local government to support the health sector and meet community needs, even though it was not in their charter.

Don't frack with Labor's base

JOE SPAGNOLO

Members of the Labor Party have sent the Cook Government a clear signal they want a fracking ban extended to all parts of WA.

At a State conference meeting in Fremantle on Saturday, a new clause inserted in the party's conservation, environment and climate-change platform was passed, demanding fracking is banned throughout State.

It's understood the AWU and the Progressive Labor faction did not support the clause.



Premier Roger Cook.

Currently, the fracking ban extends to 98 per cent of WA, with it still allowed in parts of the Kimberley and the Mid West. Although the clause was passed, any changes to WA's fracking laws would need to be passed by the WA Parliament.

In recent times, WA Premier Roger Cook has stood firm on the Government's policies on fracking, saying they are balanced and responsible.

Environs Kimberley executive director Martin Pritchard said on Saturday the Cook Government needed to listen to its members.

"The majority of West Australians don't want to see the Kimberley trashed so polluting, dangerous fracking can proceed and it's powerful to see ALP members elevating fracking into the party platform," he said.

Waddi
WIND FARM
PROJECT SNAPSHOT
Location: 15km north-west of Dandaragan
Number of turbines: 18
Blade tip height: 220m
The Waddi Wind Farm would help reduce Western Australia's carbon footprint by generating enough clean energy to power more than 68,000 homes per year.
We are preparing to start construction of the Waddi Wind Farm soon. To find out more and sign up for updates please visit www.waddiwindfarm.com.au
For any questions or feedback please contact the project team via 1800 WE TILT (938 458) or waddiwindfarm@tiltrenewables.com
Stay informed about construction activities by scanning the QR code

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Figure 1-16: Broome Advertiser – 13 November 2025



4 NEWS broomead.com.au Broome Advertiser Thursday, November 13, 2025

Pastoralists & army unit join forces

CALLY DUPE

WA's northern pastoral industry has formed a powerful new alliance with the Australian Army which both hope will bolster biosecurity and community resilience while unlocking "long-term employment and leadership opportunities".

The Kimberley Pilbara Cattlemen's Association inked a memorandum of understanding with NORFORCE at KPCA's 10-year anniversary conference in Broome late last week, with both lauding the partnership as a "bold step forward".

NORFORCE, which stands for North West Mobile Force, is an Australian Army reserve unit that conducts surveillance and reconnaissance patrols across northern Australia — the biggest operational area of any military force in the world.

KPCA chief executive Bron Christensen said under the MOU, pastoral workers would have the chance to contribute to NORFORCE operations while maintaining their employment in the cattle industry. "This helps them gain year-round stability, transferable skills and broader career horizons," she said.

"This alliance positions KPCA and NORFORCE at the forefront of safeguarding Australia's northern frontier where defence, industry and community unite to build a stronger, more secure future."

The agreement cements a partnership aimed at strengthening regional biosecurity, bolstering community resilience, and creating new employment and leadership pathways across northern Australia.

NORFORCE already has a similar arrangement in place with the Northern Territory Cattlemen's Association.

Commanding Officer NORFORCE Lieutenant Colonel Matthew Cooper was present at the signing of the MOU in Broome, telling ABC Country Hour the organisation was looking to recruit more members who were also working on cattle stations in the Kimberley.

"So in the wet season, when the cattle industry is not as busy, we can be training them up in the Army," he said. "We are looking to recruit . . . the ages of 18-25."

Chair & vice-chair to exit as term ends

Jak Andrews. Picture: Simon Santi

GEORGIA CAMPION

Spots on the board of a key northern pastoralist group are up for grabs after two members reached their maximum terms, with a younger age group eyed to bring fresh ideas to the association.

The announcement was made at the Kimberley Pilbara Cattlemen's Association 2025 Northern Resilience Conference in Broome that chair Jak Andrews and vice-chair Shane Dunn would be stepping down from their respective roles.

The move to step down was a result of reaching the maximum limit of six years on the board as set by the KPCA constitution.

Speaking to ABC Country Hour Mr Andrews, the former operations manager of Yeeda Pastoral Company, said he was amazed by the growth of KPCA since its inception in 2015 — noting the first annual general meeting finished with a couple of drinks after the conference.

"The biggest change has just been the growth," he said.

"We started out, well in my early days I recall we had an AGM (annual general meeting) and then we had a few drinks afterwards and we talked about business — now we've grown to this three-day event.

"We've got a massive conference, a massive program, great line of speakers.

"So it's become an information centre, as well as an AGM, and it allows us an opportunity to bring knowledge and provide knowledge, and give back to our very loyal members."

Mr Andrews first joined the KPCA executive in 2019 after moving to the West Kimberley that same year.

Mr Dunn, general manager of the Indigenous-owned Kimberley Agriculture and Pastoral Company, also joined in 2019.

He said the newly empty spots will allow for a younger age group to be involved in KPCA as the older members begin to leave the association.

Have you been affected by ACBF/Youpla going broke?

The Youpla Support Program has been set up to support mob who were affected by the Aboriginal Community Benefit Fund (ACBF), also known as Youpla Group, going broke.

If you paid ACBF/Youpla for a funeral fund on or after 1 August 2015, you could get a payment through the Youpla Support Program.

If this sounds like you or someone you know, call Services Australia on 1800 136 380 or visit your local Service Centre.

To find out more visit niaa.gov.au/youpla or scan the QR code

Australian Government | Youpla Support Program

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Vermilion Oil and Gas Australia is a subsidiary of Vermilion Energy and has operated in Australia for over 20 years. Our Australian operations focus on exploring for and developing oil and gas from the Wandoo Field off the shore of Western Australia.

The Wandoo field sits within the Petroleum Safety Zone (PSZ) WA-14-L and currently operates under approved EPs for production and well construction activities at the Wandoo Facility.

Our Activities

The Wandoo Field currently operates under approved EPs within the production licence area WA-14-L for production and well construction at the Wandoo Facility.

Vermilion is planning to submit a five-year revision of the Wandoo Facility EP as Vermilion plans to continue producing hydrocarbons at Wandoo.

The Well Construction EP is updated and reassessed every 5 years, as per Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023.

Vermilion is preparing two Environment Plans for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

Project Location

Relevant Person Information

Learn more about who is a relevant person to be consulted, the environment that may be affected by the proposed activities, and the proposed control measures on our website.

Your Feedback

If you think you may be a relevant person, please contact us to discuss consultation or provide feedback at the below channels.

We are asking relevant persons to provide feedback by 21 November 2025.

For More Information

Email: abu.consultation@vermilionenergy.com

To visit our website, scan the QR code.

www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities

Figure 1-17: Pilbara Times – 19 November 2025

Pilbara NEWS
Wednesday, November 19, 2025
pilbaranews.com.au

For going 'above & beyond'

PHOEBE SOLON

Karratha's Pharmacy 777 received national recognition at the National Rural and Remote Health Awards earlier this month at Canberra's National Press Club.

The awards celebrate health professionals going above and beyond to serve rural and remote communities across Australia.

National Rural Health Commissioner Professor Jenny May AM joined more than 180 guests to honour the winners and celebrate the 30 finalists in 10 award categories.

"It is an honour to be here to recognise the important work being done to build high-quality health access for remote and rural Australians and celebrate the rural, remote and First Nations health professionals and organisations on a national stage," Professor May said.

Pharmacy 777 took home the title of rural/remote health employer of the year, triumphing over a record number of nominees hailing from far and wide across the nation.

The pharmacy was also a finalist in the outstanding contribution to rural/remote health access award, which recognises exceptional dedication to improving health access and ensuring communities receive sustainable, high-quality, culturally safe, and responsive care.

Pharmacy 777 rural pharmacist and owner of the Karratha and Port Hedland pharmacies Laura Stewart, has been with the organisation since its inception.



The Pharmacy 777 team, pictured with sponsor Phil Williams of Regional Australia Bank. Picture: National Rural and Remote Health Awards

She said the national recognition made her feel incredibly proud.

"This national recognition is tribute to our amazing team who work incredibly hard to deliver outstanding health care to our local communities, and we are incredibly honoured and humbled," she said.

Ms Stewart said Pharmacy 777's service model was built around meeting the complex needs of its geographically isolated community, including Aboriginal people, fly-in, fly-out mining workers, and residents affected by economic fluctuation, housing crises, natural disasters, and social isolation.

"We're really focused on our patients and the patient journey, and we've really pushed the envelope in terms of services that pharmacists can provide, particularly for remote and rural communities," she said.

"Pharmacy 777 is extremely passionate about rural and remote health access and providing those extended trading hours in rural communities that don't often experience those."

Among the pharmacy's services are Aboriginal health outreach in partnership with Mawarnkarra Health Service, a pioneering sleep apnoea clinic, telehealth, and daily medication delivery to support a remote mining town.

Cultural safety is embedded in every aspect of the organisation — from trauma-informed consultations and private pharmacy spaces to staff training via the Pharmaceutical Society of Australia's Deadly Pharmacists Project and ASIST suicide intervention.

RDN chair Professor Peter O'Mara, a proud Wiradjuri man and rural doctor, praised the high calibre of nominees, particularly with regard to engagement from Aboriginal and Torres Strait Islander healthcare organisations.

A full list of winners can be found at ruralhealthpro.org/s/awards.

HHBSC HAMPTON HARBOUR
BOAT & SAILING CLUB
DAMPIER, WA

ATTN: HHBSC MEMBERS:
HHBSC Annual General Meeting (AGM)

Monday 8th December 2025

6:30pm

HHBSC Club Wardroom (Upstairs)

All Full Financial Members are welcome to vote for the election of our 2026 Committee.

Nominations & Voting information can be obtained from the office

Wandoo Field
Environment Plans Consultation
SEEKING RELEVANT PERSONS
VERMILION ENERGY

Vermilion is seeking to consult with relevant persons whose functions, interests or activities may be affected by proposed activities in the Wandoo Field.

Vermilion Oil and Gas Australia is a subsidiary of Vermilion Energy and has operated in Australia for over 20 years. Our Australian operations focus on exploring for and developing oil and gas from the Wandoo Field off the shore of Western Australia.

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Vermilion is preparing two Environment Plans for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

Project Location

Relevant Person Information

Learn more about who is a relevant person to be consulted, the environment that may be affected by the proposed activities, and the proposed control measures on our website.

Your Feedback

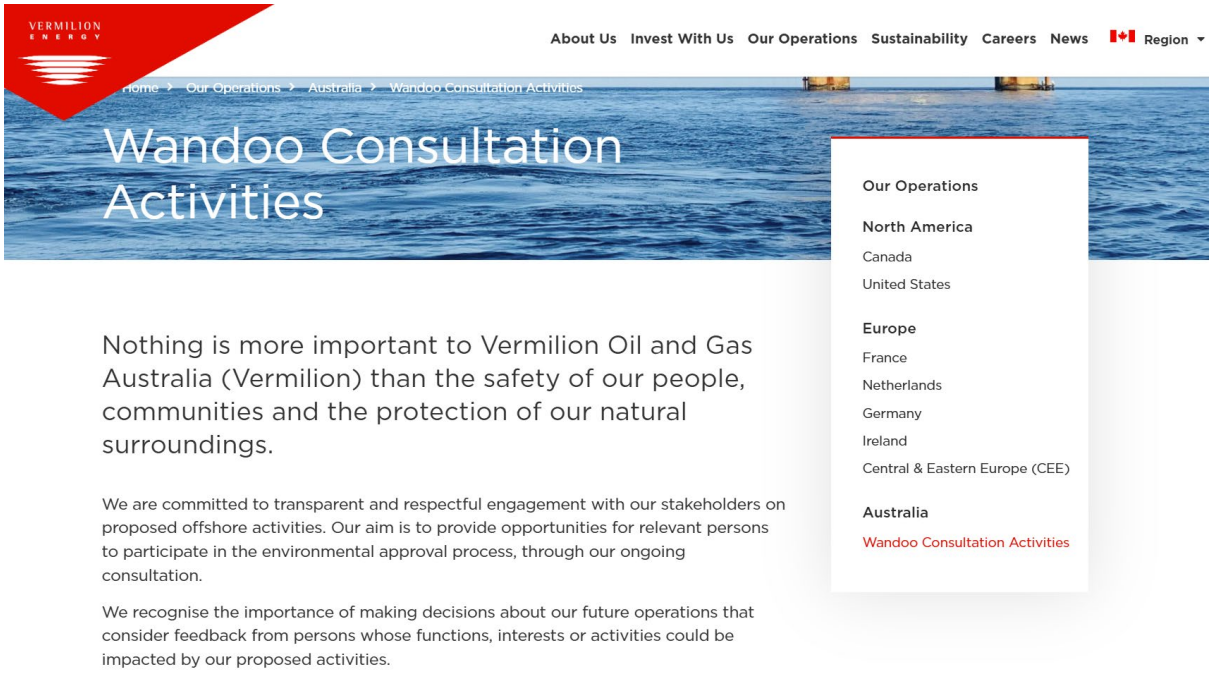
If you think you may be a relevant person, please contact us to discuss consultation or provide feedback at the below channels.

We are asking relevant persons to provide feedback by 21 November 2025.

For More Information
Email: ebu.consultation@vermilionenergy.com
To visit our website, scan the QR code

www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities

Figure 1-18: Consultation website



Wandoo Environment Plans

Vermilion has operated the Wandoo field since 2005, located approximately 80 km northwest of Karratha, Western Australia, in Commonwealth waters.

We are preparing to undertake additional offshore activities, including a shallow hazard geophysical and geotechnical survey in 2025 and exploration drilling in 2025/2026. Our operational and development drilling Environment Plans will be updated for submission early 2026. Environment Plans for these activities will be submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for acceptance.

Consultation with stakeholders is vital for confirming that our proposed activities will mitigate environmental impacts and risks to acceptable levels. We welcome input from individuals and organisations whose interests may be affected by our initiatives.



- **Upcoming Activities**
- **Current Activities**

Environment Plans and Consultation

In preparing our Environment Plans, we consult with relevant stakeholders to gather insights on the local environment, including specific concerns about the potential impacts of offshore petroleum activities at Wandoo.

This feedback is essential for assessing measures to avoid or reduce impacts on communities, heritage values, and ecological and cultural features of the environment. During consultation, your input will inform the control measures we propose in the Environment Plans to mitigate these impacts and risks.

Are you a Relevant Person?

You may be considered a relevant person if you or your organisation have functions, interests, or activities that could be impacted by our proposed activities in the Wandoo field.

As part of our consultation process, Vermilion is proactively reaching out to relevant stakeholders. If you are a community member, Traditional Owner, or business owner who may be affected by our offshore activities and have not yet been contacted, we encourage you to get in touch with us.

Contact abu.consultation@vermilionenergy.com or (08) 9217-5858 to register your details and receive information about our Environment Plans.

Your Feedback

To provide feedback on our proposed activities, **please contact us** at abu.consultation@vermilionenergy.com or (08) 9217-5858.

We will review all stakeholder responses during our ongoing consultation process and consider their implications for our proposed activities, making revisions to Environment Plans as needed.

Please note that your feedback, along with our response, will be included in the Environment Plans submitted to the NOPSEMA. If your feedback is sensitive, please inform us so we can ensure its confidentiality upon submission.

Fundamental objections, threats, social media comments, spam and petitions would not be considered as feedback as they do not meet the intended outcome of consultation.

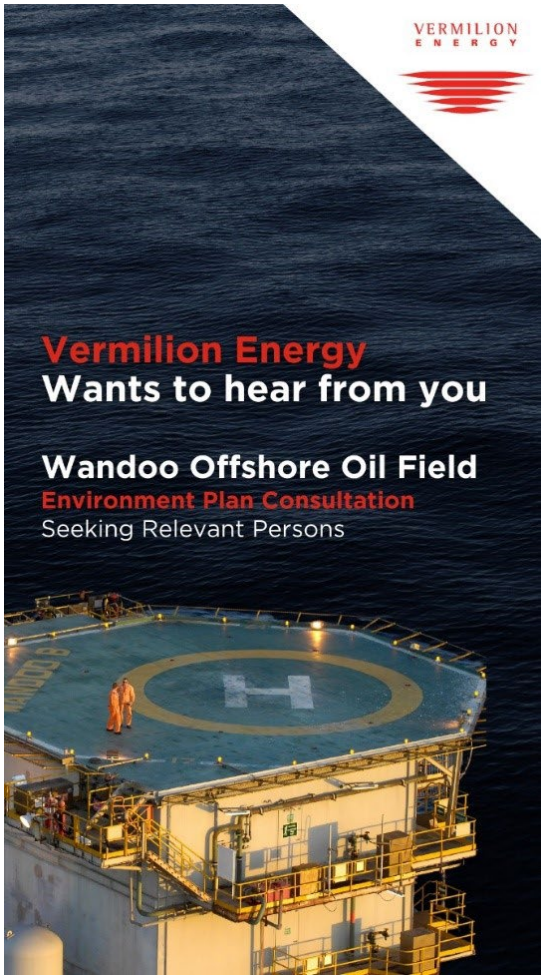


Additional Resources

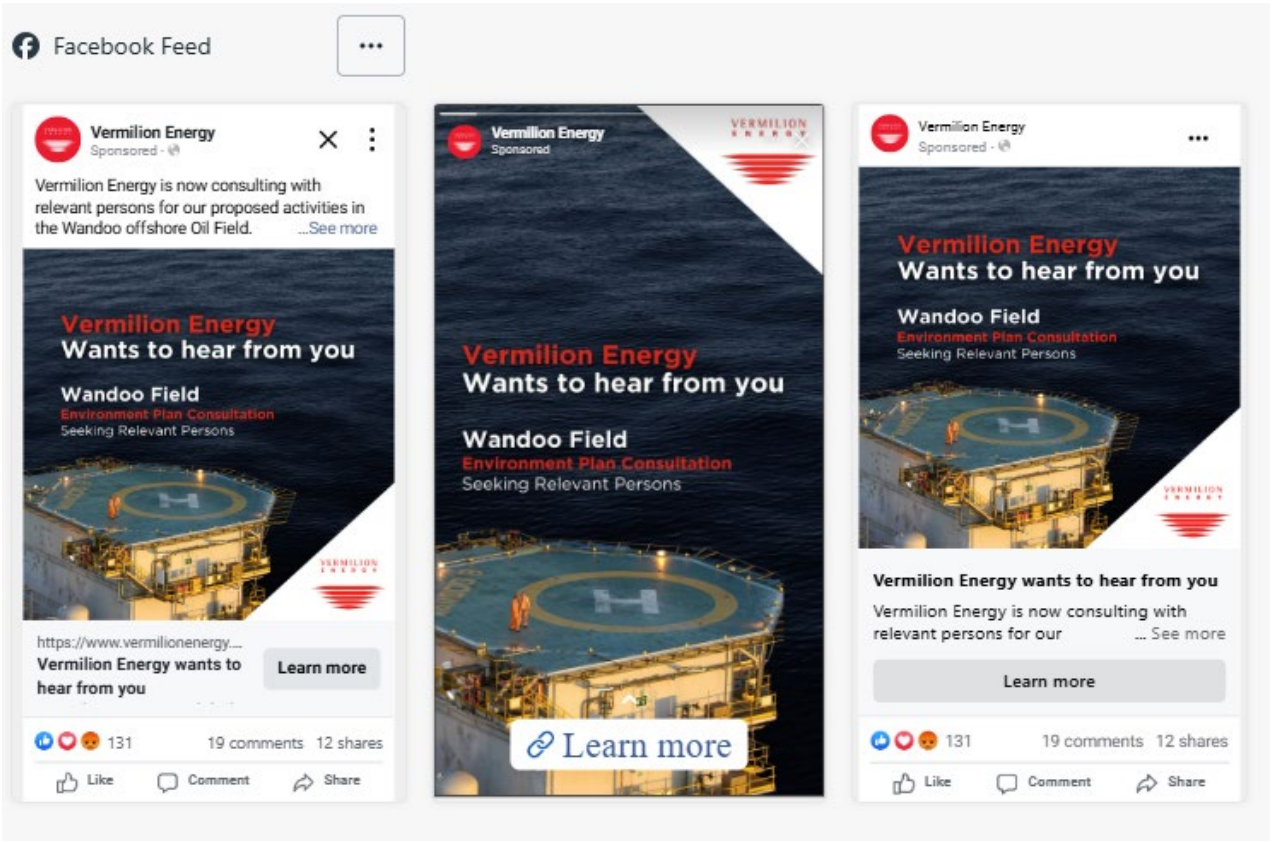
- Our Wandoo Operations
- Frequently Asked Questions - Wandoo Field Environment Plan Consultation
- NOPSEMA: Environment Plan Content Requirement
- NOPSEMA: Environmental Requirements
- NOPSEMA: Consultation in the Course of Preparing an Environment Plan
- Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations
- NOPSEMA: Environment Plans Assessment Process

Figure 1-19: Social media campaign

Facebook Advertisements






Facebook Feed
Vermilion Energy
Sponsored
Vermilion Energy is now consulting with relevant persons for our proposed activities in the Wandoo offshore Oil Field. ...See more
Vermilion Energy
Wants to hear from you
Wandoo Field
Environment Plan Consultation
Seeking Relevant Persons
https://www.vermilionenergy....
Vermilion Energy wants to hear from you
Learn more
131
19 comments 12 shares
Like
Comment
Share
Vermilion Energy
Sponsored
Vermilion Energy
Wants to hear from you
Wandoo Field
Environment Plan Consultation
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131
19 comments 12 shares
Like
Comment
Share

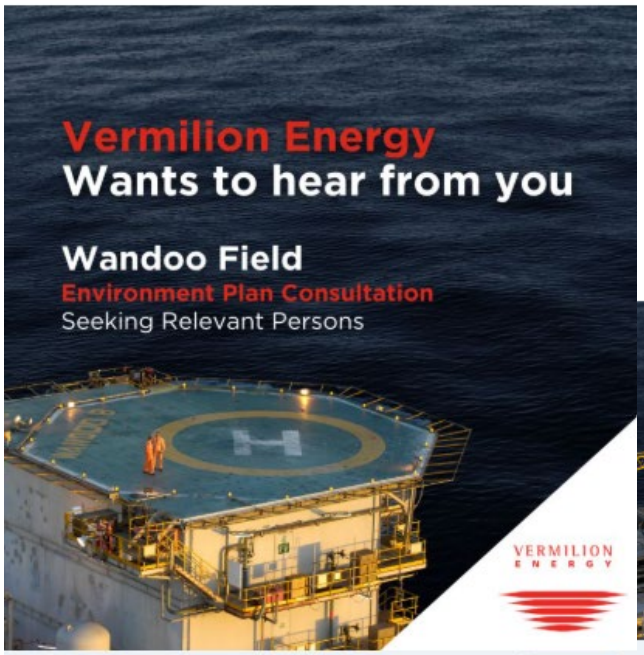
Vermilion Energy
54,686 followers
Promoted

Vermilion Energy is now consulting with relevant persons for our proposed activities in the Wandoo offshore Oil Field.

Wandoo is located in Commonwealth waters within the Carnarvon Basin, approximately 80km northwest of the port of Dampier and 110km northeast of Barrow Island.

Vermilion is seeking to identify and consult with relevant persons whose functions, interests, or activities could be affected by our plans in the Wandoo field.

To learn more, please visit our website. Or,
email: abu.consultation@vermilionenergy.com. Feedback is open until 17 January 2025.



Vermilion Energy wants to hear from you
vermilionenergy.com
Learn more

5

Vermilion Energy
54,686 followers
Promoted

Vermilion Energy is now consulting with relevant persons for our proposed activities in the Wandoo offshore Oil Field.

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To learn more, please visit our website. Or,
email: abu.consultation@vermilionenergy.com. Feedback is open until 17 January 2025.



Vermilion Energy wants to hear from you
vermilionenergy.com
Learn more

4

Figure 1-20: Community flyer

VERMILION ENERGY

Wandoo Field
Environment Plans Consultation
SEEKING RELEVANT PERSONS

Vermilion Energy is a long-standing international energy producer operating in North America, Europe, and Australia.

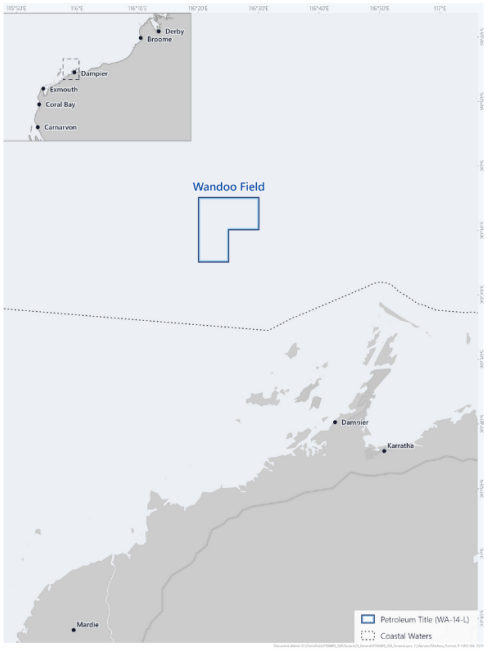
Vermilion Oil and Gas Australia is a subsidiary of Vermilion Energy and has operated in Australia for over 20 years.

Our Australian operations are focused on exploring for and developing oil and gas from the Wandoo Field off the shore of Western Australia.

Wandoo Field

Vermilion currently operates the Wandoo Field within its existing exploration permit WA-14-L.

The Wandoo Field is located in Commonwealth waters within the Carnarvon Basin, approximately 80km northwest of the port of Dampier and 110km northeast of Barrow Island. It operates at a water depth in the range from 50m - 60m.



Seeking Relevant Persons

Vermilion is seeking to identify and consult with relevant persons whose functions, interests or activities may be affected by our proposed activities at the Wandoo Field.

Vermilion wishes to continue developing and producing from the existing exploration permit WA-14-L. The Wandoo Field operates under existing accepted Environmental Plans in place for production and well construction.

Vermilion is planning to submit a five-year revision of the Wandoo Facility EP as Vermilion plans to continue producing hydrocarbons at Wandoo.

The Well Construction EP is updated and reassessed every 5 years, as per Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023.

Vermilion is preparing two Environment Plans for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

More information is available on our website (below) regarding who is a relevant person to be consulted, the environment that may be affected by the proposed activities, and the proposed control measures.

If you think you may be a relevant person, please contact us to discuss consultation or provide feedback at the below channels.

For More Information

Email: abu.consultation@vermilionenergy.com

To visit our website, scan the QR code

www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities

Figure 1-21: Newspaper Advertisement

Wandoo Field
Environment Plans Consultation
SEEKING RELEVANT PERSONS

VERMILION ENERGY

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Our Activities

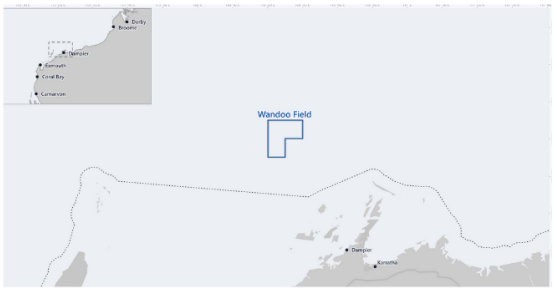
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Vermilion is preparing two Environment Plans for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

Project Location



Relevant Person Information

Learn more about who is a relevant person to be consulted, the environment that may be affected by the proposed activities, and the proposed control measures on our website.

Your Feedback

If you think you may be a relevant person, please contact us to discuss consultation or provide feedback at the below channels.

We are asking relevant persons to provide feedback by 13 February 2026.

For More Information

Email: abu.consultation@vermilionenergy.com

To visit our website, scan the QR code

www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities

1.4 Consultation Report

1.4.1. Summary Consultation Report

Consultation activities undertaken with relevant persons or organisations are summarised in Table 6 and engagement activities undertaken with persons or organisations VOGA assessed as not relevant but chose to contact are summarised in Table 7.

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Table 6: Consultation Report with Relevant Persons or Organisations

Section 25(1)(a) of the OPGGS(E)R: Departments or agencies of the Commonwealth to which the activities to be carried out under the environment plan may be relevant			
Commonwealth Government Departments and Agencies			
Australian Border Force (ABF) (Maritime Border Command)			
Consultation overview and summary of response on this EP			

• On 22 October 2025, VOGA advised the ABF by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.14).
  ○ The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
  ○ The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
• On 13 November 2025, VOGA emailed ABF following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.1).
  ○ The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
• On 16 December 2025 VOGA emailed ABF and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.1)
  ○ The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
  ○ Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
  ○ VOGA asked ABF to review previous information and provide any feedback by 24 December 2025.			

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**

No response was received on this EP despite a follow-up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process where appropriate (Section 8.8 of the EP).	VOGA accepts that ABF has no comment at this time.	VOGA considers the measures and controls in the EP address ABF's functions, interests or activities

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with ABF for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to ABF on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- In accordance with NOPSEMA's guideline for engaging with Commonwealth government departments or agencies, VOGA consulted with ABF via email.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding ABF of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising ABF that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Australian Fisheries Management Authority (AFMA)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the AFMA by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.15).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 26 October 2025, AFMA emailed VOGA and advised that it had no direct comments on the proposed EP but would like to be included in future consultation and shared its recently updated contact details (SI Report, reference 1.2.1).
    - The email also confirmed that the Commonwealth fisheries stakeholders identified as relevant are accurate and encouraged continued direct engagement with the fisheries stakeholders.
- On 16 December 2025, VOGA emailed AFMA and thanked them for confirming that it had no direct comment on the proposed EP, noting that AFMA would like to be included in future consultation (SI Report, reference 1.2.2).
    - The email also confirmed that VOGA would continue direct engagement with the fisheries stakeholders identified.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted
AFMA requested that VOGA consult with relevant fishing stakeholders, including CFA, SIA and Tuna Australia.	VOGA addressed AFMA's request to consult with CFA, SIA, and Tuna Australia and advised that it had continued to consult with the associations directly.	VOGA has consulted relevant fishing industry associations in preparing this EP.	VOGA has assessed the potential for interaction with Commonwealth fisheries and has notified CFA, SIA and Tuna Australia as well as ASBITA and PPA, at its discretion.

While feedback has been received, there were no objections or claims on this EP.	VOGA engages in ongoing consultation throughout the life of an EP. VOGA notes that further feedback may be received as part of ongoing consultation and where appropriate, VOGA will apply its Management of Change and Revision process (Section 8.8 of the EP).	VOGA accepts that AFMA has no further comment at this time.	VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with AFMA for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to AFMA on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.
- VOGA has addressed and responded to AFMA over a two-month period.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- In accordance with NOPSEMA's guideline for engaging with Commonwealth government departments or agencies, VOGA consulted with AFMA via email.

Australian Hydrographic Office (AHO)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the AHO by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.16).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
    - The email also included a shipping lane map (Record of Consultation, reference 3.16.1).
- On 13 November 2025, VOGA emailed AHO following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.2).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 20 November 2025, AHO emailed VOGA and reported it had no concerns with the activities associated with the EP (SI Report, reference 1.2.3).
    - The email requested that further updates be provided to the AHO once activities are due to begin.
- On 20 November 2025, VOGA emailed AHO and thanked it for its response and advised it will provide further updates once the activities are due to begin. (SI Report, reference 1.2.4).

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
AHO has requested VOGA provide updates on the activities once the proposed activities are due to begin.	VOGA noted and actioned AHO's advice.	VOGA notes that the AHO's notification requirements will be incorporated into the relevant sections of this EP.	VOGA will notify the AHO of any activities four weeks prior to commencement (Section 7 Table 7.2, CM-1.2) (Section 9.4.11, Table 9-6). once activities are due to begin.

AHO advised it has no concerns with the activities associated with this EP. While feedback has been received, there were no objections or claims on this EP.	VOGA engages in ongoing consultation throughout the life of an EP. VOGA notes that further feedback may be received as part of ongoing consultation and where appropriate, VOGA will apply its Management of Change and Revision process (Section 8.8 of the EP).		VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with AHO for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to AHO on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.
- VOGA has addressed and responded to AHO over a one-month period.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- In accordance with NOPSEMA's guideline for engaging with Commonwealth government departments or agencies, VOGA consulted with AHO via email.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding AHO of the opportunity to provide feedback.

Australian Maritime Safety Authority (AMSA) – maritime safety

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the AMSA – maritime safety by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.16).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
    - The email also included a shipping lane map (Record of Consultation, reference 3.16.1).
- On 13 November 2025, VOGA emailed AMSA – maritime safety following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.2).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 14 November 2025, AMSA – maritime safety emailed VOGA advising of the consultation outreach receipt and requested that AHO be notified of any activities four weeks prior to commencement (SI Report, reference1.4.1).
    - The email also included:
        - A vessel traffic plot for the locality surrounding the project.
        - Details for the requirements of vessels used at the project.
        - A request to contact AMSA – maritime safety's Response Centre at least 24-48 hours before operations commence.
        - Details of AMSA- maritime safety's spatial data gateway and portal.
- On 14 November 2025, VOGA emailed AMSA – maritime safety to confirm the receipt of the response and thanked AMSA – maritime safety for the information confirming it would contact AHO no less than four working weeks before operations commence for notices to mariners (SI Report, reference 1.4.2).
    - VOGA noted and reviewed the vessel traffic plot provided and acknowledged the presence of vessel traffic in the area during activities.
    - VOGA confirmed it would notify AMSA – maritime safety before operations commence and ensure vessels comply with the International Rules for Preventing Collisions at Sea (COLREG) regulations and evaluate and implement adequate anti-collision measures.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

AMSA – maritime safety has requested the AHO be notified of any activities four weeks prior to commencement.	VOGA will notify AMSA – maritime safety in advance of operations commencing and will notify AHO four weeks prior to commencement.	VOGA has addressed AMSA – maritime safety's request and proposed notification protocols for the ongoing nature of the activities during this EP.	VOGA will notify the AHO of any activities for weeks prior to commencement (Section 7, Table 7.2, CM-1.24) (Section 9.4.11, Table 9-6).
AMSA – maritime safety requested that their Rescue Centre (ARC) and Joint Rescue Coordination Centre (JRCC) be notified 24-48 hours before operations commence, as well as provide all of the details for relevant vessels.	VOGA will notify ASMA – maritime safety's ARC and JRCC 24-48 hours before operations commence, and follow the advice provided.	VOGA has addressed AMSA – maritime safety's requests and proposed notification protocols for the ongoing nature of the activities during this EP.	VOGA will notify the Rescue Centre (ARC) and Joint Rescue Coordination Centre (JRCC) 24-48 hours before operations commence, as well as provide all of the details for relevant vessels (Section 7, Table 7-2, CM-1.34) (Section 9.4.11, Table 9-6).
AMSA – maritime safety requested vessels comply with COLREG regulations, including implementation of adequate anti-collision measures.	VOGA will also ensure all vessels comply with COLREG regulations.	VOGA has addressed AMSA – maritime safety's requests and proposed notification protocols for the ongoing nature of the activities during this EP.	VOGA will ensure vessels comply with COLREG regulations, including implementation of adequate anti-collision measures (Section 7, Table 7-2, CM-1.4) (Section 9.4.11, Table 9-6).

While feedback has been received, there were no objections or claims on this EP.	VOGA engages in ongoing consultation throughout the life of an EP. VOGA notes that further feedback may be received as part of ongoing consultation and where appropriate, VOGA will apply its Management of Change and Revision process (Section 8.8 of the EP).	VOGA accepts that AMSA – maritime safety has no further comment at this time.	VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with AMSA – maritime safety for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to AMSA – maritime safety on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.
- VOGA has addressed and responded to AMSA – maritime safety over a one-month period.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- In accordance with NOPSEMA's guideline for engaging with Commonwealth government departments or agencies, VOGA consulted with AMSA – maritime safety via email.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding AMSA – maritime safety of the opportunity to provide feedback.

Australian Maritime Safety Authority (AMSA) – marine pollution			
Consultation overview and summary of response on this EP			
• On 22 October 2025, VOGA advised the AMSA – maritime pollution by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.16). o The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation. o The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information. o The email also included a shipping lane map (Record of Consultation, reference 3.16.1). • On 13 November 2025, VOGA emailed AMSA – maritime pollution following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.2). o The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP. • On 16 December 2025 VOGA emailed AMSA – maritime pollution and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.2) o The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA). o Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback. o VOGA asked AMSA – maritime pollution to review previous information and provide any feedback by 24 December 2025. o VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.			
Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**

No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that AMSA – marine pollution has no comment at this time.	VOGA considers the measures and controls in the EP address AMSA – maritime pollution's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with AMSA – marine pollution for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to AMSA – marine pollution on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- In accordance with NOPSEMA's guideline for engaging with Commonwealth government departments or agencies, VOGA consulted with AMSA – marine pollution via email.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding AMSA – marine pollution of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising AMSA – marine pollution that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Department of Agriculture, Forestry and Fisheries (DAFF) – Biosecurity (marine pests) (vessels, aircraft and personnel)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the DAFF - Biosecurity by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.17).
  - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
  - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
  - The email also included VOGA's assessment of biosecurity risks, including:
    - An environmental description and assessment
    - Invasive marine species prevention controls
- On 22 October 2025, DAFF - Biosecurity emailed VOGA and thanked them for contacting the department and provided general information relating to the requirements for ballast water and biofouling management in Australia (SI Report, reference 1.5.1).
- On 13 November 2025, VOGA emailed DAFF - Biosecurity following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.3).
  - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 16 December 2025 VOGA emailed DAFF - Biosecurity and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.3)
  - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
  - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
  - VOGA asked DAFF to review previous information and provide any feedback by 24 December 2025.
  - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that DAFF - Biosecurity has no comment at this time.	VOGA considers the measures and controls in the EP address DAFF - Biosecurity's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with DAFF - Biosecurity for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to DAFF - Biosecurity on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- In accordance with NOPSEMA's guideline for engaging with Commonwealth government departments or agencies, VOGA consulted with DAFF - Biosecurity via email.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding DAFF - Biosecurity of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising DAFF - Biosecurity that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Department of Agriculture, Forestry and Fisheries (DAFF) – Fisheries
Consultation overview and summary of response on this EP

• On 22 October 2025, VOGA advised the DAFF - Fisheries by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.17).
  o The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
  o The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
  o The email also included VOGA's assessment of biosecurity risks, including:
  ▪ An environmental description and assessment
  ▪ Invasive marine species prevention controls
• On 22 October 2025, DAFF – Fisheries emailed VOGA an auto-reply which advised they would endeavour to respond as soon as possible (SI Report, reference 1.6.1).
• On 13 November 2025, VOGA emailed DAFF - Fisheries following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.3).
  o The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
• On 13 November 2025, DAFF – Fisheries emailed VOGA an auto-reply which advised they would endeavour to respond as soon as possible (SI Report, reference 1.6.2).
• On 16 December 2025 VOGA emailed DAFF - Fisheries and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.3)
  o The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
  o Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
  o VOGA asked DAFF - Fisheries to review previous information and provide any feedback by 24 December 2025.
  o VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.
• On 16 December 2025, DAFF – Fisheries emailed VOGA an auto-reply which advised they would endeavour to respond as soon as possible (SI Report, reference 1.6.3).

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that DAFF - Fisheries has no comment at this time.	VOGA considers the measures and controls in the EP address DAFF - Fisheries' functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with DAFF - Fisheries for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to DAFF - Fisheries on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- In accordance with NOPSEMA's guideline for engaging with Commonwealth government departments or agencies, VOGA consulted with DAFF - Fisheries via email.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding DAFF - Fisheries of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising DAFF - Fisheries that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Department of Climate Change, Energy, the Environment and Water (DCCEEW) – Underwater Cultural Heritage (UCH)			
Consultation overview and summary of response on this EP			

• On 22 October 2025, VOGA advised the DCCEEW – UCH by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.36).
  o The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
  o The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
  o The email also included VOGA's assessment of underwater cultural heritage, including an analysis of any cultural heritage artifacts identified within the Operational Area or EMBA.
• On 23 October 2025, DCCEEW emailed VOGA and advised it had received the enquiry and would action it as soon as possible (SI Report, reference 2.6.1).
• On 13 November 2025, VOGA emailed DCCEEW – UCH following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.21).
  o The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
• On 16 December 2025 VOGA emailed DCCEEW – UCH and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.4)
  o The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
  o Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
  o VOGA asked DCCEEW - UCH to review previous information and provide any feedback by 24 December 2025.
  o VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.
• On 16 December 2025, DCCEEW emailed VOGA and advised it had received the enquiry and would action it as soon as possible (SI Report, reference 2.6.2).			

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**

No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that DCCEEW – UCH has no comment at this time.	VOGA considers the measures and controls in the EP address DCCEEW-UCH's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with DCCEEW – UCH for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to DCCEEW – UCH on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- In accordance with NOPSEMA's guideline for engaging with Commonwealth government departments or agencies, VOGA consulted with DCCEEW – UCH via email.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding DCCEEW – UCH of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising DCCEEW – UCH that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Department of Defence (DoD)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the DoD by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.18).
  - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
  - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
  - The email also included VOGA's assessment of impacts or risks to defence for this EP, including:
    - An assessment of defence related uses in the Operational Area and EMBA
    - It concluded there are no unexploded ordnance (UXO) potential in the Operational Area.
- On 13 November 2025, VOGA emailed DoD following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.4).
  - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 16 December 2025 VOGA emailed DOD and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.5)
  - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
  - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
  - VOGA asked DOD to review previous information and provide any feedback by 24 December 2025.
  - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that DoD has no comment at this time.	VOGA considers the measures and controls in the EP address DoD's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with DoD for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to DoD on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- In accordance with NOPSEMA's guideline for engaging with Commonwealth government departments or agencies, VOGA consulted with DoD via email.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding DoD of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising DoD that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Department of Industry, Science and Resources (DISR)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the DISR by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.19).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed DISR following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.5).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 16 December 2025 VOGA emailed DISR and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.6)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked DISR to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that DISR has no comment at this time.	VOGA considers the measures and controls in the EP address DISR's functions, interests or activities.
Consultation demonstration statement			

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with DISR for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to DISR on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- In accordance with NOPSEMA's guideline for engaging with Commonwealth government departments or agencies, VOGA consulted with DISR via email.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding DISR of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising DISR that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Director of National Parks (DNP)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the DNP by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.20).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
    - The email advised that there are no Australian Marine Parks within the Operational Area and included VOGA's assessment of the nearest relevant marine parks, including:

- An analysis of what marine parks may be situated near the Operational Area
- An assessment of potential risks to Australian Marine Parks
- A NOPSEMA-approved oil spill response plan and a list of parks within the EMBA that will be contacted in the event of a spill following a review of hydrocarbon spill modelling.

- On 13 November 2025, VOGA emailed DNP following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.6).
  - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 13 November 2025, DNP emailed VOGA and clarified that planned activities do not overlap Australian Marine Parks. DNP confirmed that no authorisation is needed from DNP (SI Report, reference 1.4.1).
  - DNP confirmed that it should be made aware of any oil or gas pollution incidences which occur within a marine park, and provided contact details for the officer to contact, as well as details on what any notification should include.
  - The email provided further information on titleholder requirements, the North-west Network Management Plan, and information for potential emergency responses.
- On 20 November 2025, VOGA emailed DNP and thanked them for their response and the information provided (SI Report, reference 1.4.2).
  - The email confirmed that VOGA will contact DNP if details regarding the activity change and result in an overlap with or new impact to a marine park, or for emergency responses.
  - VOGA also noted DNP's confirmation that planned activities do not overlap with any Australian Marine Parks.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
DNP confirmed that the activity does not overlap any Australian Marine Park.	VOGA noted DNP's confirmation of no activity overlap with Australian Marine Parks.	VOGA confirmed that no activities are set to overlap marine parks.	AMPs are assessed in Section 3.6.5 of the EP.

DNP confirmed that no authorisation is required for this activity.	VOGA noted that there were no requirements from the DNP at this time.	VOGA noted that there were no requirements from the DNP at this time.	VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.
DNP requested an update should the operational area change.	VOGA noted DNP's request for contact regarding any activity change and will notify the Marine Compliance Duty Officer within 24 hours of any spill.	VOGA confirmed that it will contact the DNP regarding any activity change.	VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.
DNP requested that the 24-hour Marine Compliance Duty Officer be notified of any spill or pollution. While feedback has been received, there were no objections or claims on this EP.	VOGA noted DNP's request to notify the Marine Compliance Duty Officer within 24 hours of any spill.	VOGA confirmed that it will notify the Marine Compliance Duty Officer within 24 hours of any spill.	VOGA will notify DNP of any spill associated with this EP (Section 7, Table 7-2, CM-11.20) (Section 9.4.11, Table 9-6).
Consultation demonstration statement			

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with DNP for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to DNP on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.
- VOGA has addressed and responded to DNP over a one-month period.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- In accordance with NOPSEMA's guideline for engaging with Commonwealth government departments or agencies, VOGA consulted with DNP via email.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding DNP of the opportunity to provide feedback.

Section 25(1)(a) and (b) of the OPGGS(E)R: Departments or agencies of Western Australia to which the activities to be carried out under the environment plan may be relevant.

State Government Departments and Agencies

Department of Planning, Lands and Heritage (DPLH)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the DPLH by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.37).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.

- The email also outlined VOGA's assessment of underwater cultural heritage and its consultation with the West Australian Museum and the Department of Climate Change, Energy, The Environment, and Water as part of the consultation outreach.

- On 22 October 2025, DPLH emailed VOGA an automatic response to confirm VOGA's email had been received and would be forwarded to the appropriate team for action (SI Report, reference 2.1.1).
- On 3 November 2025, DPLH emailed VOGA confirming that the EP is located in Commonwealth waters and the Land Use Management Division of DPLH has no comment on the EP (SI Report, reference 2.1.2).
  - The email also confirmed that the EMBA partially intersects with State Waters and several marine reserves and conservation areas and recommended VOGA consult with the DBCA, DWER and DCCEEW regarding environmental disturbances and impacts, as well as Western Australian Museum the delegated authority for the management of commonwealth historic shipwrecks and relics.
- On 13 November 2025, VOGA emailed DPLH to thank them for their response and the information provided (SI Report, reference 2.1.3).
  - The email confirmed that VOGA consults with the State and Commonwealth agencies as well as the Western Australian Museum.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
DPLH requested that VOGA consult with DBCA, DWER, DCCEEW and Western Australian Museum.	VOGA noted DPLH's request for it to consult with DBCA, DWER, DCCEEW and Western Australian Museum.	VOGA advised DPLH that it consults with DBCA, DWER, DCCEEW and Western Australian Museum.	VOGA considers the measures and controls in the EP address DPLH's functions, interests or activities.
DPLH has no comment on this EP. While feedback has been received, there were no objections or claims on this EP.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that DPLH has no comment at this time.	VOGA considers the measures and controls in the EP address DPLH's functions, interests or activities.
Consultation demonstration statement			

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with DPLH for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to DPLH on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.
- VOGA has addressed and responded to DPLH over a one-month period.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.

Department of Mines, Petroleum and Exploration (DMPE)

Consultation overview and summary of response on this EP

- On 13 October 2025, VOGA emailed DMPE to enquire who the appropriate contact person was in the department following the machinery of government changes effective 1 July 2025 (SI Report, reference 1.8.1).
- On 22 October 2025, VOGA advised the DMPE by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.21).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed DMPE following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.8).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.

- On 16 December 2025 VOGA emailed DMPE and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.7)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked DMPE to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that DMPE has no comment at this time.	VOGA considers the measures and controls in the EP address DMPE's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with DMPE for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to DMPE on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.

- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding DMPE of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising DMPE that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Department of Primary Industries and Regional Development (DPIRD) – Fisheries

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the DPIRD by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.22).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
    - The Commercial Fisher Information Sheet included an overview of the proposed activities; key information for the commercial fishing sector about the activities; coordinates for operational areas; an activity summary; assessment of commercial fishing, potential effects and impacts; and VOGA's impact assessment (Record of Consultation, reference 1.2).
- On 13 November 2025, VOGA emailed DPIRD following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.7).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 16 December 2025 VOGA emailed DPIRD and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.8)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked DPIRD to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that DPIRD has no comment at this time.	VOGA considers the measures and controls in the EP address DPIRD's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with DPIRD for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to DPIRD on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding DPIRD of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising DPIRD that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Department of Biodiversity, Conservation and Attractions (DBCA)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the DBCA by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.23).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
    - The email acknowledged the guidance provided by DBCA in previous consultations and confirmed that these areas have been assessed as part of the EP development.
- On 13 November 2025, VOGA emailed DBCA following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.9).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 21 November 2025, DBCA emailed VOGA thanking them for the information and that it is still finalising its advice to VOGA and that it is unable to meet the deadline of 21 November 2025, due to staff changes. DBCA sought an extension and requested a date that would be acceptable to VOGA (SI Report, reference 2.2.1).
- On 25 November 2025, VOGA emailed DBCA thanking them for their email and asking DBCA if they could forward their advice by 11 December 2025 (SI Report, reference 2.2.2).
- On 2 December 2025, DBCA emailed VOGA thanking them for the consultation information and provided comments for consideration (SI Report, reference 2.2.3)
    - The email outlined considerations for marine parks and conservation reserves located within the project EMBA, including the importance of values and documentation prior to activities being conducted. DBCA requested the following:
        - VOGA establish baseline survey data on current contamination and ecological values within the EMBA, as well as risk assessment and information on threatened and protected fauna.
        - VOGA assess what baseline information may be required and determine suitable methods to identify information to ensure the impacts on ecological values are monitored and remediated. This includes a before-after, control-impact (BACI) framework in planning and evaluating VOGA's management response.
        - In the event of a hydrocarbon release, it requested that VOGA notify DBCA's Pilbara regional office.
- On 4 December 2025, VOGA emailed DBCA thanking them for their email and the guidance provided on ecological important areas within the EMBA (SI Report, reference 2.2.4). In the email, VOGA:
    - Confirmed that the ecologically important areas had been assessed as part of this EP and that VOGA maintains an understanding of ecological importance within and adjacent to the operational areas and EMBA.
    - Outlined an assessment of potential management and mitigation measures that had been considered in this EP, and all relevant controls had been adopted to reduce the impact to as low as reasonably practical (ALARP).

- Outlined that in accordance with the OPGGS(E)R 21(1) - (7), VOGA included details of the particular values and sensitivities of the environment within and in proximity to operational areas and the EMBA for impact assessment and risk evaluation.
- VOGA confirmed that as per the Oil Pollution Emergency Plan (OPEP), that in the event of an oil spill where marine wildlife is potentially impacted, VOGA would notify DBCA's Pilbara regional office.
- VOGA noted that DBCA would not implement an oiled wildlife management response on behalf of a petroleum operator.
- VOGA also advised that it has referred to guidance from the Department of Transport (DoT) and has consulted with the DoT – marine pollution as the jurisdictional authority while developing the OPEP.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
DBCA provided guidance on ecologically important areas within the EMBA, including marine parks in the vicinity of the proposed operations, and requested that baseline values and potentially affected environment areas be documented prior to any operations commencing.	VOGA acknowledged that areas of ecological importance should be assessed and that baseline values should be documented prior to operations.	VOGA confirmed that areas of ecological importance have been assessed as part of this EP's development. VOGA maintains a baseline understanding of areas of ecological importance within and adjacent to the operational areas and EMBA.	VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.
DBCA requested that VOGA acquire the relevant information to implement a Before-After, Control-Impact (BACI) framework.	VOGA acknowledged that a baseline understanding of ecological importance is important, and that VOGA follows the BACI framework.	VOGA confirmed an assessment of potential management and mitigation measures was considered in this EP to reduce the impact to ALARP.	VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.

DBCA requested VOGA contact DBCA's Pilbara regional office in the event of a hydrocarbon release.	VOGA acknowledged the request to contact DBCA's regional office in the event of a hydrocarbon release.	VOGA confirmed that it will contact DBCA's Pilbara regional office in the event of a hydrocarbon release.	VOGA will notify DBCA of any hydrocarbon release associated with this EP (Section 7, Table 7-2, CM-11.20) (Section 9.4.11, Table 9-64).
DBCA requested VOGA refer to the DoT web content and an offshore industry guidance note for WA marine oil pollution. While feedback has been received, there were no objections or claims on this EP.	VOGA acknowledged the request to refer to the DoT information and industry guidance note. VOGA engages in ongoing consultation throughout the life of an EP. VOGA notes that further feedback may be received as part of ongoing consultation and where appropriate, VOGA will apply its Management of Change and Revision process (Section 8.8 of the EP).	VOGA confirmed it has referred to the DoT's web content regarding marine pollution and has consulted with the DoT while developing the OPEP.	VOGA confirmed it has referred to the DoT's web content regarding marine pollution and has consulted with the DoT while developing the OPEP.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with DBCA for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to DBCA on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.
- VOGA has addressed and responded to DBCA over a two-month period.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding DBCA of the opportunity to provide feedback.

Department of Transport and Major Infrastructure (DTMI) – marine pollution

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the DTMI by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.24).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- The email included a reference to DTMI's previous advice to provide them with the information requested in the Guidance Note information as per Appendix 6 of the department's industry guidance note – Marine Oil Pollution: Response and Consultation Arrangements (July 2020).
- On 22 October 2025, DTMI emailed VOGA acknowledging receipt of its email and advising that the mailbox is only monitored during normal business hours (SI Report, reference 2.3.1)
- On 13 November 2025, VOGA emailed DTMI following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.10).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 24 November 2025, DTMI emailed VOGA and thanked them for the opportunity to review the EP (SI Report, reference 2.3.2).
    - The email included DTMI's observations and recommendation including:
        - The importance of determining oil properties in spill risk assessment and response
        - Identification of incorrect flash points
        - Potential implications for incorrect oil types and on oil spill modelling

- On 9 December 2025, VOGA emailed DTMI and thanked them for their feedback and assessment of the EP and responded to their query regarding the MDO and MGO oil types (SI Report, reference 2.3.3).
    - The email response noted that:
        - Different hydrocarbon parameters were used between the EP DTMI assessed and the parameters provided to DTMI to review
        - Acknowledged an incorrect Flash Point had been used for both MDO and MGO and confirmed that all documentation would be updated
        - Confirmed that the Flash Point was not used in the oil spill modelling and will not impact VOGA's oil spill response strategy determinations
        - Noted that our oil spill modelling was in fact conservative due to the use of a higher hydrocarbon residual component and that ISO 8217 standards dose not state residue content or boiling point distributions for marine fuels
        - Provided the current status of VOGA EP assessments.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
DTMI provided guidance on the importance of determining oil properties in spill risk assessment and response.	VOGA acknowledged that different hydrocarbon parameters were used between the EP DTMI assessed and the parameters provided to DTMI to review.	VOGA confirmed that areas of ecological importance have been assessed as part of this EP's development. VOGA maintains a baseline understanding of areas of ecological importance within and adjacent to the operational areas and EMBA.	VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.
DTMI identified incorrect flash points for both MDO and MGO and requested that VOGA update the relevant information.	VOGA acknowledged an incorrect Flash Point had been used for both MDO and MGO.	VOGA confirmed that the Flash Point was not used in the oil spill modelling and will not impact VOGA's oil spill response strategy determinations.	VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.

DTMI requested update on the potential implications for incorrect oil types and on the oil spill modelling. While feedback has been received, there were no objections or claims on this EP.	VOGA acknowledged an incorrect Flash Point had been used for both MDO and MGO and confirmed that all documentation would be updated. VOGA engages in ongoing consultation throughout the life of an EP. VOGA notes that further feedback may be received as part of ongoing consultation and where appropriate, VOGA will apply its Management of Change and Revision process (Section 8.8 of the EP).	VOGA confirmed that its oil spill modelling was in fact conservative due to the use of a higher hydrocarbon residual component and that ISO 8217 standards dose not state residue content or boiling point distributions for marine fuels.	VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with DTMI for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to DTMI on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.
- VOGA has addressed and responded to DTMI over a two-month period.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.

- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding DTMI of the opportunity to provide feedback.

Department of Water and Environmental Regulation (DWER)

Consultation overview and summary of response on this EP

- On 11 November 2025, VOGA advised DWER by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.42).
  - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
  - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 25 November 2025, VOGA emailed DWER following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.26).
  - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 25 November 2025, DWER emailed VOGA and confirmed the project falls outside the remit of the North West Region of DWER and that it had forwarded the information to the EPA and the Marine Ecosystems sections of DWER and suggested following up. (SI Report, reference 2.5.1).
- On 9 December 2025, VOGA emailed DWER and thanked them for their email and advice that it falls outside the remit of the North West Region of DWER and also thanked them for forwarding the consultation to the EPA and Marine Ecosystems Branch as it may be more relevant to those sections. (SI Report, reference 2.5.2).

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted
DWER confirmed the project falls outside the remit of the North West Region of DWER and forwarded the email to the EPA and Marine Ecosystems Branch. While feedback has been received, there were no objections or claims on this EP.	VOGA noted DWER's advice and noted there were no requirements from DWER at this time. VOGA engages in ongoing consultation throughout the life of an EP. VOGA notes that	VOGA noted that there no requirements from DWER at this time.	VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.

	further feedback may be received as part of ongoing consultation and where appropriate, VOGA will apply its Management of Change and Revision process (Section 8.8 of the EP).		

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with DWER for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to DWER on 11 November 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.
- VOGA has addressed and responded to DWER over a one-month period.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 25 November 2025, reminding DWER of the opportunity to provide feedback.

Ningaloo Coast World Heritage Advisory Committee (NCWHAC)

Consultation overview and summary of response on this EP

- On 13 October 2025, DBCA emailed VOGA to advise that they were no longer the contact for NCWHAC and to ask to be removed from the mailing list (SI Report, reference 2.8.1).
- On 11 November 2025, VOGA advised the NCWHAC by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.44).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 25 November 2025, VOGA emailed NCWHAC following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.28).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite a follow-up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process where appropriate (Section 8.8 of the EP).	VOGA accepts that NCWHAC has no comment at this time.	VOGA considers the measures and controls in the EP address NCWHAC's functions, interests or activities

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with NCWHAC for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to NCWHAC on 11 November 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.

- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 25 November 2025, reminding NCWHAC of the opportunity to provide feedback.

Pilbara Development Commission (PDC)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the PDC by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.25).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed PDC following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.11).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 16 December 2025 VOGA emailed PDC and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.9)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked PDC to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

No response was received on this EP despite a follow-up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process where appropriate (Section 8.8 of the EP).	VOGA accepts that PDC has no comment at this time.	VOGA considers the measures and controls in the EP address PDC's functions, interests or activities

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with PDC for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to PDC on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding PDC of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising PDC that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Pilbara Ports Authority (PPA)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the PPA by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.26).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed PPA following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.12).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 17 November 2025, PPA emailed VOGA stating that they had no feedback regarding the EP (SI Report, reference 2.4.1).
- On 25 November 2025, VOGA emailed PPA thanking them for their reply and noting that they had no feedback in relation to the proposed activities (SI Report, reference 2.4.2).

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
PPA advised it has no feedback regarding the EP. While feedback has been received, there were no objections or claims on this EP.	VOGA engages in ongoing consultation throughout the life of an EP. VOGA notes that further feedback may be received as part of ongoing consultation and where appropriate, VOGA will apply its Management of Change and Revision process (Section 8.8 of the EP).	VOGA accepts that PPA has no further comment at this time.	VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with PPA for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to PPA on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.
- VOGA has addressed and responded to PPA over a one-month period.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding PPA of the opportunity to provide feedback.

Section 25(1)(d) of the OPGGS(E)R: Persons or organisations whose functions, interests or activities may be affected by the activities to be carried out under the environment plan

Commonwealth commercial fishing - representative bodies

Western Rock Lobster Council

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the Western Rock Lobster Council by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.45).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed the Western Rock Lobster Council following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.29).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.

- On 16 December 2025 VOGA emailed Western Rock Lobster Council and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.25)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked Western Rock Lobster Council to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA accepts the Western Rock Lobster Council have no comment at this time.	VOGA has consulted with Western Rock Lobster Council. VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA has assessed the relevancy of State fisheries in Section 3.5.1 of this EP. No additional measures or controls are required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Western Rock Lobster Council for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient information

- Consultation information was provided to the Western Rock Lobster Council on 22 October 2025, based on their function, interest, and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence and consultation material sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.

Section 25(1)(d) of the OPGGS(E)R: Persons or organisations whose functions, interests or activities may be affected by the activities to be carried out under the environment plan
State commercial fisheries
Western Australian Fishing Industry Council (WAFIC)
Consultation overview and summary of response on this EP

• On 22 October 2025, VOGA advised WAFIC by email of the proposed activity and provided a Consultation Information Sheet and Commercial Information Sheet (Record of Consultation, reference 1.1, 1.2 and 3.27).
  ○ The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
  ○ The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
  ○ The Commercial Fisher Information Sheet included an overview of the proposed activities; key information for the commercial fishing sector about the activities; coordinates for operational areas; an activity summary; assessment of commercial fishing, potential effects and impacts; and VOGA's impact assessment (Record of Consultation, reference 1.2).
• On 10 November 2025, WAFIC emailed VOGA seeking an extension to Monday 24 November 2025. (SI Report, reference 5.1.2).
• On 11 November 2025, VOGA emailed WAFIC confirming the requested extension. (SI Report, reference 5.1.3).
• On 25 November 2025, WAFIC emailed VOGA providing comments and questions in relation to the proposed activities in the EP particularly about decreased water quality and the potential impact on valuable commercial species and their habitats, especially given the recent stock assessment showing the Pilbara Demersal Scalefish Resource is at severe risk and asked the following questions: (SI Report, reference 5.1.4)
  ○ How will drill cuttings be monitored, and what controls or procedures are in place to minimise impacts and demonstrate ALARP.
  ○ Acknowledge that further research is needed to confirm if it is safe for fishers to operate near drill cuttings. Even if safety risks are managed, could there still be a risk of contamination to catch?
  ○ Has VOGA considered cumulative impacts of decreased water quality from proposed activities on the marine environment and was the assessment included in the EP?
  ○ Can VOGA clarify the exact locations and habitat characteristics of designated anchorage areas for support vessels?
  ○ Given commercial fishers have previously raised concerns about anchor chain swing or drag impacting benthic habitats and that previous proponents anchoring barges and tugs on coral lumps northeast of the Montebello Islands, causing direct habitat damage, WAFIC requested confirmation of the measures that will be implemented to ensure that anchoring associated with the EP does not impact sensitive benthic habitats or key fishing grounds.
  ○ For unplanned events, WAFIC understands Vermillion will have the following in place:
  ▪ WAFIC listed as a contact in the Oil Spill Response planning documents, with notification to be made within 24 hours of any event. WAFIC can also assist with communication to the fishing industry if required.
  ▪ Vermilion retains a current list of WA commercial fisheries that may be impacted by unplanned spill scenarios.

        - Vermilion, as required under the Regulations, will maintain an effective Operational and Scientific Monitoring Program (OSMP) to determine impacts and monitor environmental recovery.
    - WAFIC also appreciates Vermilion's communication with mariners through notices on marine safety information, drilling commencement, and temporary exclusion zones. WAFIC requests to be included in any vessel-operation notifications for this EP.
- On 4 December 2025, VOGA responded to WAFIC's feedback and questions and provided the following responses: (SI Report, reference 5.1.5).
    - The controls implemented for the management of drill cuttings
        - only water-based drilling fluids will be used during exploration drilling with polymers that break down naturally in the environment
        - only drilling and completion fluids that comply with VOGA's Chemical Selection Process will be used
        - a drilling unit solids control system will be used to remove fines from drilling fluids to keep fluids in specification for reuse to minimise the volume of fluids being discharged
    - The measures being taken to mitigate contamination risks
        - the water-based mud meets VOGA's Chemical Selection Process requirements, and the short drilling duration ensures limited discharges
        - the assessment undertaken has determined that no change in water quality parameters is expected that may impact the quality of habitat for fishes
        - research indicates that the discharge of water-based drilling muds has little to no long-term adverse biological on either the water column or the seafloor.
    - The cumulative impacts of decreased water quality
        - VOGA will consider the cumulative impacts of decreased water quality from the proposed activities within its impact and risk assessment
    - The exact locations and habitat characteristics of the designated anchorage areas for support vessels
        - All support vessels would anchor within VOGA's safe anchorage locations or within the Operational Area and provided co-ordinates of the area.
        - The benthic habitat within these locations is flat and featureless, with no sensitive habitats.
        - The localise nature of the disturbance and lack of significant benthic habitat in the region, potential impacts from anchoring are considered minimal.
    - The procedures in the event of an unplanned event
        - VOGA's Oil Spill Contingency Plan includes notifying WAFIC within 24 hours of any event of a Level 2 oil spill.
        - Thanked WAFIC for the offer to communicate with the fishing industry should this occur.
        - Advised VOGA routinely updates its EPs to ensure all existing environment information is up-to-date and includes a current list of State commercial fisheries that could potentially be impacted and is included in the updates.
        - VOGA has prepared and adopted an Oil Spill Monitory Plan (OSMP) utilising the joint industry framework for operational and scientific monitoring (OSM).
    - Thanked WAFIC for sharing its position regarding consultation with the WA fishing industry for unplanned events and confirmed VOGA would apply WAFIC's position to its consultation methodology.
    - VOGA confirmed the following:
        - Baseline scientific data on aquatic organisms and the marine environment is included within Vermilion's OSMP.
        - An understanding of the Fish Resources Management Act 1994 and the associated procedures form part of Vermilion's industry and government liaison process.

<table>
<tr><td colspan="4">

Scientific monitoring for potential fish tainting in the event of an oil spill is included within Vermilion’s OSMP.
Scientific and operational monitoring in the event of an oil spill is the basis of Vermilion’s OSMP.
Should this occur, Vermilion would consider the matter of compensation.

On 9 December 2025, WAFIC emailed VOGA thanking them for the responses to their feedback and confirmed it had no further comments at this time. (SI Report, reference 5.1.6).

</td></tr>
<tr><th>Relevant person objections, claims or other feedback</th><th>VOGA's assessment of the merits</th><th>VOGA's statement of response</th><th>Details of the measures adopted</th></tr>
<tr><td>WAFIC requested to be informed as to how drill cuttings will be monitored, and what controls or procedures are in place to minimise impacts and demonstrate ALARP.</td><td>VOGA accepts WAFIC’s request for drill cutting monitoring, and its request for what controls or procedures are in place to minimise impacts and demonstrate ALARP.</td><td>VOGA advised WAFIC only water-based drilling fluids will be used during exploration drilling with polymers that break down naturally in the environment,
only drilling and completion fluids that comply with VOGA’s Chemical Selection Process will be used, and that a drilling unit solids control system will be used to remove fines from drilling fluids to keep fluids in specification for reuse to minimise the volume of fluids being discharged.

The measures being taken to mitigate contamination risks includes the water-based mud meets VOGA’s Chemical Selection Process requirements, and the short drilling duration ensures limited discharges.
VOGA advised the assessment undertaken has determined that no change in water quality parameters is expected that may impact the quality of habitat for fishes and research indicates that the discharge of water-based drilling muds has little to no long-term adverse biological on either the water column or the seafloor.</td><td>VOGA considers the measures and controls in the EP are appropriate.</td></tr>
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WAFIC asked whether VOGA considered cumulative impacts of decreased water quality from proposed activities on the marine environment and did it include the assessment in the EP.	VOGA accepts WAFIC's request for cumulative impacts of water quality from proposed activities.	VOGA has considered the cumulative impacts of decreased water quality from the proposed activities within its impact and risk assessment.	VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required
In the event of a Level 2 oil spill, WAFIC requested to be notified of any unplanned event within 24 hours.	VOGA accepts WAFIC's request for notification in the event of an unplanned event or spill.	VOGA will notify WAFIC within 24 hours in the event of a Level 2 oil spill.	VOGA will notify WAFIC of any Level 2 spills associated with this EP within 24 hours (Section 7, Table 7-2, CM-11.20) (Section 9.4.11, Table 9-6).
WAFIC requested to be included in any vessel operation notification associated with this EP.	VOGA accepts WAFIC's request for inclusion in vessel operation notification.	VOGA will notify WAFIC of any vessel operations associated with this EP.	VOGA will notify WAFIC of any vessel operations associated with this EP (Section 7, Table 7-2, CM-1.3) (Section 9.4.11, Table 9-6).

WAFIC requested ongoing communication with mariners regarding notices on activity commencement and distances regarding temporary exclusion zones.	VOGA accepts WAFIC's request regarding ongoing communication with mariners.	VOGA has implemented a fee-for-service model with WAFIC to communicate with mariners on activity commencement and distances regarding exclusion zones.	VOGA will notify WAFIC of any vessel operations associated with this EP (Section 7, Table 7-2, CM-1.3) (Section 9.4.11, Table 9-6).
WAFIC requested VOGA clarify the exact locations and habitat characteristics of designated anchorage areas for support vessels. WAFIC requested confirmation of the measures that will be implemented to ensure that anchoring associated with the EP does not impact sensitive benthic habitats or key fishing grounds.	VOGA accepts WAFIC's request for clarification of locations and habitat characteristics of anchorage areas for support vessels and confirmation of measures to ensure anchoring does not impact sensitive benthic habitats.	VOGA advised that all support vessels would anchor within VOGA's safe anchorage locations or within the Operational Area and provided co-ordinates of the area. VOGA noted the benthic habitat within these locations is flat and featureless, with no sensitive habitats. The localise nature of the disturbance and lack of significant benthic habitat in the region, indicates potential impacts from anchoring are considered minimal.	VOGA considers the measures and controls in the EP are appropriate.
WAFIC requested that VOGA have suitable OSMP to determine impacts and recovery of marine environments.	VOGA accepts WAFIC's request for suitable OSMP's.	VOGA has initiated appropriate controls in an Oil Spill Management Plan and has initiated procedures as part of the Fish Resources Management Act 1994 as part of VOGA's industry and government liaison process, including scientific monitoring for potential fish tainting and in the event of an oil spill as the basis of VOGA's OSMP.	VOGA has enacted the appropriate controls as outlined in the EP.

WAFIC requested VOGA note WAFIC's position regarding consultation and unplanned events. While feedback has been received, there were no objections or claims on this EP.	VOGA notes WAFIC's position regarding consultation and unplanned events.	VOGA notes WAFIC's position regarding ongoing consultation and unplanned events. VOGA engages in ongoing consultation throughout the life of an EP. VOGA notes that further feedback may be received as part of ongoing consultation and where appropriate. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with WAFIC for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to WAFIC on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Commercial Fisher Information Sheet has been provided to stakeholder and publicly available on the VOGA website since October 2025.
- Consultation for this EP commenced in October 2025.
- VOGA has addressed and responded to WAFIC over a one-month period.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.

State commercial fishing - representative bodies			
Mackerel Managed Fishery - Area 2			
Consultation overview and summary of response on this EP			
• In accordance with VOGA's "Fee for Service Agreement" with WAFIC and WAFIC's 'Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector' WAFIC engaged the licence holders of Mackerel Managed Fishery - Area 2 on behalf of VOGA as their fishing area intersects the operational area and there is expected fishing effort (Record of Consultation, references 3.27). • On 22 October 2025, VOGA provided WAFIC with consultation information to distribute to licence holders of Mackerel Managed Fishery - Area 2 (SI Report, reference 6.1.1 and Record of Consultation, reference 3.27). • On 22 October 2025, WAFIC contacted licence holders of Mackerel Managed Fishery – Area 2 to advise of the proposed activity and provided a Consultation Information Sheet and Commercial Fisher Information sheet (SI Report, reference 5.1.1 and Record of Consultation, reference 1.1 and 1.2). o The email included an activity summary, directions for providing input into the EP development through consultation, the closing date and a link to VOGA's website with additional resources on EP consultation. o The Consultation Information Sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the Environment That May Be Affected (EMBA) based on a review of publicly available information. o The Commercial Fisher information sheet included an overview of the proposed activities, key information about the commercial fishing sector, coordinates for operational areas, an activity summary, an assessment of commercial fishing, potential effects and impacts, and VOGA's impact assessment. • On 25 November 2025, WAFIC emailed VOGA advising that it did not receive any feedback from licence holders on this EP, including from Mackerel Managed Fishery – Area 2 (SI Report, reference 6.1.3). • On 4 December 2025, VOGA emailed WAFIC thanking them for their advice that there was no feedback from licence holders on this EP, including from Mackerel Managed Fisher – Area 2 (SI Report, reference 6.1.4).			
Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA accepts that the individual relevant licence holders of the Mackerel Managed Fishery – Area 2 have no comment at this time.	VOGA has consulted DPIRD, WAFIC and individual relevant licence holders via WAFIC. VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA has assessed the relevancy of State fisheries in Section 3.5.1 of this EP. VOGA will notify DPIRD and WAFIC prior to the commencement and at the end of the activity. No additional measures or controls are required.

Consultation demonstration statement
VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Mackerel Managed Fishery - Area 2 for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically: **Sufficient information** • Consultation information was provided to the Mackerel Managed Fishery - Area 2 through WAFIC on 22 October 2025, based on their function, interest, and activities. • Consultation Information Sheet has been publicly available on the VOGA website since October 2025. **Reasonable period** • A consultation period was noted in the initial consultation correspondence and consultation material sent. • Commercial Fisher Information Sheet, developed specifically for fisheries, was provided to the Mackerel Managed Fishery - Area 2 on 23 October 2025. • Consultation for this EP commenced in October 2025. **Reasonable opportunity** • VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons. • From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
Onslow Prawn Limited Entry Fishery
Consultation overview and summary of response on this EP

- In accordance with VOGA's "Fee for Service Agreement" with WAFIC and WAFIC's 'Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector' WAFIC engaged the licence holders of Onslow Prawn Limited Entry Fishery on behalf of VOGA as their fishing area intersects the operational area and there is expected fishing effort (Record of Consultation, references 3.27).
- On 22 October 2025, VOGA provided WAFIC with consultation information to distribute to licence holders of Onslow Prawn Limited Entry Fishery (SI Report, reference 6.1.1 and Record of Consultation, reference 3.27).
- On 22 October 2025, WAFIC contacted licence holders of Onslow Prawn Limited Entry Fishery to advise of the proposed activity and provided a Consultation Information Sheet and Commercial Fisher Information sheet (SI Report, reference 5.1.1 and Record of Consultation, reference 1.1 and 1.2).
    - The email included an activity summary, directions for providing input into the EP development through consultation, the closing date and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information Sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the Environment That May Be Affected (EMBA) based on a review of publicly available information.
    - The Commercial Fisher information sheet included an overview of the proposed activities, key information about the commercial fishing sector, coordinates for operational areas, an activity summary, an assessment of commercial fishing, potential effects and impacts, and VOGA's impact assessment.
- On 25 November 2025, WAFIC emailed VOGA advising that it did not receive any feedback from licence holders on this EP, including from Onslow Prawn Limited Entry Fishery (SI Report, reference 6.1.3).
- On 4 December 2025, VOGA emailed WAFIC thanking them for their advice that there was no feedback from licence holders on this EP, including from Onslow Prawn Limited Entry Fishery (SI Report, reference 6.1.4).

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA accepts that the individual relevant licence holders of the Onslow Prawn Limited Entry Fishery have no comment at this time.	VOGA has consulted DPIRD, WAFIC and individual relevant licence holders via WAFIC. VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA has assessed the relevancy of State fisheries in Section 3.5.1 of this EP. VOGA will notify DPIRD and WAFIC prior to the commencement and at the end of the activity. No additional measures or controls are required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Onslow Prawn Ltd Entry Fishery for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient information

- Consultation information was provided to the Onslow Prawn Ltd Entry Fishery through WAFIC on 22 October 2025, based on their function, interest, and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence and consultation material sent.
- Commercial Fisher Information Sheet, developed specifically for fisheries, was provided to the Onslow Prawn Ltd Entry Fishery on 23 October 2025.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.

Pilbara Crab Managed Fishery

Consultation overview and summary of response on this EP

- In accordance with VOGA's "Fee for Service Agreement" with WAFIC and WAFIC's 'Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector' WAFIC engaged the licence holders of Pilbara Crab Managed Fishery on behalf of VOGA as their fishing area intersects the operational area and there is expected fishing effort (Record of Consultation, references 3.27).
- On 22 October 2025, VOGA provided WAFIC with consultation information to distribute to licence holders of Pilbara Crab Managed Fishery (SI Report, reference 6.1.1 and Record of Consultation, reference 3.27).
- On 22 October 2025, WAFIC contacted licence holders of Pilbara Crab Managed Fishery to advise of the proposed activity and provided a Consultation Information Sheet and Commercial Fisher Information sheet (SI Report, reference 5.1.1 and Record of Consultation, reference 1.1 and 1.2).
    - The email included an activity summary, directions for providing input into the EP development through consultation, the closing date and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information Sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the Environment That May Be Affected (EMBA) based on a review of publicly available information.
    - The Commercial Fisher information sheet included an overview of the proposed activities, key information about the commercial fishing sector,

coordinates for operational areas, an activity summary, an assessment of commercial fishing, potential effects and impacts, and VOGA's impact assessment.

- On 25 November 2025, WAFIC emailed VOGA advising that it did not receive any feedback from licence holders on this EP, including from Pilbara Crab Managed Fishery (SI Report, reference 6.1.3).
- On 4 December 2025, VOGA emailed WAFIC thanking them for their advice that there was no feedback from licence holders on this EP, including from Pilbara Crab Managed Fisher (SI Report, reference 6.1.4).

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA accepts that the individual relevant licence holders of the Pilbara Crab Managed Fishery have no comment at this time.	VOGA has consulted DPIRD, WAFIC and individual relevant licence holders via WAFIC. VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA has assessed the relevancy of State fisheries in Section 3.5.1 of this EP. VOGA will notify DPIRD and WAFIC prior to the commencement and at the end of the activity. No additional measures or controls are required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Pilbara Crab Managed Fishery for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient information

- Consultation information was provided to the Pilbara Crab Managed Fishery through WAFIC on 22 October 2025, based on their function, interest, and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence and consultation material sent.
- Commercial Fisher Information Sheet, developed specifically for fisheries, was provided to the Pilbara Crab Managed Fishery on 23 October 2025.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.

Pilbara Line Fishery (Condition)

Consultation overview and summary of response on this EP

- In accordance with VOGA's "Fee for Service Agreement"with WAFIC and WAFIC's 'Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector' WAFIC engaged the licence holders of Pilbara Line Fishery on behalf of VOGA as their fishing area intersects the operational area and there is expected fishing effort (Record of Consultation, references 3.27).
- On 22 October 2025, VOGA provided WAFIC with consultation information to distribute to licence holders of Pilbara Line Fishery (SI Report, reference 6.1.1 and Record of Consultation, reference 3.27).
- On 22 October 2025, WAFIC contacted licence holders of Pilbara Line Fishery to advise of the proposed activity and provided a Consultation Information Sheet and Commercial Fisher Information sheet (SI Report, reference 5.1.1 and Record of Consultation, reference 1.1 and 1.2).
    - The email included an activity summary, directions for providing input into the EP development through consultation, the closing date and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information Sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the Environment That May Be Affected (EMBA) based on a review of publicly available information.
    - The Commercial Fisher information sheet included an overview of the proposed activities, key information about the commercial fishing sector, coordinates for operational areas, an activity summary, an assessment of commercial fishing, potential effects and impacts, and VOGA's impact assessment.
- On 25 November 2025, WAFIC emailed VOGA advising that it did not receive any feedback from licence holders on this EP, including from Pilbara Line Fishery (SI Report, reference 6.1.3).
- On 4 December 2025, VOGA emailed WAFIC thanking them for their advice that there was no feedback from licence holders on this EP, including from Pilbara Line Fishery (SI Report, reference 6.1.4).

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

No response was received on this EP despite follow up.	VOGA accepts that the individual relevant licence holders of the Pilbara Line Fishery have no comment at this time.	VOGA has consulted DPIRD, WAFIC and individual relevant licence holders via WAFIC. VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA has assessed the relevancy of State fisheries in Section 3.5.1 of this EP. VOGA will notify DPIRD and WAFIC prior to the commencement and at the end of the activity. No additional measures or controls are required.
Consultation demonstration statement			
VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Pilbara Line Fishery for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically: **Sufficient information** • Consultation information was provided to the Pilbara Line Fishery through WAFIC on 22 October 2025, based on their function, interest, and activities. • Consultation Information Sheet has been publicly available on the VOGA website since October 2025. **Reasonable period** • A consultation period was noted in the initial consultation correspondence and consultation material sent. • Commercial Fisher Information Sheet, developed specifically for fisheries, was provided to the Pilbara Line Fishery on 23 October 2025. • Consultation for this EP commenced in October 2025. **Reasonable opportunity** • VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons. • From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.		
Pilbara Fish Trawl (Interim) Managed Fishery			
Consultation overview and summary of response on this EP			

- In accordance with VOGA's "Fee for Service Agreement" with WAFIC and WAFIC's 'Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector' WAFIC engaged the licence holders of Pilbara Fish Trawl (Interim) Managed Fishery on behalf of VOGA as their fishing area intersects the operational area and there is expected fishing effort (Record of Consultation, references 3.27).
- On 22 October 2025, VOGA provided WAFIC with consultation information to distribute to licence holders of Pilbara Fish Trawl (Interim) Managed Fishery (SI Report, reference 6.1.1 and Record of Consultation, reference 3.27).
- On 22 October 2025, WAFIC contacted licence holders of Pilbara Fish Trawl (Interim) Managed Fishery to advise of the proposed activity and provided a Consultation Information Sheet and Commercial Fisher Information sheet (SI Report, reference 5.1.1 and Record of Consultation, reference 1.1 and 1.2).
    - The email included an activity summary, directions for providing input into the EP development through consultation, the closing date and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information Sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the Environment That May Be Affected (EMBA) based on a review of publicly available information.
    - The Commercial Fisher information sheet included an overview of the proposed activities, key information about the commercial fishing sector, coordinates for operational areas, an activity summary, an assessment of commercial fishing, potential effects and impacts, and VOGA's impact assessment.
- On 25 November 2025, WAFIC emailed VOGA advising that it did not receive any feedback from licence holders on this EP, including from Pilbara Fish Trawl (Interim) Managed Fishery (SI Report, reference 6.1.3).
- On 4 December 2025, VOGA emailed WAFIC thanking them for their advice that there was no feedback from licence holders on this EP, including from Pilbara Fish Trawl (Interim) Managed Fishery (SI Report, reference 6.1.4).

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA accepts that the individual relevant licence holders of the Pilbara Fish Trawl (Interim) Managed Fishery have no comment at this time.	VOGA has consulted DPIRD, WAFIC and individual relevant licence holders via WAFIC. VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA has assessed the relevancy of State fisheries in Section 3.5.1 of this EP. VOGA will notify DPIRD and WAFIC prior to the commencement and at the end of the activity. No additional measures or controls are required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Pilbara Fish Trawl (Interim) Managed Fishery for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient information

- Consultation information was provided to the Pilbara Fish Trawl (Interim) Managed Fishery through WAFIC on 22 October 2025, based on their function, interest, and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence and consultation material sent.
- Commercial Fisher Information Sheet, developed specifically for fisheries, was provided to the Pilbara Fish Trawl (Interim) Managed Fishery on 23 October 2025.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.

Pilbara Trap Managed Fishery

Consultation overview and summary of response on this EP

- In accordance with VOGA's "Fee for Service Agreement" with WAFIC and WAFIC's 'Commercial Fishing Consultation Framework for the Offshore Oil and Gas Sector' WAFIC engaged the licence holders of Pilbara Trap Managed Fishery on behalf of VOGA as their fishing area intersects the operational area and there is expected fishing effort (Record of Consultation, references 3.27).
- On 22 October 2025, VOGA provided WAFIC with consultation information to distribute to licence holders of Pilbara Trap Managed Fishery (SI Report, reference 6.1.1 and Record of Consultation, reference 3.27).
- On 22 October 2025, WAFIC contacted licence holders of Pilbara Trap Managed Fishery to advise of the proposed activity and provided a Consultation Information Sheet and Commercial Fisher Information sheet (SI Report, reference 5.1.1 and Record of Consultation, reference 1.1 and 1.2).
    - The email included an activity summary, directions for providing input into the EP development through consultation, the closing date and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information Sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the Environment That May Be Affected (EMBA) based on a review of publicly available information.

- The Commercial Fisher information sheet included an overview of the proposed activities, key information about the commercial fishing sector, coordinates for operational areas, an activity summary, an assessment of commercial fishing, potential effects and impacts, and VOGA's impact assessment.

- On 25 November 2025, WAFIC emailed VOGA advising that it did not receive any feedback from licence holders on this EP, including from Pilbara Trap Managed Fishery (SI Report, reference 6.1.3).
- On 4 December 2025, VOGA emailed WAFIC thanking them for their advice that there was no feedback from licence holders on this EP, including from Pilbara Trap Managed Fishery (SI Report, reference 6.1.4).

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA accepts that the individual relevant licence holders of the Pilbara Trap Managed Fishery have no comment at this time.	VOGA has consulted DPIRD, WAFIC and individual relevant licence holders via WAFIC. VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA has assessed the relevancy of State fisheries in Section 3.5.1 of this EP. VOGA will notify DPIRD and WAFIC prior to the commencement and at the end of the activity. No additional measures or controls are required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Pilbara Trap Managed Fishery for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient information

- Consultation information was provided to the Pilbara Trap Managed Fishery through WAFIC on 22 October 2025, based on their function, interest, and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence and consultation material sent.
- Commercial Fisher Information Sheet, developed specifically for fisheries, was provided to the Pilbara Trap Managed Fishery on 23 October 2025.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.

West Coast Rock Lobster Managed Fishery

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the West Coast Rock Lobster Managed Fishery by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.45).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
    - The Commercial Fisher Information Sheet included an overview of the proposed activities; key information for the commercial fishing sector about the activities; coordinates for operational areas; an activity summary; assessment of commercial fishing, potential effects and impacts; and VOGA's impact assessment (Record of Consultation, reference 1.2).
- On 13 November 2025, VOGA emailed the West Coast Rock Lobster Managed Fishery following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.29).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 16 December 2025 VOGA emailed West Coast Rock Lobster Managed Fishery and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.25)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked West Coast Rock Lobster Managed Fishery to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

No response was received on this EP despite follow up.	VOGA accepts that the individual relevant licence holders of the West Coast Rock Lobster Managed Fishery have no comment at this time.	VOGA has consulted with West Coast Rock Lobster Managed Fishery. VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA has assessed the relevancy of State fisheries in Section 3.5.1 of this EP. No additional measures or controls are required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with West Coast Rock Lobster Managed Fishery for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient information

- Consultation information was provided to the West Coast Rock Lobster Managed Fishery on 22 October 2025, based on their function, interest, and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence and consultation material sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.

Recreational fishers and marine users and peak representative bodies

WA Game Fishing Association (WAGFA)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the WAGFA by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.32).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.

- On 13 November 2025, VOGA emailed the WAFGA following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.17).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 16 December 2025 VOGA emailed the WAGFA and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.11)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked the WAGFA to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that WAGFA has no comment at this time.	VOGA considers the measures and controls in the EP address WAGFA's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with WAGFA for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to WAGFA on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.

- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding WAGFA of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising WAGFA that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Recfishwest

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised Recfishwest by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.32).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed the Recfishwest following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.17).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 21 November 2025, Recfishwest emailed and thanked VOGA for the information regarding the Environment Plan. (SI Report, reference 7.1.1).
    - The email detailed the importance of recreational fishing in the Pilbara region of Western Australia, including its host of offshore islands, coral reef systems and offshore habitats. It highlighted the importance of recreational fishing on tourism to the region.
    - It also outlined the area being commonly accessed for deepwater fishing by the charter sector and fishers in larger boats.
    - It also asked it be informed as activities progress so it can communicate to the recreational fishing community as required.
- On 9 December 2025, VOGA emailed Recfishwest thanking them for the email and acknowledging their support and offer to review information on recreational within the EP to ensure it is up-to-date and has been accurately captured (SI Report, reference 7.1.2).
    - VOGA confirmed it would provide Recfishwest with notifications for activity updates for planned dates and start timing and exclusion zones.
    - VOGA also thanked Recfishwest for its offer to communicate with the recreational fishing community as required.

- On 9 December 2025, VOGA emailed Recfishwest with a further email confirming that it had included the text provided by Recfishwest regarding the integral part recreational fishing played in the Pilbara. (SI Report, reference 7.1.3).
    - The email also advised that the reference to recreational fishing contributing $190m to the WA economy annually had been removed as a result of the recent changes to demersal fishing in the West Coast bioregion.
- On 6 January 2026, Recfishwest emailed and thanked VOGA for its efforts to update recreational fishing information, however, disagreed with the removal of economic data. (SI Report, reference 7.1.4).
    - The email also clarified the $190m contribution refers specifically to recreational fishing for demersals in the Pilbara bioregion only
    - recent changes to demersal fishing in the West Coast bioregion (Kalbarri to Augusta) does not affect this Pilbara-specific data
    - visitation and expenditure in the Pilbara may actually increase due to the closure elsewhere and recommends keeping the economic information in the EPs.
- On 27 January 2026, VOGA emailed Recfishwest to thank them for their response and advised that they would include the economic information provided in the EPs and provided the text that would be included. (SI Report, reference 7.1.5).

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
Recfishwest provided feedback regarding VOGA's coverage of recreational fishing and asked to be kept informed as activities progress so it can communicate to the recreational fishing community as required.	VOGA accepts Recfishwest's feedback regarding coverage of recreational fishing in this EP.	VOGA provided updated draft for this EP for Recfishwest to review and provide input. VOGA advised it will consider Recfishwest's advice on recreational fishing and acknowledged Recfishwest's offer to communicate with the recreational fishing community as required, and will incorporate it into its EP as appropriate.	No additional EP controls required.
Recfishwest provided feedback regarding VOGA's draft text and economic information on recreational fishing in this EP.	VOGA noted Recfishwest's feedback regarding the draft recreational fishing information.	VOGA accepts Recfishwest's feedback and has considered Recfishwest's advice regarding recreational fishing.	VOGA has incorporated Recfishwest's feedback into Section 3.5.4.1 of the EP.

Recfishwest requested to be notified about the progress of the EP and project to keep the recreational fishing community informed. While feedback has been received, there were no objections or claims on this EP.	VOGA accepts Recfishwest's request to be notified.	VOGA offered to provide activity updates to Recfishwest on start timing and inclusion zones. VOGA engages in ongoing consultation throughout the life of an EP. VOGA notes that further feedback may be received as part of ongoing consultation and where appropriate, VOGA will apply its Management of Change and Revision process (Section 8.8 of the EP).	VOGA has offered to provide notifications to Recfishwest on progress during this EP's activities. VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Recfishwest for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Recfishwest on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.
- VOGA has addressed and responded to Recfishwest over a three-month period.
-

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Recfishwest of the opportunity to provide feedback.

Marine Tourism WA

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised Marine Tourism WA by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.32).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed Marine Tourism WA following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.17).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 16 December 2025 VOGA emailed Marine Tourism WA and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.11)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked Marine Tourism WA to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Marine Tourism WA has no comment at this time.	VOGA considers the measures and controls in the EP address Marine Tourism WA's functions, interests or activities.
Consultation demonstration statement			

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Marine Tourism WA for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Marine Tourism WA on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Marine Tourism WA of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising Marine Tourism WA that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Ashburton Anglers

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the Ashburton Anglers by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.32).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed the Ashburton Anglers following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.17).

- The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.

- On 16 December 2025 VOGA emailed the Ashburton Anglers and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.11)
  - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
  - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
  - VOGA asked the Ashburton Anglers to review previous information and provide any feedback by 24 December 2025.
  - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Ashburton Anglers has no comment at this time.	VOGA considers the measures and controls in the EP address Ashburton Anglers' functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Ashburton Anglers for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Ashburton Anglers on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Ashburton Anglers of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising Ashburton Anglers that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Exmouth Game Fishing Club (EGFC)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the EGFC by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.32).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed the EGFC following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.17).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 16 December 2025 VOGA emailed the EGFC and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.11)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked the EGFC to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that EGFC has no comment at this time.	VOGA considers the measures and controls in the EP address EGFC's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with EGFC for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to EGFC on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding EGFC of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising EGFC that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

King Bay Game Fishing Club (KBFC)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the KBFC by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.32).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed the KBFC following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.17).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 16 December 2025 VOGA emailed the KBFC and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.11)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked the KBFC to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that KBFC has no comment at this time.	VOGA considers the measures and controls in the EP address KBFC's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with KBFC for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to KBFC on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding KBFC of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising KBFC that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Nickol Bay Sportsfishing Club (NBSC)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the NBSC by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.32).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed the NBSC following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.17).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 16 December 2025 VOGA emailed the NBSC and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.11)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked the NBSC to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that NBSC has no comment at this time.	VOGA considers the measures and controls in the EP address NBSC's functions, interests or activities.
Consultation demonstration statement			

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with NBSC for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to NBSC on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding NBSC of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising NBSC that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Pilbara / Kimberley Recreational Marine Users

Consultation overview and summary of response on this EP

- On 27 October 2025, VOGA sent a letter to Pilbara / Kimberley Recreational Marine Users advising of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 3.45 and 1.1).
    - The letter included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information Sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the Environment That May Be Affected (EMBA) based on a review of publicly available information.
- On 13 November 2025, VOGA sent a follow-up letter to Pilbara / Kimberley Recreational Marine Users on the proposed activity (Record of Consultation, reference 4.29 and 1.1).
    - The email included an activity summary, directions for how to provide input to into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Pilbara / Kimberley Recreational Marine Users has no comment at this time.	VOGA considers the measures and controls in the EP address Pilbara / Kimberley Recreational Marine Users' functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Pilbara / Kimberley Recreational Marine Users for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Pilbara / Kimberley Recreational Marine Users on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent follow-up consultation letters on 13 November 2025, reminding Pilbara / Kimberley Recreational Marine Users of the opportunity to provide feedback.

Gascoyne Recreational Marine Users

Consultation overview and summary of response on this EP

- On 27 October 2025, VOGA sent a letter to Gascoyne Recreational Marine Users advising of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 3.46 and 1.1).
  - The letter included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and a link to VOGA's website with additional resources on EP consultation.
  - The Consultation Information Sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the Environment That May Be Affected (EMBA) based on a review of publicly available information.
- On 13 November 2025, VOGA sent a follow-up letter to Gascoyne Recreational Marine Users on the proposed activity (Record of Consultation, reference 4.30).
  - The email included an activity summary, directions for how to provide input to into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Gascoyne Recreational Marine Users has no comment at this time.	VOGA considers the measures and controls in the EP address Gascoyne Recreational Marine Users' functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Gascoyne Recreational Marine Users for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Gascoyne Recreational Marine Users on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent follow-up consultation letters on 13 November 2025, reminding Gascoyne Recreational Marine Users of the opportunity to provide feedback.

Energy industry titleholders and operators

3D Energi Limited

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the 3D Energi Limited by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.28).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed 3D Energi Limited following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.14).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025 VOGA emailed 3D Energi Limited and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.20)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked 3D Energi Limited to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that 3D Energi Limited has no comment at this time.	VOGA considers the measures and controls in the EP address 3D Energi Limited's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with 3D Energi Limited for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to 3D Energi Limited on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding 3D Energi Limited of the opportunity to provide feedback.
- VOGA sent a final consultation email on 18 December 2025, advising 3D Energi Limited that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Beagle No. 1 Pty Ltd / Longreach Capital Investment

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the Beagle No. 1 Pty Ltd / Longreach Capital Investment by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.28).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed Beagle No. 1 Pty Ltd / Longreach Capital Investment following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.14).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025 VOGA emailed Beagle No. 1 Pty Ltd / Longreach Capital Investment and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.20)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked Beagle No. 1 Pty Ltd / Longreach Capital Investment to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Beagle No. 1 Pty Ltd / Longreach Capital Investment has no comment at this time.	VOGA considers the measures and controls in the EP address Beagle No. 1 Pty Ltd / Longreach Capital Investment's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Beagle No. 1 Pty Ltd / Longreach Capital Investment for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Beagle No. 1 Pty Ltd / Longreach Capital Investment on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Beagle No. 1 Pty Ltd / Longreach Capital Investment of the opportunity to provide feedback.

- VOGA sent a final consultation email on 18 December 2025, advising Beagle No. 1 Pty Ltd / Longreach Capital Investment that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

BP Developments Australia

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised BP Developments Australia by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.28).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed BP Developments Australia following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.14).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025 VOGA emailed BP Developments Australia and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.20)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked BP Developments Australia to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the meris	VOGA's statement of response	Details of the measures adopted

No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that BP Developments Australia has no comment at this time.	VOGA considers the measures and controls in the EP address BP Developments Australia's functions, interests or activities.
Consultation demonstration statement			
VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with BP Developments Australia for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically: **Sufficient Information** • Consultation information provided to BP Developments Australia on 22 October 2025 based on their function, interest and activities. • Consultation Information Sheet has been publicly available on the VOGA website since October 2025. **Reasonable period** • A consultation period was noted in the initial consultation correspondence, and consultation material was sent. • Consultation for this EP commenced in October 2025. **Reasonable opportunity** • VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons. • From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA. • VOGA sent a follow-up consultation email on 13 November 2025, reminding BP Developments Australia of the opportunity to provide feedback. • VOGA sent a final consultation email on 18 December 2025, advising BP Developments Australia that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.		
Chevron Australia			
Consultation overview and summary of response on this EP			

- On 11 November 2025, VOGA advised Chevron Australia by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.43).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 25 November 2025, VOGA emailed Chevron following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.27).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025 VOGA emailed Chevron Australia and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.19)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked Chevron Australia to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Chevron Australia has no comment at this time.	VOGA considers the measures and controls in the EP address Chevron Australia functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Chevron Australia for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Chevron Australia on 11 November 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 25 November 2025, reminding Chevron Australia of the opportunity to provide feedback.
- VOGA sent a final consultation email on 18 December 2025, advising Chevron Australia that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Finder No 16 Pty Ltd

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised Finder No 16 Pty Ltd by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.28).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed Finder No 16 Pty Ltd following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.14).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.

- On 18 December 2025 VOGA emailed Finder No 16 Pty Ltd and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.20)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked Finder No 16 Pty Ltd to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Finder No 16 Pty Ltd has no comment at this time.	VOGA considers the measures and controls in the EP address Finder No 16 Pty Ltd's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Finder No 16 Pty Ltd for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Finder No 16 Pty Ltd on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Finder No 16 Pty Ltd of the opportunity to provide feedback.
- VOGA sent a final consultation email on 18 December 2025, advising Finder No 16 Pty Ltd that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

INPEX Browse E&P Pty Ltd

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised INPEX Browse E&P Pty Ltd by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.28).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed INPEX Browse E&P Pty Ltd following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.14).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025 VOGA emailed INPEX Browse E&P Pty Ltd and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.20)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked INPEX Browse E&P Pty Ltd to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that INPEX Browse E&P Pty Ltd has no comment at this time.	VOGA considers the measures and controls in the EP address INPEX Browse E&P Pty Ltd's functions, interests or activities.
Consultation demonstration statement			
VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with INPEX Browse E&P Pty Ltd for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically: **Sufficient Information** • Consultation information provided to INPEX Browse E&P Pty Ltd on 22 October 2025 based on their function, interest and activities. • Consultation Information Sheet has been publicly available on the VOGA website since October 2025. **Reasonable period** • A consultation period was noted in the initial consultation correspondence, and consultation material was sent. • Consultation for this EP commenced in October 2025. **Reasonable opportunity** • VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons. • From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA. • VOGA sent a follow-up consultation email on 13 November 2025, reminding INPEX Browse E&P Pty Ltd of the opportunity to provide feedback. • VOGA sent a final consultation email on 18 December 2025, advising INPEX Browse E&P Pty Ltd that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.		
Jadestone Energy (Australia) Pty Ltd			
Consultation overview and summary of response on this EP			

- On 22 October 2025, VOGA advised Jadestone Energy (Australia) Pty Ltd by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.28).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed Jadestone Energy (Australia) Pty Ltd following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.14).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025 VOGA emailed Jadestone Energy (Australia) Pty Ltd and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.20)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked Jadestone Energy (Australia) Pty Ltd to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Jadestone Energy (Australia) Pty Ltd has no comment at this time.	VOGA considers the measures and controls in the EP address Jadestone Energy (Australia) Pty Ltd's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Jadestone Energy (Australia) Pty Ltd for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Jadestone Energy (Australia) Pty Ltd on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Jadestone Energy (Australia) Pty Ltd of the opportunity to provide feedback.
- VOGA sent a final consultation email on 18 December 2025, advising Jadestone Energy (Australia) Pty Ltd that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Kato Energy (WA) Pty Ltd

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised Kato Energy (WA) Pty Ltd by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.28).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed Kato Energy (WA) Pty Ltd following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.14).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.

- On 18 December 2025 VOGA emailed Kato Energy (WA) Pty Ltd and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.20)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked Kato Energy (WA) Pty Ltd to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Kato Energy (WA) Pty Ltd has no comment at this time.	VOGA considers the measures and controls in the EP address Kato Energy (WA) Pty Ltd's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Kato Energy (WA) Pty Ltd for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Kato Energy (WA) Pty Ltd on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Kato Energy (WA) Pty Ltd of the opportunity to provide feedback.
- VOGA sent a final consultation email on 18 December 2025, advising Kato Energy (WA) Pty Ltd that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Kufpec (Perth) Pty Ltd

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised Kufpec (Perth) Pty Ltd by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.28).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed Kufpec (Perth) Pty Ltd following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.14).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025 VOGA emailed Kufpec (Perth) Pty Ltd and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.20)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked Kufpec (Perth) Pty Ltd to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Kufpec (Perth) Pty Ltd has no comment at this time.	VOGA considers the measures and controls in the EP address Kufpec (Perth) Pty Ltd's functions, interests or activities.
Consultation demonstration statement			
VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Kufpec (Perth) Pty Ltd for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically: **Sufficient Information** • Consultation information provided to Kufpec (Perth) Pty Ltd on 22 October 2025 based on their function, interest and activities. • Consultation Information Sheet has been publicly available on the VOGA website since October 2025. **Reasonable period** • A consultation period was noted in the initial consultation correspondence, and consultation material was sent. • Consultation for this EP commenced in October 2025. **Reasonable opportunity** • VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons. • From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA. • VOGA sent a follow-up consultation email on 13 November 2025, reminding Kufpec (Perth) Pty Ltd of the opportunity to provide feedback. • VOGA sent a final consultation email on 18 December 2025, advising Kufpec (Perth) Pty Ltd that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.		
MEO International Pty Ltd			
Consultation overview and summary of response on this EP			

- On 22 October 2025, VOGA advised MEO International Pty Ltd by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.28).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed MEO International Pty Ltd following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.14).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025 VOGA emailed MEO International Pty Ltd and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.20)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked MEO International Pty Ltd to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that MEO International Pty Ltd has no comment at this time.	VOGA considers the measures and controls in the EP address MEO International Pty Ltd's functions, interests or activities.
Consultation demonstration statement			

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with MEO International Pty Ltd for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to MEO International Pty Ltd on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding MEO International Pty Ltd of the opportunity to provide feedback.
- VOGA sent a final consultation email on 18 December 2025, advising MEO International Pty Ltd that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Mobil Australia Resources Company Pty Limited

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised Mobil Australia Resources Company Pty Limited by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.28).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed Mobil Australia Resources Company Pty Limited following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.14).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.

- On 18 December 2025 VOGA emailed Mobil Australia Resources Company Pty Limited and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.20)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked Mobil Australia Resources Company Pty Limited to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Mobil Australia Resources Company Pty Limited has no comment at this time.	VOGA considers the measures and controls in the EP address Mobil Australia Resources Company Pty Limited's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Mobil Australia Resources Company Pty Limited for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Mobil Australia Resources Company Pty Limited on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Mobil Australia Resources Company Pty Limited of the opportunity to provide feedback.
- VOGA sent a final consultation email on 18 December 2025, advising Mobil Australia Resources Company Pty Limited that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Santos Offshore Pty Ltd

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised Santos Offshore Pty Ltd by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.28).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed Santos Offshore Pty Ltd following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.14).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025 VOGA emailed Santos Offshore Pty Ltd and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.20)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked Santos Offshore Pty Ltd to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.
- On 13 January 2026, Santos emailed VOGA and confirmed it has no objections or claims in relation to the planned activity. (SI Report, reference 8.1.1).

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted
Santos Offshore Pty Ltd reported it had no concerns with the activities associated with the EP. Whilst feedback has been received, there were no objections or claims.	VOGA engages in ongoing consultation throughout the life of an EP. VOGA notes that further feedback may be received as part of ongoing consultation and where appropriate, VOGA will apply its Management of Change and Revision process (Section 8.8 of the EP).	VOGA notes Santos Offshore Pty Ltd has advised it has no comments on the proposed activities under this EP.	VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Santos Offshore Pty Ltd for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Santos Offshore Pty Ltd on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.

- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Santos Offshore Pty Ltd of the opportunity to provide feedback.
- VOGA sent a final consultation email on 18 December 2025, advising Santos Offshore Pty Ltd that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Shell Australia Pty Ltd

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised Shell Australia Pty Ltd by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.28).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed Shell Australia Pty Ltd following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.14).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025 VOGA emailed Shell Australia Pty Ltd and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.20)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked Shell Australia Pty Ltd to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Shell Australia Pty Ltd has no comment at this time.	VOGA considers the measures and controls in the EP address Shell Australia Pty Ltd's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Shell Australia Pty Ltd for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Shell Australia Pty Ltd on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Shell Australia Pty Ltd of the opportunity to provide feedback.
- VOGA sent a final consultation email on 18 December 2025, advising Shell Australia Pty Ltd that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Western Gas (474 P) Pty Ltd

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised Western Gas (474 P) Pty Ltd by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.28).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed Western Gas (474 P) Pty Ltd following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.14).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025 VOGA emailed Western Gas (474 P) Pty Ltd and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.20)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked Western Gas (474 P) Pty Ltd to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Western Gas (474 P) Pty Ltd has no comment at this time.	VOGA considers the measures and controls in the EP address Western Gas (474 P) Pty Ltd's functions, interests or activities.
Consultation demonstration statement			

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Western Gas (474 P) Pty Ltd for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Western Gas (474 P) Pty Ltd on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Western Gas (474 P) Pty Ltd of the opportunity to provide feedback.
- VOGA sent a final consultation email on 18 December 2025, advising Western Gas (474 P) Pty Ltd that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Woodside Energy (Australia) Pty Ltd

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised Woodside Energy (Australia) Pty Ltd by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.28).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 23 October 2025, Woodside Energy (Australia) Pty Ltd emailed VOGA and reported no concerns with the activities associated with the EP (SI Report, reference 8.2.1).
- On 23 October 2025, Woodside Energy (Australia) Pty Ltd emailed VOGA and to provide a correction and updated email (SI Report, reference 8.2.2)
- On 24 October 2025, VOGA emailed Woodside Energy (Australia) Pty Ltd and thanked it for its response (SI Report, reference 8.2.3).

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted
Woodside Energy (Australia) Pty Ltd reported it had no concerns with the activities associated with the EP. Whilst feedback has been received, there were no objections or claims.	VOGA engages in ongoing consultation throughout the life of an EP. VOGA notes that further feedback may be received as part of ongoing consultation and where appropriate, VOGA will apply its Management of Change and Revision process (Section 8.8 of the EP).	VOGA notes Woodside Energy (Australia) Pty Ltd has advised it has no comments on the proposed activities under this EP.	VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Woodside Energy (Australia) Pty Ltd for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Woodside Energy (Australia) Pty Ltd on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.

Peak industry representative bodies and associations			
Australian Energy Producers (AEP)			
Consultation overview and summary of response on this EP			

• On 22 October 2025, VOGA advised the Australian Energy Producers by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.29).
  ○ The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
  ○ The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
• On 13 November 2025, VOGA emailed AEP following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.15).
  ○ The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
• On 18 December 2025 VOGA emailed Australian Energy Producers and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.18)
  ○ The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
  ○ Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
  ○ VOGA asked the Australian Energy Producers to review previous information and provide any feedback by 24 December 2025.
  ○ VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.			

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**

No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Australian Energy Producers has no comment at this time.	VOGA considers the measures and controls in the EP address Australian Energy Producers' functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Australian Energy Producers for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Australian Energy Producers on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Australian Energy Producers of the opportunity to provide feedback.
- VOGA sent a final consultation email on 18 December 2025, advising Australian Energy Producers that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Infrastructure operators

Vocus Communications

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised Vocus Communications by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.30).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 23 October 2025, Vocus Communications emailed VOGA to thank them for their email and to confirm that they had no comment on this EP due to the distance from Vocus' operations (SI Report, reference 10.1.1).
- On 24 October 2025, VOGA emailed Vocus Communications to thank them for their response and advice (SI Report, reference 10.1.2).

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
Vocus Communications reported it had no concerns with the activities associated with the EP. Whilst feedback has been received, there were no objections or claims.	VOGA engages in ongoing consultation throughout the life of an EP. VOGA notes that further feedback may be received as part of ongoing consultation and where appropriate, VOGA will apply its Management of Change and Revision process (Section 8.8 of the EP).	VOGA notes Vocus Communications has advised it has no comments on the proposed activities under this EP.	VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Vocus Communications for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Vocus Communications on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.

- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.

Traditional Custodians and First Nations nominated representative corporations

Buurabalayji Thalanyji Aboriginal Corporation (BTAC)

Historical and ongoing engagement

VOGA has been in engagement with BTAC since October 2024, prior to the consultation on this EP below. VOGA maintains an ongoing engagement with BTAC in addition to the consultation on this EP below. A summary and current status of these engagements can be found at Appendix F, Summary of Ongoing Engagement, reference 1.4.3.

Consultation overview and summary of response on this EP

- On 25 August 2025, VOGA emailed BTAC advising of upcoming consultation in the Wandoo Offshore Field for the Wandoo Facility EP and another EP (Record of Consultation, reference 2.6).
    - VOGA advised that consultation with BTAC regarding these activities is welcome and it wanted to arrange a meeting during September – November to discuss the EP.
    - VOGA noted the EP revision was part of a standard five-year review of existing operations (not a new project) and are intended to reassess environmental risks and management measures, with an opportunity for stakeholder input including cultural heritage considerations.
- On 21 October 2025, VOGA emailed BTAC advising of proposed activities and consultation on this EP. VOGA provided a Summary Information Sheet and a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.1).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date, and a link to VOGA's website with additional resources on EP consultation.
    - VOGA advised it recognised the importance of cultural heritage to Native Title Holders and was committed to integrating these values into their environmental planning.
    - VOGA believes BTAC is relevant for consultation and invited them to participate in the process.
    - VOGA proposed a meeting to discuss the proposed activities, seek input, and engage in consultation.
    - VOGA provided information on confidentiality and the ability to opt out of the consultation.
    - VOGA attached a map of the native title determination in respect to location of operations and EMBA for this EP (Record of Consultation, reference 3.1.1).
    - VOGA asked that the matter be brought to the attention of the appropriate representatives from BTAC.
    - VOGA provided background to its knowledge of advice from BTAC about consultation and that a meeting had previously been discussed but hadn't progressed.

- On 7 November 2025, VOGA emailed BTAC following up on the previous email seeking confirmation from BTAC if it would like to be consulted on the EP (SI Report, reference 11.1.1).
- On 7 November 2025, BTAC emailed to confirm that the board had previously adopted the position that it is a relevant organisation for the EP and advised that it will propose a meeting date in due course (SI Report, reference 11.1.2).
- On 11 November 2025, VOGA emailed BTAC confirming receipt of its email and advised it would await further advice (SI Report, reference 11.1.3).
- On 10 December 2025, VOGA emailed BTAC following up on potential meeting dates, asked whether the proposed meeting would be in person or a virtual meeting and advised that the consultation period would be open until 17 February 2025 (SI Report, reference 11.1.4).
- On 21 January 2026, VOGA emailed BTAC following up on its previous email seeking a suitable time to meet with the BTAC board prior to the 17 February 2026, and if this timing did not suit, VOGA is still keen to progress a meeting at the next available opportunity (SI Report, reference 11.1.5).
- Between 28 January 2026 and 6 February 2026 VOGA and BTAC exchanged emails and administrational details to arrange the meeting on 16 February 2026. (SI Report, references 11.1.6 – 11.1.15).
- On 5 February 2026, VOGA emailed BTAC the agenda in advance of the meeting for BTAC's input (SI Report, reference 11.1.11).
- On 12 February 2026, VOGA emailed BTAC advising that they would like to offer an additional agenda item (not relevant to this EP) and provide an overview of an operational incident on 11 December 2025 (SI Report, reference 11.1.16).
- On 13 February 2026, VOGA emailed BTAC and attached the proposed presentation and consultation information previously sent for the meeting on 16 February 2026 (SI Report, reference 11.1.17).
- On 16 February 2026, VOGA met with BTAC Directors in Perth for an introductory consultation meeting to seek input on the Wandoo Facility EP and another EP and start discussion on any ongoing consultation matters (SI Report, reference 11.1.18 and 11.1.19).
    - VOGA provided an overview of the Wandoo Field location and facilities, including its history, current operations and how production and offtake occur.
    - VOGA outlined the purpose of the meeting, confirming it intended to:
        - Introduce the proposed EPs.
        - Understand BTAC's preferred approach to engagement.
        - Identify any priorities BTAC wants reflected in ongoing consultation.
    - VOGA explained the differences between two other EPs, the Exploration Drilling EP and the Well Construction EP.
    - VOGA showed an EMBA figure for the EPs with respect to BTAC native title determination.
    - VOGA provided an overview of the Wandoo Facility EP and another EP
    - VOGA explained the location and timing of the activity and provided examples of similar well construction activities.
    - BTAC asked whether feasibility studies had been completed for drilling locations. VOGA confirmed that initial seismic studies were completed previously and that existing seismic data and modelling are used for planning.
    - BTAC providing feedback and noted a culturally significant island within the Thalanyji determination area and additional significant coastal sites. BTAC advised it will not provide sensitive site details, but requested the EP record that BTAC is to be contacted during an incident to coordinate community activation and support protection of culturally significant areas.
        - BTAC sought further visibility of what has been recorded in the EP regarding Aboriginal heritage considerations. VOGA outlined how this information is recorded and offered to share extracts of the EP, which BTAC confirmed it wanted to receive.

- As part of the ongoing engagement, VOGA discussed oil spill mitigation and response.
    - VOGA discussed scenario planning and EMBAs, and provided an overview of preparedness and response measures, with a focus on shoreline response and oiled wildlife.
    - VOGA explained how coastal information is gathered during a spill and how consultation seeks Traditional Owner input on priority areas to guide response strategies (including dugong foraging areas).
    - VOGA outlined response planning and capability, including how Traditional Owners can support protecting important areas (DTMI “no-go” mapping and incident input), and walked through response options/resources (e.g., booms/dispersants; local and overseas aviation/maritime).
- BTAC asked questions, including:
    - BTAC asked whether there is scope for involvement in emergency response measures and incident exercises. VOGA confirmed it would explore this further and incorporate relevant priorities into the EP.
    - BTAC asked whether AMOSC supports VOGA. VOGA confirmed its engagement.
    - BTAC wants to be engaged early “day one” in spill planning/response and is seeking ranger training and exercise opportunities to support on-ground protection of culturally significant coastal areas.
    - BTAC noted it has progressed heritage review and cultural mapping of priority coastal areas and intends to share outcomes with operators. BTAC asked whether VOGA could fund this work. VOGA indicated a preference for an industry-level, government-led approach rather than funding individual organisation programs.
    - BTAC noted challenges engaging DoT/DTMI but is advocating for Traditional Owner ranger program input at an industry level. BTAC said AMOSC is keen to lead the initiative and emphasised early involvement to manage access constraints.
- VOGA discussed the December CALM Buoy incident as part of the ongoing engagement.
    - VOGA gave an overview of the incident, explained the response and actions, the current status of the incident, future plans and next steps.
- BTAC asked questions, including:
    - BTAC raised questions about ageing asset integrity, including what is “normal” for ageing facilities and how integrity is assessed. VOGA outlined maintenance cycles, recent major maintenance shutdowns, replacement of export system components, and use of corrosion-resistant materials to reduce future leak potential.
    - BTAC asked whether the incident changes VOGA’s risk profile for previously submitted EPs and current EP revisions. VOGA advised preparedness is designed around worst-case scenarios that exceed the recent incident, and that response planning remains focused on higher-consequence events.
- VOGA confirmed it would provide relevant EP extracts and Aboriginal heritage content and share an action list for the ongoing engagement around traditional owner involvement and input to priority protection planning.
- VOGA will continue to engage with BTAC on matters arising as part of the ongoing consultation and as part of ongoing engagement.

- On 17 February 2026, VOGA emailed BTAC to thank them for meeting and requesting confirmation of the names and positions of the attendees at the meeting (SI Report, reference 11.1.20).
- On 17 February 2026, BTAC emailed VOGA and provided the names and positions of all the attendees and advised it would soon provide EP feedback (SI Report, reference 11.1.21).
- On 19 February 2026, VOGA emailed BTAC with a summary of the meeting actions and noted the key aspects of their discussion for ongoing engagement (SI Report, reference 11.1.22).
- On 19 February 2026, VOGA emailed BTAC to notify them of the last opportunity to provide feedback for this EP and that it intends to submit the EP, with the formal consultation period having closed on 17 February 2026 and inviting final comments by 20 February 2026 (SI Report, reference 11.3.23).
    - The email summarised consultation undertaken since August 2025, including the most recent meeting on 16 February 2026 in Perth.
    - VOGA acknowledged BTAC's key interests, including identification of cultural values to inform planning and priority protection measures, early engagement of Traditional Owners in incident response, recognition of access limitations to culturally significant areas, and appropriate handling of sensitive information.
    - The correspondence noted BTAC's progression of coastal heritage mapping to identify culturally significant priority areas, and its intention to coordinate community activation in the event of an incident rather than disclose culturally sensitive site information.
    - VOGA acknowledged BTAC's interest in involvement of Thalanyji rangers in emergency response, including participation in training and exercises, and noted ongoing engagement on these matters.
    - VOGA noted BTAC's cultural duty to protect Country and confirmed this has been documented in the EP.
    - VOGA confirmed that questions raised regarding operational risk management of the ageing facility had been addressed and that it considered there were no outstanding information requests.
    - BTAC was invited to provide any final feedback by 20 February 2026, with advice on how feedback would be handled.
- On 20 February 2026, BTAC emailed VOGA and attached a Cost Recovery document which included information about BTAC's functions interests and activities (SI Report, reference 11.1.24). The letter outlined:
    - Proposed consultation arrangements and cost recovery terms between BTAC and Vermilion in relation to Environment Plans for the Wandoo oil field and related activities that may impact Thalanyji Country.
    - Vermilion to consult primarily through BTAC's Energy Project Working Group (EPWG), with escalation to the Board or common law holders where required.
    - Thalanyji Country includes determined land, claim areas and broader sea country extending offshore (including Monte Bello Islands, Barrow Island and surrounding areas within ~150km of the Ashburton River mouth).
    - Thalanyji People maintain cultural and spiritual connections to land and waters, including offshore areas, and undertake activities there.
    - BTAC acts as representative for Thalanyji People in relation to proposed activities that may pose risks to interests or activities within Thalanyji Country.
    - BTAC asserts it is a relevant organisation for consultation where the operational area or EMBA of an EP intersects Thalanyji Country
    - Its position is stated to be consistent with Federal Court authority and NOPSEMA guidance recognising that Aboriginal interests may extend beyond determined native title to broader sea country values and cultural connections.
- On 20 February 2026, BTAC emailed VOGA to advise that BTAC has further comments in respect of the EP and would aim to provide comment by close of business Monday 23 February 2026 (SI Report, reference 11.1.25).
- On 23 February 2026, VOGA acknowledged BTAC's intention to provide additional feedback, asked whether feedback could still be provided by close of business, and noted that the Cost Acceptance letter had been received and was under review (Sensitive Information Report, reference 11.1.26)

• On 23 February 2026 BTAC emailed VOGA to offer feedback and raise additional questions as part of the ongoing engagement (not relevant to this EP) (SI Report, reference 11.1.27). • BTAC set out why it considers itself a relevant organisation for consultation, explaining that Thalanyji people have a cultural connection to land and waters inside a general radius of 150km from the mouth of the Ashburton River, and that the EMBAs for all three EPs overlap with this area. • BTAC asked how Thalanyji cultural, ecological and livelihood values have been incorporated into worst-case risk modelling. • BTAC asked if any cultural heritage mapping has taken place across the broader EMBA, and whether intangible cultural values have been factored into risk assessment. • BTAC asked what cumulative impacts production, exploration and drilling have on sea country, and how these impacts will be monitored and responded to. • On 24 March 2026, VOGA emailed BTAC to provide its written response to the issues raised in BTAC's previous correspondence. The email attached a letter addressing BTAC's concerns regarding an additional agenda item not relevant to this EP (Sensitive Information Report, reference 11.1.28) • VOGA said it recognised that Thalanyji cultural and spiritual connection extends beyond the boundaries of native title determination areas, and that cultural values shared through consultation will be considered in future EP cultural impact assessments. • VOGA said it had not undertaken cultural mapping but welcomed BTAC's cultural mapping project as a potential input to future EPs and would seek BTAC's guidance for handling of such information.			
Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
• BTAC stated it is the Registered Native Title Body Corporate (RNTBC) for the Thalanyji People and represents the Thalanyji/Nhuwala claim group. • BTAC advised it should be consulted as a relevant person where an EP operational area or EMBA intersects Thalanyji Country. • BTAC confirmed that consultation should occur through its established governance structures. • BTAC noted that common law holders or broader groups may need to be	BTAC's status as RNTBC and representative body establishes it as a relevant person. The EMBA intersect areas identified by BTAC as Thalanyji Country.	• VOGA recognises BTAC as a relevant person for consultation in respect of this EP. • VOGA has and will continue consultation through BTAC's nominated representatives and governance structures. • Where requested, VOGA will engage with broader governance structures as advised by BTAC.	• BTAC has been recorded in the EP as a relevant person. • Consultation has been undertaken directly with BTAC in accordance with its governance framework. • Cultural and heritage values and sensitivities, including Sea Country, are described in Section 3.7.6 of the EP.

consulted where formal decisions are required.			
• BTAC identified a culturally significant island and other important coastal sites within Thalanyji Country. • BTAC advised it will not provide sensitive site information due to cultural confidentiality. • BTAC requested that the EP explicitly require BTAC to be contacted in the event of an incident to support protection of cultural heritage values during spill response or other emergency activities.	The request aligns with best practice for Traditional Owner involvement, respects cultural confidentiality, and is directly relevant to spill response planning.	VOGA has agreed to incorporate a commitment in the EP to notify and consult BTAC as soon as practicable in the event of a spill or reportable incident with potential to affect Thalanyji Country. The EP recognises the cultural significance of relevant islands and coastal areas without disclosing sensitive site-specific information. VOGA has provided BTAC an excerpt of this information documented in the EP. VOGA will continue to engage with BTAC to support culturally informed response arrangements where required.	• Thalanyji cultural values and interests have been recorded in Section 3.7.6 (Table 3-18) of the EP. • A notification commitment has been included in the EP, requiring contact with BTAC in the event of an incident that may impact Thalanyji Country (Section 7, Table 7.2, CM-11.20) (Section 9.4.11, Table 9-6).
• BTAC outlined that Thalanyji Country extends beyond determined native title areas to include broader sea country, offshore islands and surrounding waters. • BTAC noted that cultural and spiritual connections extend to offshore areas (including islands).	• NOPSEMA guidance recognises that Aboriginal interests may extend beyond formal native title determinations. • It is appropriate to consider broader sea country values when assessing potential impacts.	VOGA has considered Thalanyji sea country values in defining the consultation scope and in assessing potential impacts. The EP acknowledges cultural connections to offshore areas within and proximate to the planning area.	Cultural and heritage values relevant to offshore islands and surrounding waters are described in Section 3.7.6 of the EP. Impact and risk assessments consider potential effects on Sea Country values within the EMBA are assessed in Section 5.13.3.1 of the EP.
BTAC sought transparency for how Aboriginal Heritage considerations are documented in the EP.	Transparency supports accuracy and trust and is directly relevant to providing accurate information in the EP.	VOGA agreed to provide extracts of the EP relating to Thalanyji cultural values and interests. VOGA emailed BTAC with an extract of what has been recorded in the EP.	VOGA has provided BTAC an excerpt of the EP from Section 3.7.6, Table 3-18.

BTAC was willing to share outcomes of its heritage review and cultural mapping, and asked if VOGA could fund this work.	Funding of individual programs is outside EP consultation scope and may create inequity across other relevant persons.	VOGA expressed a preference for a government-led, industry-wide approach to heritage mapping rather than individual operator funding. VOGA will continue to engage with BTAC as part of ongoing consultation to receive input to the planning process.	Not required.
BTAC questioned whether the incident changes VOGA's risk profile for existing or upcoming EPs**.**	VOGA supports that this relates to BTAC's understanding of risk management.	VOGA confirmed that EP preparedness is based on worst□case scenarios that exceed the incident and that the risk profile for another EP remains unchanged.	Not required.
Expectation of early and active involvement in spill planning, response, and exercises. Interest in ranger capability development and participation in emergency response. Emphasis on priority coastal area protection, informed by Traditional Owner knowledge.	The request reflects a legitimate interest in ensuring culturally informed spill preparedness and response.	VOGA supports early as practical engagement with BTAC in relation to oil spill contingency planning relevant to Thalanyji Country. VOGA acknowledges BTAC's interest in ranger capability development and will continue discussions s part of ongoing engagement regarding how local knowledge may inform response planning and prioritisation strategies.	Section 3.7.6, Table 3-18 of the EP has been updated to reflect consultation outcomes and BTAC's interest in culturally informed spill preparedness.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with BTAC for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided BTAC on 21 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.
- A Summary Consultation Information Sheet, developed specifically for First Nations groups, was provided to BTAC on 21 October 2025.
- Maps were provided showing the location and EMBA in relation to relevant native title determination.
- BTAC has shown an understanding of the proposed activity during an in-person meeting held with VOGA on 16 February 2026 where VOGA gave a presentation and provided supplementary information, including an overview of this EP.

- VOGA responded to questions at the meeting about the activity, and BTAC indicated to VOGA that they did not have any objections or claims that required addressing.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in August 2025.
- Follow up emails were sent in November 2025 and on 10 December 2025 and 19 February 2026 advising of the consultation period.
    - BTAC responded on 7 November 2025 noting the consultation period until February 2026.
- VOGA has addressed and responded to BTAC over a six-month period.
- VOGA has provided BTAC with more than six months to consult ahead of preparing the EP for submission and continues to take feedback in relation to the EP.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA has sent follow-up consultation emails and made phone calls, reminding BTAC of the opportunity to provide feedback.
- VOGA has had a face-to-face meeting with BTAC representatives and directors to discuss this EP.
- VOGA asked for BTAC's input on how BTAC would like to engage in consultation and has consulted in a way it understands is appropriate for First Nations groups. BTAC advised it prefers meetings to take place in person and VOGA has met with BTAC in person.
- VOGA sent an email to BTAC advising of its intent to submit the EP and prompted BTAC to provide any final feedback by 20 February 2026. This correspondence included a summary of cultural values and interests recorded in the EP in Section 3.7.6 that BTAC had raised during consultation and from publicly available literature, providing BTAC the opportunity to review the information and provide any final feedback.

Kariyarra Aboriginal Corporation (KAC)

Historical and ongoing engagement

VOGA has been in engagement with KAC since October 2024, prior to the consultation on this EP below. VOGA maintains an ongoing engagement with KAC in addition to the consultation on this EP below. A summary and current status of these engagements can be found at Appendix F, Summary of Ongoing Engagement, reference 1.4.3.

Consultation overview and summary response on this EP

- On 25 August 2025, VOGA emailed KAC advising of upcoming consultation in the Wandoo Offshore Field for the Wandoo Facility EP and another EP (Record of Consultation, reference 2.2).
    - VOGA advised that consultation with KAC regarding these activities is welcome and it wanted to arrange a meeting during September – November to discuss the EP.
    - VOGA noted the EP revision was part of a standard five-year review of existing operations (not a new project) and are intended to reassess environmental risks and management measures, with an opportunity for stakeholder input including cultural heritage considerations.
- On 26 August 2025 KAC emailed VOGA and provided potential dates for an upcoming meeting (SI Report, reference 11.3.1).
- Between 1 September and 2 September 2025 VOGA and KAC exchanged emails and administrational details to arrange the meeting on 6 October 2025 (SI Report, references 11.3.2 to 11.3.12).
- On 2 October 2025 VOGA emailed KAC the agenda in advance of the meeting for KAC's input, as well as the presentation, information sheets and a map (SI Report, reference 11.3.13).
- On 3 October 2025, VOGA and KAC exchanged emails to prepare the administrational aspects of the meeting including advance copies of consultation materials (SI Report, reference 11.3.14 to 11.3.17).
- On 6 October 2025, VOGA met with the KAC Board of Directors and its CEO and staff. This was the third meeting held with KAC to discuss ongoing consultation matters, with an agenda item included for consultation on another Environment Plan (SI Report, reference 11.3.18 and 11.3.18).
    - VOGA provided a presentation with background on the Wandoo Field and consultation to date, outlining the next steps for consultation with KAC.
    - VOGA highlighted KAC priorities raised in previous consultation, which include:
        - Cultural duty to protect Country.
        - Interest in emergency response procedures.
        - Interest in building community awareness and a formalinizing consultation arrangement.
        - Progressing discussion on ranger program collaboration.
    - VOGA provided an overview of the Wandoo Facility EP and another EP:
        - VOGA outlined what another EP covers, including where/when the activity would occur (timing driven by rig availability).
        - VOGA explained the drilling process and new vs existing wells, including how it can access new parts of the reservoir.
    - KAC raised several questions about the Wandoo Facility EP and another EP:
        - KAC asked about the lifespan of Wandoo. VOGA confirmed its currently to 2035-2036.
        - KAC asked what the process was for introducing new wells vs retiring others. VOGA explained the drilling process and how it can help unlock new areas of the reservoir.
        - KAC asked about decommissioning plans. VOGA explained the facility structure, noting it is still figuring out the best way to manage decommissioning
        - KAC asked about access for fishing. VOGA discussed the exclusion zone for recreational fishers and that leaving infrastructure in could be theoretically beneficial as an artificial reef.
    - KAC then asked questions about the operations more generally:

        - KAC asked about platform staffing. VOGA explained their safety obligations
        - KAC asked whether Traditional Owners are involved in environmental monitoring. VOGA explained its obligations to notify Traditional Owners of breaches/incidents and that consultation is used to capture Traditional Owner knowledge, so important areas can be documented and protected in response planning.
        - KAC raised concerns about sharing culturally sensitive information (IP), including how it is stored/used, and what information can/cannot be shared due to Lore; noting caution shaped by past experiences with regulatory/state processes (including maritime jurisdiction). VOGA noted this concern.
    - In response to oil spill prevention discussions as part of VOGA and KAC's ongoing consultation, KAC raised several questions, including:
        - KAC's raised concerns with how priorities are determined in the spill response decision matrix. VOGA reiterated consultation is intended to capture Kariyarra priorities to inform response strategies and protection planning.
        - VOGA confirmed Traditional Owner input can inform GIS/shoreline segmentation used in tactical response planning.
        - KAC provided an example of culturally important hunting and gathering areas and asked how this information could be protected in a spill scenario, and how this sits in regard to maritime jurisdiction.
        - KAC stated it wants the capability to act on its own priorities (if sensitive) and if areas are designated non-priority under broader response arrangements. VOGA suggested sensitive information may be more appropriately retained with nominated rangers rather than broadly provided to government/industry.
        - KAC is interested to know how much funding it would get from operators to do this. VOGA explained the role of AMOSC in managing major response capability and suggested an approach beginning with formal completion of training (DOT).
    - VOGA will continue to engage with KAC on matters arising as part of the ongoing consultation; as part of ongoing engagement.
- On 21 October 2025, VOGA emailed KAC advising of proposed activities on this EP. VOGA provided a Summary Information Sheet and a link to a Consultation Information Sheet on its website (Record of Consultation, reference 1.1 and 3.2).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date, and a link to VOGA's website with additional resources on EP consultation.
        - VOGA advised it recognised the importance of cultural heritage to Native Title Holders and was committed to integrating these values into their environmental planning.
        - VOGA believes KAC is relevant for consultation and invited them to participate in the process.
    - VOGA proposed a meeting to discuss the proposed activities, seek input, and engage in consultation.
    - VOGA provided information on confidentiality and the ability to opt out of the consultation.
    - VOGA attached a map of the native title determination in respect to location of operations and EMBA for this EP (Record of Consultation, reference 3.1.1).
- On 18 February 2026, VOGA emailed KAC to notify them of the last opportunity to provide feedback for this EP and that it intends to submit the EP, with the formal consultation period having closed on 17 February 2026 and inviting final comments by 20 February 2026 (SI Report, reference 11.3.20).
    - The email summarised consultation undertaken since August 2025, including written correspondence (25 August and 21 October 2025) and the in-person meeting held in South Hedland on 6 October 2025.

○ VOGA acknowledged KAC's key interests, including incorporation of Kariyarra cultural values into spill response planning, determination of priority protection areas, appropriate handling of culturally sensitive information, co-protection of Country in the event of a spill, ranger capability building, and interest in operational matters such as field lifespan and decommissioning. ○ VOGA noted KAC's cultural duty to protect Country and confirmed that relevant cultural values and interests, including On Country access, tangible heritage sites and broader cultural connections, have been documented in the EP. ○ VOGA confirmed that questions raised during consultation on the EP had been addressed and that it considered there were no outstanding information requests. ○ KAC was invited to provide any final feedback by 20 February 2026, with advice on how feedback would be handled.			
Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
KAC has a Cultural duty to protect Country and expectation that this be recognised in VOGA's planning.	Relevant to identifying environment that may be affected and to informing culturally appropriate risk management.	VOGA has accepted KAC's cultural duty and recognised this in the EP. VOGA has provided KAC an excerpt of this documentation in the EP.	Cultural values and interests recorded in the EP in Section 3.7.6, Table 3-18.

Interest in emergency response procedures, including how spill priorities are determined. Concern regarding the industry and government spill response priority decision matrix and protection of culturally important areas. Concerns about sharing culturally sensitive information (IP), storage and use. Interest in capability to act on own priorities and funding to do so.	Relevant to impact assessment and response strategy; aligns with requirement to consult on potential impacts and management measures. Relevant to spill response planning and protection priorities. Material to consultation integrity and handling of sensitive heritage information; relevant to confidentiality provisions. Response capability and funding arrangements fall outside EP consultation scope.	Confirmed consultation is intended to capture Traditional Owner priorities to inform response strategies and protection planning. Confirmed Traditional Owner input can inform GIS/shoreline segmentation and tactical response planning. Noted concerns; advised sensitive information may be retained with nominated rangers rather than broadly shared. Explained AMOSC framework for response capability and suggested training pathway; did not commit to providing training or funding. VOGA will continue to engage with KAC on this topic as part of ongoing engagement.	Cultural values recorded in Section 3.7.6, Table 3-18, without disclosure of sensitive details. Considered as part of oil spill preparedness planning; no additional measures in this EP are required. Additional measures may be included to the OPEP as part of ongoing engagement.
Interest in progressing ranger program collaboration. Interest in building community awareness around oil spill preparation and response.	Ranger program collaboration and community awareness supports effective consultation but not to inform EP control measures.	Noted and confirmed as part of ongoing engagement. Provided a draft information document for the community as part of ongoing engagement.	Not required.
Questions regarding: • introduction of new wells vs retirement of existing wells. • access for fishing and exclusion zones.	Relevant to understanding scope of activity; explanatory in nature.	Explained drilling process and reservoir access; clarified scope of another EP. Explained exclusion zone requirements and noted theoretical reef effect of infrastructure.	Not required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with KAC for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to KAC on 21 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.
- A Summary Consultation Information Sheet, developed specifically for First Nations groups, was provided to KAC on 21 October 2025.
- Maps were provided showing the location and EMBA in relation to the native title determination.
- KAC has shown an understanding of the proposed activity during an in person meeting held with VOGA on 6 October 2025 where VOGA gave a presentation and provided supplementary information, including an overview of this EP.
- VOGA responded to questions at the meeting, and KAC indicated to VOGA that they did not have any objections or claims that required addressing.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in August 2025.
- Follow up emails were sent on 21 October 2025 and 18 February 2026 advising of the consultation period.
- VOGA has addressed and responded to KAC over a six-month period.
- VOGA has provided KAC with more than six months to consult ahead of preparing the EP for submission and continues to take feedback in relation to the EP.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA has sent follow-up consultation emails and phone calls, reminding KAC of the opportunity to provide feedback.
- VOGA has had a face-to-face meeting with the CEO and the KAC board of directors to discuss this EP.
- VOGA asked for KAC's input on how KAC would like to engage in consultation and has consulted in a way it understands is appropriate for First Nations groups.

- VOGA sent an email to KAC advising of its intent to submit the EP and prompted KAC to provide any final feedback by 20 February 2026. This correspondence included a summary of cultural values and interests recorded in the EP in Section 3.7.6 that KAC had raised during consultation and from publicly available literature, providing KAC the opportunity to review the information and provide any final feedback.

Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC), Yinggarda Aboriginal Corporation

Historical and ongoing engagement

VOGA has been in engagement with NTGAC October 2024, prior to the consultation on this EP below. VOGA maintains an ongoing engagement with NTGAC in addition to the consultation on this EP below. A summary and current status of these engagements can be found at Appendix F, Summary of Ongoing Engagement, reference 1.4.3.

Consultation overview and summary of response on this EP

- On 25 August 2025, VOGA emailed NTGAC advising of upcoming consultation in the Wandoo Offshore Field for the Wandoo Facility EP and another EP (Record of Consultation, reference 2.7).
    - VOGA advised that consultation with NTGAC regarding these activities is welcome and it wanted to arrange a meeting during September – November to discuss the EP.
    - VOGA noted the EP revision was part of a standard five-year review of existing operations (not a new project) and are intended to reassess environmental risks and management measures, with an opportunity for stakeholder input including cultural heritage considerations.
- On 21 October 2025, VOGA emailed NTGAC advising of proposed activities on this EP. VOGA provided a Summary Information Sheet and a link to a Consultation Information Sheet on its website (Record of Consultation, reference 1.1 and 3.3).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date, and a link to VOGA's website with additional resources on EP consultation.
        - VOGA advised it recognised the importance of cultural heritage to Native Title Holders and was committed to integrating these values into their environmental planning.
        - VOGA believes NTGAC is relevant for consultation and invited them to participate in the process.
    - VOGA proposed a meeting to discuss the proposed activities, seek input, and engage in consultation.
    - VOGA provided information on confidentiality and the ability to opt out of the consultation.
    - VOGA attached a map of the native title determination in respect to location of operations and EMBA for this EP (Record of Consultation, reference 3.3.1).
- On 10 December 2025, VOGA emailed the NTGAC engagement team to follow up on consultation information provided on 21 October 2025.
    - VOGA sought clarification on NTGAC's preferred consultation format, including whether NTGAC wished to arrange a meeting within the consultation period, and invited proposed dates (Record of Consultation, reference 5.23).
    - The correspondence confirmed that the formal consultation period was open until 17 February 2026
- On 17 February 2026, VOGA emailed NTGAC to notify them of the last opportunity to provide feedback for this EP noting the formal consultation period had closed on 17 February 2026 and inviting any final comments by 20 February 2026 (SI Report, reference 11.6.1).

- The email summarised consultation undertaken since October 2025, including provision of consultation information sheets and EMBA in respect to native title on 21 October 2025, and follow-up correspondence on 10 December 2025 and 11 February 2026 seeking NTGAC's preferred consultation format and offering to arrange a meeting within the consultation window.
- VOGA acknowledged ongoing engagement with NTGAC via Yamatji Marlpa Aboriginal Corporation (YMAC), including efforts to establish a consultation protocol, and confirmed that correspondence had been maintained in accordance with the draft protocol.
- VOGA noted that no response had been received to the consultation correspondence or follow-ups regarding the EP.
- NTGAC was invited to review the information previously provided and submit any final comments, concerns or requests for further information regarding potential impacts to its functions, interests or activities, with advice on confidentiality and how feedback would be handled.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA acknowledged that ongoing engagement with NTGAC via YMAC, including efforts to establish a consultation protocol, and confirmed that correspondence had been maintained in accordance with the draft protocol. VOGA has followed up with NTGAC via YMAC on several occasions regarding consultation on this EP and separately to seek an update on NTGAC's consideration of the Consultation Protocol draft as part of ongoing engagement. VOGA accepts that NTGAC has no comment at this time on the EP.	VOGA considers the measures and controls in the EP are appropriate.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with NTGAC for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to NTGAC on 21 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.
- A Summary Consultation Information Sheet, developed specifically for First Nations groups, was provided to NTGAC on 21 October 2025.
- Maps were provided showing the location and EMBA in relation to the NTGAC native title determination.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in August 2025.
- Follow up emails were sent on 21 October 2025, 10 December 2025 and 18 February 2026 advising of the consultation period.
- VOGA has provided NTGAC with more than six months to consult ahead of preparing the EP for submission and will continue to take feedback in relation to the EP.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA has sent follow-up consultation emails, reminding NTGAC of the opportunity to provide feedback.
- VOGA asked for NTGAC's input on how NTGAC would like to engage in consultation and has consulted in a way it understands is appropriate for First Nations groups. VOGA has consulted with NTGAC via its engagement team at YMAC as per the draft Consultation Protocol in progress between the two parties.
- VOGA sent an email to NTGAC advising of its intent to submit the EP and prompted NTGAC to provide any final feedback by 20 February 2026.

Ngarluma Aboriginal Corporation (NAC)

Historical and ongoing engagement

VOGA has been in engagement with NAC since October 2024, prior to the consultation on this EP below. VOGA maintains an ongoing engagement with NAC in addition to the consultation on this EP below. A summary and current status of these engagements can be found at Appendix F, Summary of Ongoing Engagement, reference 1.4.3.

Consultation overview and summary of response on this EP

- On 25 August 2025, VOGA emailed NAC advising of upcoming consultation in the Wandoo Offshore Field for the Wandoo Facility EP and another EP (Record of Consultation, reference 2.3).
    - VOGA advised that consultation with NAC regarding these activities is welcome and it wanted to arrange a meeting during September – November to discuss the EP.
    - VOGA noted the EP revision was part of a standard five-year review of existing operations (not a new project) and are intended to reassess environmental risks and management measures, with an opportunity for stakeholder input including cultural heritage considerations.
- On 21 October 2025, VOGA emailed NAC advising of proposed activities in the Wandoo Field. VOGA provided a Summary Information Sheet and a link to a Consultation Information Sheet on its website (Record of Consultation, reference 1.1 and 3.4).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date, and a link to VOGA's website with additional resources on EP consultation.

        - VOGA advised it recognised the importance of cultural heritage to Native Title Holders and was committed to integrating these values into their environmental planning.
        - VOGA believes NAC is relevant for consultation and invited them to participate in the process.
    - VOGA acknowledges our previous and ongoing engagement and advised it would be happy to provide NAC with a summary of our understanding of NAC's functions, interests and activities and provide an option to discuss the proposed activities, seek input, and engage in consultation.
    - VOGA provided information on confidentiality and the ability to opt out of the consultation.
    - VOGA attached a map of the native title determination in respect to location of operations and EMBA for this EP (Record of Consultation, reference 3.4.1).
- On 10 December 2025, VOGA emailed the NAC engagement team to follow up on consultation information provided on 21 October 2025.
    - VOGA sought clarification on NAC's preferred consultation format, including whether NAC wished to arrange a meeting within the consultation period, and invited proposed dates (Record of Consultation, reference 5.21).
    - The correspondence confirmed that the formal consultation period was open until 17 February 2026
- Between 12 December 2025 and 2 February 2026, VOGA and NAC exchanged emails and administrational details to arrange the meeting on 3 February 2026 (SI Report, reference 11.8.1 – 11.8.11).
- On 2 February 2026, VOGA emailed NAC the agenda in advance of the meeting for NAC's input, as well as the presentation, information sheets and a map (SI Report, reference 11.8.12).
- On 3 February 2025, VOGA met with Ngarluma Aboriginal Corporation (NAC) Directors and its CEO in Karratha for a second time, to discuss ongoing consultation matters and consultation on the Wandoo Facility EP and another Environment Plan (SI Report, reference 11.8.13 and 11.8.14).
    - VOGA provided a presentation with background on the Wandoo Field and consultation to date and outline the next steps for consultation with NAC.
    - VOGA highlighted NAC priorities raised in previous consultation, which include:
        - Progressing a consultation protocol agreement
        - Sea Country priorities, identifying culturally significant areas/species for planning
        - Participation in ongoing studies (UWA)
        - Priority protection planning for sensitive areas
        - Oil spill confidence and wanting clearer visibility of Vermilion Energy oil spill mechanisms
        - Clearer understanding of EP activities, timing, and pathways.
    - VOGA provided an overview of the Wandoo Facility EP and another EP
        - Outlined how the activity for the other EP is carried out (using rig and typing new wells back to existing production infrastructure).
        - Explained it needs to book a rig alongside timing from other operators.
    - NAC asked a series of questions mainly regardingthe other EP, including:
        - NAC inquired about the existing well inventory and drilling program. VOGA advised there are five wells at Wandoo A and eighteen at Wandoo B, and that a typical campaign drills three wells.

        - NAC asked why additional wells are required / whether the reservoir is compartmentalised. VOGA explained that as the reservoir matures, water production increases and permeability declines, so wells may be drilled longer horizontally to maintain production efficiency.
        - NAC inquired about whether drill pipelines remain permanently and how the wells are connected. VOGA explained the tie-back approach connecting wells to production infrastructure
        - NAC asked if the operations were in Commonwealth or State waters. VOGA said Commonwealth.
        - NAC asked if oil spill plans cover a loss-of-well control scenario. VOGA said yes and emphasised that while wells do not free-flow and pressure is reduced, preparedness measures are maintained.
    - As part of ongoing consultation, VOGA and NAC discussed oil spill mitigation and response. NAC then asked questions about the response planning and incident communications more generally, including:
        - NAC were concerned about how it should react during an incident and when resources should be activated? VOGA supported the idea of a joint workshop following completion of priority protection planning so both parties can clarify roles.
        - NAC highlighted the importance of having a Ngarluma knowledge holder provide cultural input during incidents.
        - NAC also expressed interest in understanding VOGA's tiered spill matrix and requested this be incorporated into a future workshop with senior Elders.
        - NAC stated it would be beneficial to be trained to support response activities and participate in exercises. VOGA noted the industry's movement toward structured awareness-level spill training led by the WA Department of Transport and industry partners.
        - NAC also identified turtles and dugongs as culturally significant species requiring consideration in response planning.
- VOGA outlined its future actions, which include sharing an action list, providing a proposed emergency contact framework and to outline the communications pathways during an incident.
- VOGA will continue to engage with WAC on matters arising as part of the ongoing consultation; as part of ongoing engagement.
- On 18 February 2026, VOGA emailed NAC to notify them of the last opportunity to provide feedback for this EP noting the formal consultation period had concluded on 17 February 2026 and inviting any final comments by 20 February 2026 (SI Report, reference 11.8.15).
    - The email summarised consultation undertaken since August 2025, including written correspondence (25 August and 21 October 2025) and the in-person meeting held in Karratha on 3 February 2026.
    - VOGA acknowledged NAC's key interests, including identification of cultural values to inform planning and priority protection measures, appropriate handling of sensitive information, confidence in oil spill preparedness and response, ranger capability building, and interest in operational risk management of the ageing facility.
    - The correspondence noted discussions regarding development of joint incident notification and communication procedures, the potential for a joint workshop to clarify roles and expectations in spill response, and the importance of Ngarluma knowledge holder input during incident response.
    - VOGA acknowledged NAC's cultural duty to protect Country and confirmed that relevant cultural values and interests — including connection to Murujuga and the Dampier Archipelago, culturally significant marine species and areas, and ranger program interests — have been documented in the EP based on consultation and publicly available literature.

○ VOGA confirmed that questions raised during consultation had been addressed and that it considered there were no outstanding information requests. ○ NAC was invited to review the information previously provided and submit any final comments, concerns or requests for further information, with advice on confidentiality and confirmation for how feedback would be handled. • On 18 February 2026, VOGA emailed NAC with a correction to their earlier email (SI Report, reference 11.8.16).			
Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
• Identification of Sea Country priorities and culturally significant areas/species for planning purposes. • Identification of turtles and dugongs as culturally significant species requiring consideration in response planning. • Priority protection planning for sensitive areas.	Relevant to environmental impact and risk assessment and evaluation of impacts on matters of cultural significance. Relevant to oil spill preparedness and response planning.	• Agreed. VOGA recognised cultural heritage importance and committed to integrating these values into environmental planning. • Agreed in principle. VOGA discussed progressing priority protection planning as part of ongoing consultation.	Cultural values recorded in Section 3.7.6, Table 3-18. The EP reflects consideration of Ngarluma cultural and sea country values.
• Concern regarding oil spill preparedness and desire for clearer visibility of oil spill mechanisms. • Concern regarding NAC's role during an incident and timing for activation of resources. • Importance of Ngarluma knowledge holder providing cultural input during incidents.		Noted and discussed. VOGA supported a joint workshop following completion of priority protection planning to clarify roles as part of ongoing engagement.	Considered as part of oil spill preparedness planning; no additional measures in this EP are required. Additional measures may be included to the OPEP as part of ongoing engagement.

• Interest in receiving training to support response activities and participate in exercises.			
Questions regarding: • well inventory and drilling program scale. • need for additional wells / reservoir compartmentalisation. • permanence of drill pipelines and well tie-back arrangements. • confirmation that oil spill plans cover loss-of-well control scenario.	Informational query relevant to understanding operational rationale and activity scope; no objections or claims.	• VOGA explained reservoir maturation, water production and horizontal drilling rationale. • VOGA explained tie-back approach to existing production infrastructure. • VOGA advised oil spill plans include loss-of-well control scenarios and preparedness measures are maintained.	Not required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with NAC for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided NAC on 21 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.
- A Summary Consultation Information Sheet, developed specifically for First Nations groups, was provided to NAC on 21 October 2025.
- Maps were provided showing the location and EMBA in relation to the relevant native title determinations.
- NAC has shown an understanding of the proposed activity during an in person meeting held with VOGA on 3 February 2026 where VOGA gave a presentation and provided supplementary information, including an overview of this EP.
- VOGA responded to questions at the meeting, and NAC indicated to VOGA that they did not have any objections or claims that required addressing.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in August 2025.
- Follow up emails were sent on 10 December 2025 and 18 February 2026 advising of the consultation period.
- VOGA has addressed and responded to NAC over a six-month period.
- VOGA has provided NAC with more than six months to consult ahead of preparing the EP for submission and continues to take feedback in relation to the EP.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA has sent follow-up consultation emails and phone calls, reminding NAC of the opportunity to provide feedback.
- VOGA has had a face-to-face meeting with the CEO and the NAC representatives and Directors to discuss this EP.
- VOGA asked for NAC's input on how NAC would like to engage in consultation and has consulted in a way it understands is appropriate for First Nations groups.
- VOGA sent an email to NAC advising of its intent to submit the EP and prompted NAC to provide any final feedback by 20 February 2026. This correspondence included a summary of cultural values and interests recorded in the EP in Section 3.7.6 that NAC had raised during consultation and from publicly available literature, providing NAC the opportunity to review the information and provide any final feedback.

Wanparta Aboriginal Corporation

Historical and ongoing engagement

VOGA has been in engagement with WAC since October 2024, prior to the consultation on this EP below. VOGA maintains an ongoing engagement with WAC in addition to the consultation on this EP below. A summary and current status of these engagements can be found at Appendix F, Summary of Ongoing Engagement, reference 1.4.3.

Consultation overview and summary of response on this EP

- On 25 August 2025, VOGA emailed WAC advising of upcoming consultation in the Wandoo Offshore Field for the Wandoo Facility EP and another EP (Record of Consultation, reference 2.1 SI Report, reference 11.11.1).
    - VOGA advised that consultation with WAC regarding these activities is welcome and it wanted to arrange a meeting during September – November to discuss the EP.
    - VOGA noted the EP revision was part of a standard five-year review of existing operations (not a new project) and are intended to reassess environmental risks and management measures, with an opportunity for stakeholder input including cultural heritage considerations.
- Between 25 August 2025 and 27 November 2025, VOGA and WAC exchanged emails and administrational details to arrange the meeting on 28 November 2025 (SI Report, reference 11.11.1 – 11.11.6).

- On 21 October 2025, VOGA emailed WAC advising of proposed activities in the Wandoo Field. VOGA provided a Summary Information Sheet and a link to a Consultation Information Sheet on its website (Record of Consultation, reference 1.1 and 3.5).
- The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date, and a link to VOGA's website with additional resources on EP consultation.
    - VOGA advised it recognised the importance of cultural heritage to Native Title Holders and was committed to integrating these values into their environmental planning.
    - VOGA believes WAC is relevant for consultation and invited them to participate in the process.
- VOGA acknowledges our previous and ongoing engagement and advised it would be happy to provide WAC with a summary of our understanding of WAC's functions, interests and activities and provide an option to discuss the proposed activities, seek input, and engage in consultation.
- VOGA provided information on confidentiality and the ability to opt out of the consultation.
- VOGA attached a map of the native title determination in respect to location of operations and EMBA for this EP (Record of Consultation, reference 3.5.1).
- On 27 November 2025, VOGA emailed WAC the agenda in advance of the meeting for WAC's input, as well as the presentation, information sheets and a map (SI Report, reference 11.11.7).
- On 28 November 2025, VOGA met with Wanparta Aboriginal Corporation (WAC) Directors and Ngarla Elders for the second time, to discuss ongoing consultation matters and consultation on the Wandoo Facility EP and another Environment Plan. VOGA provided a presentation with background on the Wandoo Field and consultation to date and outlined the next steps for consultation with WAC (SI Report, reference 11.11.9 and 11.11.10).
    - VOGA highlighted WAC's priorities raised in previous consultation, which include:
        - Cultural duty to protect Ngarla Country.
        - Interest in emergency response procedures (cyclone and oil spills).
        - Desire to build oil spill mitigation/preparedness/response capability and involve rangers.
        - Practical ranger training/involvement in oil spill response.
        - A formal consultation agreement.
    - VOGA provided context to the plans at Wandoo, the last consultation for EPs with WAC and the next EPs for discussion
    - VOGA provided context to the 5-year revision EPs it was seeking for WAC to consider.
    - VOGA explained the process and clarified the difference between what was discussed for the previous EPs at the last meeting and how these activities differ.
    - VOGA provided an overview of the Wandoo Facility EP and another EP:
        - Explained location and timing for the other EP, which is largely driven by rig availability as a small operator.
        - Gave examples of the activity occurring.
    - WAC were interested in how wells produced. VOGA explained how wells produce using diagrams; noting production may occur via natural flow or with assistance via gas lift, reinjection or electric pumps.
    - As part of ongoing consultation, VOGA also provided information on oil spill prevention and response strategies:
        - How a spill would be managed and the response options available
        - Clarified relevant partners and how VOGA would interface with them during response

        - Explained how WAC information can inform response planning
        - VOGA explained the response activation/notification process and available response options/resources (booms, dispersants, wildlife containers).
        - WAC discussed involvement and capability building via the developing sea ranger program. Ranger capability building and specialist oiled-wildlife training was discussed, noting approximately 13-15 days to mobilize resources and equipment for WAC's area.
        - WAC confirmed it will explore collaboration through the developing sea ranger program as an ongoing consultation item, focused on building ranger capability and involvement in oil spill preparedness and response (including training).
        - WAC raised several questions about the oil spill prevention and response strategies, including:
        - WAC requested further detail on how the level of oil pollution is assessed, and where oil-polluted soil, vegetation, and fauna would be disposed of. VOGA explained oiling is assessed via shoreline segmentation and shoreline assessment/clean-up forms, with Traditional Owner input needed for consistent, accurate detail.
        - WAC asked about mapping and EMBA areas. VOGA used maps to flag likely access/staging areas and noted the EMBA is worst-case but advised it would respond/intervene to minimize spill extent and impacts.
        - WAC requested VOGA to bring DTMI and AMOSC representatives to a future meeting to clarify their roles and support ranger training in oil spill response. VOGA outlined how Traditional Owner information feeds into spill response (including DTMI cultural "no-go" mapping).
        - WAC also requested VOGA to inquire whether there are any large-scale meeting programs where permit holders/representative bodies meet with multiple relevant Traditional Owner groups in addition to individual meetings between single groups and permit holders.
    - VOGA will continue to engage with WAC on matters arising as part of the ongoing consultation; as part of ongoing engagement.
- On 4 December 2025, VOGA emailed WAC to follow up with WAC regarding the document that they indicated they would provide with questions and action items (SI Report, reference 11.11.11).
- On 13 December 2025, WAC emailed VOGA and attached the action item list following the meeting of 28 November 2025 and advised that the Consultation Protocol is completed (SI Report, reference 11.11.12).
- On 11 February 2025 VOGA emailed WAC with an updated action item list with responses and further information including an attachment of files relevant to ongoing engagement topics. VOGA also made a commitment to bring a presentation for the next meeting as part of ongoing engagement (SI Report, reference 11.11.13).
- On 18 February 2026, VOGA emailed WAC to notify them of the last opportunity to provide feedback for this EP noting the formal consultation period had concluded on 17 February 2026 and inviting any final comments by 20 February 2026 (SI Report, reference 11.11.14).
    - The email summarised consultation undertaken since August 2025, including written correspondence (25 August and 21 October 2025), the in-person meeting held on 28 November 2025, and follow-up correspondence on 11 February 2026 responding to action items and confirming consultation closure timeframes.

- VOGA acknowledged WAC's key interests, including oil spill preparedness and response (particularly shoreline and oiled wildlife response), Traditional Owner engagement to guide priority protection planning, ranger involvement and capacity building, and interest in potential noise impacts on migrating whales and turtle migration patterns.
- The correspondence noted WAC's cultural duty to protect Country and confirmed that relevant cultural values, features and interests — including marine fauna significance, song lines between islands, culturally significant food sources, and spiritual connection to Sea Country — have been documented in the EP based on consultation and publicly available literature.
- VOGA confirmed that questions raised during the 28 November 2025 meeting had been addressed and that it considers there were no outstanding information requests following the meeting.
- WAC was invited to review the information previously provided and submit any final comments, concerns or requests for further information, with advice on confidentiality and confirmation for how feedback would be handled.

- On 13 March 2026, WAC emailed VOGA confirming its understanding of the consultation undertaken with VOGA, including the 28 November 2025 meeting with WAC directors and Ngarla Elders regarding the Wandoo Facility EP and another Environment Plan (SI Report, reference 11.11.15)
  - The email recorded the key action items arising from the meeting, noted WAC was reviewing VOGA's 11 February 2026 update, reiterated the Ngarla People deep spiritual connection to Sea Country, and confirmed ongoing engagement under consultation protocol, including in relation to VOGA's 2026 actives and an operational incident on 11 December 2025.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
Cultural duty to protect Ngarla Country.	Relevant to identifying the environment that may be affected and informing culturally appropriate risk management under the EP.	Acknowledged and incorporated into the EP.	Cultural values and interests recorded in Section 3.7.6, Table 3-18.

Interest in emergency response procedures (cyclone and oil spill).	Relevant to potential environmental impacts and management measures	Provided detailed explanation of procedures and spill prevention measures.	Not required.
Desire to build oil spill mitigation/preparedness/response capability and involve rangers (including practical training). Interest in collaboration via developing sea ranger program and ongoing capability building.	Relevant to culturally informed practices; not a prescribed environmental performance outcome under this EP.	Confirmed will explore collaboration as ongoing consultation item; VOGA committed to continued engagement. Noted and discussed ranger capability building, specialist oiled-wildlife training and collaboration via developing sea ranger program; confirmed for ongoing engagement.	Matter considered through ongoing consultation; no specific EP commitment adopted beyond recording cultural interests in Section 3.7.6, Table 3-18.
Questions regarding well production methods and operational context of another EP.	Relevant to understanding scope and nature of activity. No objection or claim.	Provided explanation of well production (natural flow, gas lift, reinjection, electric pumps) and clarified another EP's scope.	Not required.

Request for detail on oil spill assessment methodology and disposal of polluted soil, vegetation and fauna.	Relevant to spill consequence assessment and response planning.	Explained shoreline segmentation, shoreline assessment/clean-up forms and role of Traditional Owner input; described disposal processes.	Not required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with WAC for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided WAC on 21 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.
- A Summary Consultation Information Sheet, developed specifically for First Nations groups, was provided to WAC on 21 October 2025.
- Maps were provided showing the location and EMBA in relation to the WAC native title determination.
- WAC has shown an understanding of the proposed activity during an in person meeting held with VOGA on 28 November 2025 where VOGA gave a presentation and provided supplementary information, including an overview of this EP.
- VOGA responded to questions at the meeting, and WAC indicated to VOGA that they did not have any objections or claims that required addressing.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in August 2025.
- Follow up emails were sent on 4 December 2025 and 18 February 2026 advising of the consultation period.
- VOGA has addressed and responded to WAC over a six-month period.
- VOGA has provided WAC with more than six months to consult ahead of preparing the EP for submission and continues to take feedback in relation to the EP.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.

- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA has sent follow-up consultation emails and phone calls, reminding WAC of the opportunity to provide feedback.
- VOGA has had a face-to-face meeting with the CEO and the WAC board of directors to discuss this EP.
- VOGA asked for WAC's input on how WAC would like to engage in consultation and has consulted in a way it understands is appropriate for First Nations groups.
- VOGA sent an email to WAC advising of its intent to submit the EP and prompted WAC to provide any final feedback by 20 February 2026. This correspondence included a summary of cultural values and interests recorded in the EP in Section 3.7.6 that WAC had raised during consultation and from publicly available literature, providing WAC the opportunity to review the information and provide any final feedback.

Wirrawandi Aboriginal Corporation (WAC)

Historical and ongoing engagement

VOGA has been in engagement with WAC since October 2024, prior to the consultation on this EP below. VOGA maintains an ongoing engagement with WAC in addition to the consultation on this EP below. A summary and current status of these engagements can be found at Appendix F, Summary of Ongoing Engagement, reference 1.4.3.

Consultation overview and summary of response on this EP

- On 25 August 2025, VOGA emailed WAC advising of upcoming consultation in the Wandoo Offshore Field Facility Operations Environment Plan and another EP (Record of Consultation, reference 2.5).
    - VOGA advised that consultation with WAC regarding these activities is welcome and it wanted to arrange a meeting during September – November to discuss the EP.
    - VOGA noted the EP revision was part of a standard five-year review of existing operations (not a new project) and are intended to reassess environmental risks and management measures, with an opportunity for stakeholder input including cultural heritage considerations.
- On 21 October 2025, VOGA emailed WAC advising of proposed activities in the Wandoo Field. VOGA provided a Summary Information Sheet and a link to a Consultation Information Sheet on its website (Record of Consultation, reference 1.1 and 3.6).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date, and a link to VOGA's website with additional resources on EP consultation.
        - VOGA advised it recognised the importance of cultural heritage to Native Title Holders and was committed to integrating these values into their environmental planning.
        - VOGA believes WAC is relevant for consultation and invited them to participate in the process.
    - VOGA proposed a meeting to discuss the proposed activities, seek input, and engage in consultation.
    - VOGA provided information on confidentiality and the ability to opt out of the consultation.
    - VOGA attached a map of the native title determination in respect to location of operations and EMBA for this EP (Record of Consultation, reference 3.6.1).
- On 7 November 2025, VOGA emailed WAC following up on a previous voicemail, seeking confirmation from WAC if it would like to be consulted on the EPs (SI Report, reference 11.12.1).

- On 7 November 2025, WAC emailed VOGA confirming that the board had previously adopted the position that it is a relevant organisation for the EPs and asked about the timeframe for consultation so that WAC could identify a suitable time for VOGA to meet with the board (SI Report, reference 11.12.2).
- On 10 November 2025, VOGA emailed WAC following up on its email of 21 October 2025, which included the consultation materials, advice that consultation was open to 17 February 2026 and was seeking a suitable time to meet the board (SI Report, reference 11.12.3).
- On 10 November 2025, WAC emailed VOGA thanking them for their email and advised that the board was not in a position to meet until February 2026 (SI Report, reference 11.12.4).
    - The email also confirmed that WAC would like to be notified if there were any oil spills or emergencies.
- On 12 December 2025, VOGA emailed WAC thanking them for confirming it was a relevant organisation and for seeking to find a suitable time for VOGA to meet with the board (SI Report, reference 11.12.5).
    - The email also confirmed that VOGA would notify WAC in the event of an oil spill or emergencies.
- On 21 January 2026, VOGA emailed WAC to follow up on its previous email to see if the board were available to meet in February but if not VOGA would be keen to progress a meeting at the next available opportunity (SI Report, reference 11.12.6).
- On 11 February 2026, VOGA emailed WAC to follow up once again on previous emails to see if the board were available to meet and if the board did not have capacity to engage in February, VOGA would still be keen to progress a meeting when there is availability (SI Report, reference 11.12.7).
    - VOGA advised that it was approaching the end of the consultation period for the EP (closing next week on 17 February 2026). After this date, VOGA intends to prepare and submit the EPs for assessment.
- On 11 February 2026, WAC emailed VOGA to confirm that it is a relevant person for the purpose of consultation, however the board was unable to meet in February but would like to do so in March (SI Report, reference 11.12.8).
- On 11 February 2026, VOGA emailed WAC to confirm it would like to progress a meeting in March and asked WAC to provide dates for the meeting (SI Report, reference 11.12.9).
- On 12 February 2026, WAC emailed VOGA advising it would respond once the next board meeting date had been set (SI Report, reference 11.12.10).
- On 13 February 2026, VOGA emailed WAC thanking them for their email (SI Report, reference 11.12.11).

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
WAC requested notification in the event of oil spills or emergencies.	Relevant to potential impacts on cultural values and activities.	Confirmed VOGA would notify WAC in the event of an oil spill or emergency.	A notification commitment has been included in the EP requiring contact with WAC in the event of an incident that may impact WAC Country (Section 7, Table 7.2, CM-11.20) (Section 9.4.11, Table 9-6).

WAC confirmed it is a relevant organisation/person for the EPs and advised Board was not available to meet until February/March 2026.	Relevant to procedural fairness and reasonable opportunity to consult; availability constraints do not preclude written consultation.	Acknowledged WAC as a relevant person; confirmed consultation open until 17 February 2026 and sought to arrange a meeting at a time suitable for the Board. Followed up on multiple occasions to secure meeting dates; confirmed willingness to progress a meeting in March if February not feasible.	WAC was recorded as a relevant person. No additional measures required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with WAC for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided WAC on 21 October 2025 based on their function, interest and activities. This was provided a second time to WAC's legal representative on 10 November 2025.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.
- A Summary Consultation Information Sheet, developed specifically for First Nations groups, was provided to WAC on 21 October 2025.
- Maps were provided showing the location and EMBA in relation to the relevant native title determination.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in August 2025.
- Follow up emails were sent on 10 November 2025 and 11 February 2026 advising of the consultation period.
- VOGA has addressed and responded to WAC over a six-month period.
- VOGA has provided WAC with more than six months to consult ahead of preparing the EP for submission and continues to take feedback in relation to the EP.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA has sent follow-up consultation emails and phone calls, reminding WAC of the opportunity to provide feedback.

- VOGA is in the process of arranging a face-to-face meeting in March 2026 with the CEO and the WAC board of directors to discuss this EP.
- VOGA asked for WAC's input on how WAC would like to engage in consultation and has consulted in a way it understands is appropriate for First Nations groups.
- VOGA sent an email to WAC advising of its intent to submit the EP after 17 February on 12 December 2025, 21 January 2026 and again on 11 February 2026.

Yindjibarndi Aboriginal Corporation (YAC)

Historical and ongoing engagement

VOGA has been in engagement with YAC since February 2025, prior to the consultation on this EP below. VOGA maintains an ongoing engagement with YAC in addition to the consultation on this EP below. A summary and current status of these engagements can be found at Appendix F, Summary of Ongoing Engagement, reference 1.4.3.

Consultation overview and summary of response on this EP

- In previous consultation, YAC advised VOGA that Yindjibarndi Aboriginal Corporation (**YAC**) does not need to be consulted in relation to offshore oil operations and that YAC defers this consultation to Ngarluma (SI Report, reference 11.14.1). VOGA has consulted with YAC via Ngarluma.
- On 25 August 2025, VOGA emailed YAC advising of upcoming consultation in the Wandoo Offshore Field for the Wandoo Facility EP and another EP. (Record of Consultation, reference 2.4).
    - VOGA acknowledged the previous advice from YAC and advised it would consult via Ngarluma.
    - VOGA confirmed it was sending the correspondence for YAC's information as it assumed it was its preferred method for the next two EP submissions, but welcomed the opportunity for YAC to engage directly.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted
In previous consultation, YAC advised that it does not need to be consulted in relation to offshore oil operations and that it defers consultation to Ngarluma.	YAC's advice that it does not seek direct consultation and prefers engagement via Ngarluma is relevant to determining appropriate consultation pathways.	• VOGA acknowledged YAC's advice that consultation would occur via Ngarluma. • VOGA confirmed that correspondence was being provided to YAC for information purposes for the relevant EP submissions. • VOGA welcomed the opportunity for YAC to engage directly should it wish to do so. • Providing correspondence to YAC for information ensures transparency and demonstrates that a reasonable opportunity to comment has been maintained.	Engagement undertaken via Ngarluma in accordance with YAC's stated preference. Reflected in the EP in Appendix F, reference 1.2). No additional EP-specific measures required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with YAC for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Ngarluma Aboriginal Corporation (NAC) as per YAC's preferred method of consultation on 21 October 2025.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.
- A Summary Consultation Information Sheet, developed specifically for First Nations groups, was provided to NAC as per YAC's preferred method of consultation on 21 October 2025.
- A map was provided showing the location and EMBA in relation to the NAC/YAC native title determination.

Reasonable period

- A consultation period was noted in the initial consultation correspondence to NAC, and consultation material was sent.
- Consultation for this EP commenced in August 2025.
- Follow up emails were sent to NAC on 10 December 2025 and 18 February 2026 advising of the consultation period.
- VOGA has addressed and responded to NAC on behalf of YAC over a six-month period.
- VOGA has provided YAC with more than six months to consult ahead of preparing the EP for submission and continues to take feedback in relation to the EP.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA asked for YAC's input on how YAC would like to engage in consultation and has consulted in a way it understands is appropriate for First Nations groups and is YAC's preferred method of consultation.
- VOGA has sent an initial email to advise YAC of its method for consultation, in case YAC wanted to directly engage.

Murujuga Aboriginal Corporation (MAC)

Historical and ongoing engagement

VOGA has been in engagement with MAC since February 2025, prior to the consultation on this EP below. VOGA maintains and ongoing engagement with MAC in addition to the consultation on this EP below. A summary and current status of these engagements can be found at Appendix F, Summary of Ongoing Engagement, reference 1.4.3.

Consultation overview and summary of response on this EP

- On 25 August 2025, VOGA emailed MAC advising of upcoming consultation in the Wandoo Offshore Field for the Wandoo Facility EP and another EP (Record of Consultation, reference 2.8).
    - VOGA advised that consultation with MAC regarding these activities is welcome and it wanted to arrange a meeting during September – November to discuss the EP.
    - VOGA noted the EP revision was part of a standard five-year review of existing operations (not a new project) and are intended to reassess environmental risks and management measures, with an opportunity for stakeholder input including cultural heritage considerations.
- On 8 September 2025, MAC emailed VOGA to advise that it did not believe a meeting was necessary, however, should that change MAC would be in touch (SI Report, reference 11.15.1).
- On 21 October 2025, VOGA emailed MAC advising of proposed activities in the Wandoo Field. VOGA provided a Summary Information Sheet and a link to a Consultation Information Sheet on its website (Record of Consultation, reference 1.1 and 3.7).
- The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date, and a link to VOGA's website with additional resources on EP consultation.
    - VOGA advised it recognised the importance of cultural heritage to Native Title Holders and was committed to integrating these values into their environmental planning.
    - VOGA believes MAC is relevant for consultation and invited them to participate in the process.
- VOGA proposed a meeting to discuss the proposed activities, seek input, and engage in consultation.
- VOGA provided information on confidentiality and the ability to opt out of the consultation.
- VOGA attached a map of the native title determination in respect to location of operations and EMBA for this EP (Record of Consultation, reference 3.7.1).
- On 10 December 2025, VOGA emailed the MAC engagement team to follow up on consultation information provided on 21 October 2025.
    - VOGA sought clarification on MAC's preferred consultation format, noting MAC's previous advice that it did not require a meeting but offering MAC a general follow up or for MAC to offer any feedback in case this had changed (Record of Consultation, reference 5.22).
    - The correspondence confirmed that the formal consultation period was open until 17 February 2026.
- On 2 February 2026, VOGA emailed MAC a follow up email confirming MAC's previous advice that a meeting was not considered necessary to discuss the five-yearly revisions for the Wandoo Facility and Well Construction Environment Plans, and that the consultation period is set to close on 17 February 2026, and confirmed that VOGA would continue to receive feedback through ongoing consultation through the life of the EP. (SI Report, reference 11.15.2).
- On 17 February 2026, VOGA emailed MAC to notify them of the last opportunity to provide feedback for this EP noting the formal consultation period had concluded on 17 February 2026 and inviting any final comments by 20 February 2026. (SI Report, reference 11.15.3).
    - The email summarised consultation undertaken since August 2025, including initial notification of upcoming consultation, provision of consultation information on 21 October 2025 (including activity overview, consultation information sheets and EMBA mapping), and follow-up correspondence in December 2025 and February 2026.
        - VOGA acknowledged MAC's earlier advice that a meeting was not considered necessary for these five-year EP revisions, while maintaining the opportunity for MAC to provide feedback during the consultation period.
    - The correspondence noted MAC's interests in relation to Murujuga National Park and the Murujuga World Heritage Area, including cultural heritage values and joint management arrangements, and confirmed that overlap of the EMBA with Murujuga National Park has been assessed in the EP risk assessment.

- VOGA referenced that DBCA had separately provided feedback regarding conservation reserves and areas of ecological significance, including Murujuga National Park, and confirmed these matters have been considered in the EP.
- MAC was invited to review the information previously provided and submit any final comments, concerns or requests for further information, with advice on confidentiality and how feedback would be handled.

- On 18 February 2026, MAC emailed VOGA with an attached letter to provide feedback on the Wandoo Facility and Well Construction Environment Plans including:
  - MAC noted whilst the protection of environmental values is a significant aspect of protecting cultural values, MAC believed the nature and threshold of impact must be assessed separately, noting a standard of protection that is considered to minimise impact to an acceptable level by scientific or environmental standards may still have consequences for Aboriginal people.
  - MAC noted while a deviation of marine mammal migration paths had no significant environmental impact, any change to the sighting of whales would impact the seasonal calendar that marks the transition between seasons.
  - Any development that could potentially affect the natural movement, migration or other behaviour of marine species may have an impact on the cultural interpretation of the seasonal landscape
  - MAC noted that some parts of the Murujuga landscape and seascape within the EMBA have strict gender restrictions and cultural safety restrictions
  - MAC asked in the event of an environmental incident whereby any of the Murujuga World Heritage Property landscape or seascape falls within the possible impact zone, MAC be immediately contacted for consultation on management of cultural values
- On 18 February 2026, VOGA emailed MAC to thank them for their prompt response and for providing feedback on its Wandoo Facility and Well Construction Environment Plans. VOGA noted that in addition to the proximity of the Environment that May Be Affected (EMBA) to Murujuga National Park, we also acknowledge and note the broader cultural and environmental values raised in your feedback. We confirm that we have reviewed, noted and will assess MAC's feedback. VOGA noted:
  - In the event of an environmental incident with the potential to impact Murujuga World Heritage Property landscape or seascape, Vermilion agrees to notify MAC as soon as practicable regarding the management of cultural values. VOGA asked for the preferred contact process for an incident notification.
  - VOGA noted the above matters, and VOGA's response will be included in the EP submission in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth)
  - VOGA noted in remained committed to ongoing consultation with MAC and valued its input and continued engagement.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

MAC stated that environmental impact thresholds considered acceptable under scientific/environmental standards may still result in cultural consequences, and that cultural impacts should be assessed separately.	Relevant to impact and risk evaluation under the Regulations, particularly in relation to impacts on cultural values and heritage.	Noted. VOGA acknowledged the broader cultural and environmental values raised and confirmed it would review, note and assess MAC's feedback.	Cultural values and interests recorded in Section 3.7.6, Table 3-18. Cultural considerations are incorporated into impact and risk assessment framework (Section 5.13.3.1).
MAC noted that deviation of marine mammal migration paths (e.g. whales), even if environmentally insignificant, may affect the seasonal calendar and cultural interpretation of seasonal transitions. MAC stated that any development affecting natural movement, migration or behaviour of marine species may impact cultural interpretation of the seasonal landscape.	Relevant to assessment of potential impacts on culturally significant species and intangible heritage values. Relevant to environmental impact assessment and evaluation of indirect cultural impacts associated with ecological change.	Noted. VOGA acknowledges the cultural values raised in relation to marine species and seasonal interpretation.	Cultural values reflected in Section 3.7.6, Table 3-18 and considered in environmental impact assessment (Section 5.11.3.1). No additional mitigation measures adopted beyond those already in the EP.
MAC advised that parts of the Murujuga landscape and seascape within the EMBA have strict gender and cultural safety restrictions.	Material to assessment of impacts to heritage values and culturally sensitive areas within the EMBA.	Noted. VOGA acknowledges the broader cultural values associated with the Murujuga landscape and seascape.	Cultural restrictions and sensitivities recorded in Section 3.7.6, Table 3-18.

MAC requested that in the event of an environmental incident where the Murujuga World Heritage Property landscape or seascape falls within the possible impact zone, MAC be immediately contacted for consultation regarding management of cultural values.	Relevant to potential impacts on cultural values and activities.	Confirmed VOGA would notify MAC in the event of an oil spill or emergency with potential to impact the Murujuga World Heritage Property landscape or seascape.	Notification commitment confirmed and recorded in the EP in Section 9.4.11.
MAC advised that it did not believe a meeting was necessary to discuss the five-yearly EP revisions and subsequently provided written feedback.	Demonstrates MAC's position regarding preferred consultation method.	VOGA respected MAC's advice and confirmed it would remain available should MAC wish to meet. Consultation progressed via written correspondence. Meeting not pursued.	Not required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with MAC for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided MAC on 21 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.
- A Summary Consultation Information Sheet, developed specifically for First Nations groups, was provided to MAC on 21 October 2025.
- Maps were provided showing the location and EMBA in relation to MAC's area of interest.
- MAC has shown an understanding of the proposed activity but advised it did not believe an in person meeting with VOGA was necessary.
- VOGA responded to questions sent via letter by MAC, in which MAC indicated to VOGA that they did not have any objections or claims that required addressing.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in August 2025.

- Follow up emails were sent on 10 December 2025 and 17 February 2026 advising of the consultation period.
- VOGA has addressed and responded to MAC over a six-month period.
- VOGA has provided MAC with more than six months to consult ahead of preparing the EP for submission and continues to take feedback in relation to the EP.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA has sent follow-up consultation emails and phone calls, reminding MAC of the opportunity to provide feedback.
- VOGA asked for MAC's input on how MAC would like to engage in consultation and has consulted in a way it understands is appropriate for First Nations groups.
- VOGA sent an email to MAC advising of its intent to submit the EP and prompted MAC to provide any final feedback by 20 February 2026. This correspondence included a summary of cultural values and interests recorded in the EP in Section 3.7.6 that MAC had raised during consultation and from publicly available literature, providing MAC the opportunity to review the information and provide any final feedback. \

Historical heritage groups or organisations

Western Australian Museum (WAM)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the WAM by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.38).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
    - The email also included VOGA's assessment of historic shipwrecks, including:
        - An analysis from VOGA that no historical wrecks are present within the Operational Area or within a 100km buffer of the EMBA.
- On 23 October 2025, VOGA received an automatic reply from WAM confirm receipt of its email (SI Report, reference 16.3.1).
- On 13 November 2025, VOGA emailed the WAM following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.22).

- The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that WAM has no comment at this time.	VOGA considers the measures and controls in the EP address WAM's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with WAM for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to WAM on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding WAM of the opportunity to provide feedback.

Local government and recognised local business and community reference/liaison groups or organisations			
City of Karratha			
Consultation overview and summary of response on this EP			

• On 22 October 2025, VOGA advised the City of Karratha by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.32).
  ○ The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
  ○ The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
• On 13 November 2025, VOGA emailed the City of Karratha following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.17).
  ○ The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
• On 16 December 2025 VOGA emailed the City of Karratha and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.11)
  ○ The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
  ○ Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
  ○ VOGA asked the City of Karratha to review previous information and provide any feedback by 24 December 2025.
  ○ VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.			

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**

No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that City of Karratha has no comment at this time.	VOGA considers the measures and controls in the EP address City of Karratha's functions, interests or activities.
Consultation demonstration statement			
VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with City of Karratha for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically: **Sufficient Information** • Consultation information provided to City of Karratha on 22 October 2025 based on their function, interest and activities. • Consultation Information Sheet has been publicly available on the VOGA website since October 2025. **Reasonable period** • A consultation period was noted in the initial consultation correspondence, and consultation material was sent. • Consultation for this EP commenced in October 2025. **Reasonable opportunity** • VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons. • From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA. • VOGA sent a follow-up consultation email on 13 November 2025, reminding City of Karratha of the opportunity to provide feedback. • VOGA sent a final consultation email on 18 December 2025, advising City of Karratha that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.		
Town of Port Hedland			
Consultation overview and summary of response on this EP			

- On 22 October 2025, VOGA advised the Town of Port Hedland by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.32).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed the Town of Port Hedland following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.17).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 16 December 2025 VOGA emailed the Town of Port Hedland and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.13)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked the Town of Port Hedland to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Town of Port Hedland has no comment at this time.	VOGA considers the measures and controls in the EP address Town of Port Hedland's functions, interests or activities.
Consultation demonstration statement			

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Town of Port Hedland for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Town of Port Hedland on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Town of Port Hedland of the opportunity to provide feedback.
- VOGA sent a final consultation email on 18 December 2025, advising Town of Port Hedland that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Shire of Ashburton

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the Shire of Ashburton by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.32).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed the Shire of Ashburton following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.17).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.

- On 16 December 2025 VOGA emailed the Shire of Ashburton and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.11)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked the Shire of Ashburton to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Shire of Ashburton has no comment at this time.	VOGA considers the measures and controls in the EP address Shire of Ashburton's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Shire of Ashburton for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Shire of Ashburton on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Shire of Ashburton of the opportunity to provide feedback.
- VOGA sent a final consultation email on 18 December 2025, advising Shire of Ashburton that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Shire of Exmouth

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the Shire of Exmouth by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.32).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed the Shire of Exmouth following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.17).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 16 December 2025 VOGA emailed the Shire of Exmouth and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.11)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked the Shire of Exmouth to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Shire of Exmouth has no comment at this time.	VOGA considers the measures and controls in the EP address Town of Shire of Exmouth's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Shire of Exmouth for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Shire of Exmouth on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Shire of Exmouth of the opportunity to provide feedback.
- VOGA sent a final consultation email on 18 December 2025, advising Shire of Exmouth that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Port Hedland Chamber of Commerce and Industry

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the Port Hedland Chamber of Commerce and Industry by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.32).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 24 October 2025, the Port Hedland Chamber of Commerce and Industry emailed VOGA to advise it had no concerns regarding the EP (SI Report, reference 14.1.1).
- On 24 October 2025, VOGA emailed the Port Hedland Chamber of Commerce and Industry to thank them for their response and advice (SI Report 14.1.2).

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
Port Hedland Chamber of Commerce and Industry reported it had no concerns with the activities associated with the EP. Whilst feedback has been received, there were no objections or claims.	VOGA engages in ongoing consultation throughout the life of an EP. VOGA notes that further feedback may be received as part of ongoing consultation and where appropriate, VOGA will apply its Management of Change and Revision process (Section 8.8 of the EP).	VOGA notes Port Hedland Chamber of Commerce and Industry has advised it has no comments on the proposed activities under this EP.	VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Port Hedland Chamber of Commerce and Industry for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Port Hedland Chamber of Commerce and Industry on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Port Hedland Chamber of Commerce and Industry of the opportunity to provide feedback.

Onslow Chamber of Commerce and Industry

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the Onslow Chamber of Commerce and Industry by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.32).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed the Onslow Chamber of Commerce and Industry following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.17).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 16 December 2025 VOGA emailed the Onslow Chamber of Commerce and Industry and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.11)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked the Onslow Chamber of Commerce and Industry to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Onslow Chamber of Commerce and Industry has no comment at this time.	VOGA considers the measures and controls in the EP address Onslow Chamber of Commerce and Industry's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Onslow Chamber of Commerce and Industry for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Onslow Chamber of Commerce and Industry on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Onslow Chamber of Commerce and Industry of the opportunity to provide feedback.
- VOGA sent a final consultation email on 18 December 2025, advising Onslow Chamber of Commerce and Industry that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Western Australian Local Government Association (WALGA)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised The Western Australian Local Government Association by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.32).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 24 October 2025, WALGA emailed an automated response advising that the enquiry will be forwarded to the appropriate business area for action (SI Report, reference 14.2.1).
- On 13 November 2025, VOGA emailed the WALGA following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.17).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 13 November 2025, WALGA emailed an automated response advising that the enquiry will be forwarded to the appropriate business area for action (SI Report, reference 14.2.2).
- On 16 December 2025 VOGA emailed the WALGA and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.11)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked the WALGA to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.
- On 16 December 2025, WALGA emailed an automated response advising that the enquiry will be forwarded to the appropriate business area for action (SI Report, reference 14.2.3).

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**

No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that The Western Australian Local Government Association has no comment at this time.	VOGA considers the measures and controls in the EP address The Western Australian Local Government Association's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with The Western Australian Local Government Association for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to The Western Australian Local Government Association on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding The Western Australian Local Government Association of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising The Western Australian Local Government Association that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Karratha and Districts Chamber of Commerce and Industry (KDCCI)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the Karratha and Districts Chamber of Commerce and Industry by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.32).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed the Karratha and Districts Chamber of Commerce and Industry following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.17).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 16 December 2025 VOGA emailed the Karratha and Districts Chamber of Commerce and Industry and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.12)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked the Karratha and Districts Chamber of Commerce and Industry to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Karratha and Districts Chamber of Commerce and Industry has no comment at this time.	VOGA considers the measures and controls in the EP address Karratha and Districts Chamber of Commerce and Industry's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Karratha and Districts Chamber of Commerce and Industry for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Karratha and Districts Chamber of Commerce and Industry on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Karratha and Districts Chamber of Commerce and Industry of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising Karratha and Districts Chamber of Commerce and Industry that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Regional Development Australia (Pilbara) Karratha WA

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the Regional Development Australia (Pilbara) Karratha WA by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.32).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed the Regional Development Australia (Pilbara) Karratha WA following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.17).

- The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.

- On 16 December 2025 VOGA emailed the Regional Development Australia (Pilbara) Karratha WA and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.11)
  - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
  - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
  - VOGA asked the Regional Development Australia (Pilbara) Karratha WA to review previous information and provide any feedback by 24 December 2025.
  - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Regional Development Australia (Pilbara) Karratha WA has no comment at this time.	VOGA considers the measures and controls in the EP address Regional Development Australia (Pilbara) Karratha WA's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Regional Development Australia (Pilbara) Karratha WA for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Regional Development Australia (Pilbara) Karratha WA on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.

- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Regional Development Australia (Pilbara) Karratha WA of the opportunity to provide feedback.
- VOGA sent a final consultation email on 16 December 2025, advising Regional Development Australia (Pilbara) Karratha WA that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Shire of Carnarvon

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the Shire of Carnarvon by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.47).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed the Shire of Carnarvon following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.31).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025 VOGA emailed the Shire of Carnarvon and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.24)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked the Shire of Carnarvon to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Shire of Carnarvon has no comment at this time.	VOGA considers the measures and controls in the EP address Town of Shire of Carnarvon's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Shire of Carnarvon for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Shire of Carnarvon on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Shire of Carnarvon of the opportunity to provide feedback.
- VOGA sent a final consultation email on 18 December 2025, advising Shire of Carnarvon that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Shire of East Pilbara

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the Shire of East Pilbara by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.47).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed the Shire of East Pilbara following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.31).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025 VOGA emailed the Shire of East Pilbara and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.24)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked the Shire of East Pilbara to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Shire of East Pilbara has no comment at this time.	VOGA considers the measures and controls in the EP address Town of Shire of East Pilbara's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Shire of East Pilbara for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Shire of East Pilbara on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Shire of East Pilbara of the opportunity to provide feedback.
- VOGA sent a final consultation email on 18 December 2025, advising Shire of East Pilbara that the EP was being prepared for submission to NOPSEMA and that there was a final opportunity to provide feedback by 24 December 2025.

Research institutes

Curtin University (Centre for Marine Science and Technology)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the Curtin University (Centre for Marine Science and Technology) by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.31).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed Curtin University (Centre for Marine Science and Technology) following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.16).

- The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.

- On 18 December 2025, VOGA advised Curtin University (Centre for Marine Science and Technology) that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, 5.14).
  - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
  - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (CTH) VOGA is offering a final opportunity for feedback.
  - VOGA asked Curtin University (Centre for Marine Science and Technology) to review previous information and provide any feedback by 24 December 2025.
  - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that Curtin University (Centre for Marine Science and Technology) has no comment at this time.	VOGA considers the measures and controls in the EP address Curtin University (Centre for Marine Science and Technology)'s functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Curtin University (Centre for Marine Science and Technology) for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Curtin University (Centre for Marine Science and Technology) on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.

- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Curtin University (Centre for Marine Science and Technology) of the opportunity to provide feedback.

University of Western Australia (UWA)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the University of Western Australia by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.31).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed University of Western Australia (UWA) following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.16).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025, VOGA advised University of Western Australia (UWA) that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, 5.14).
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (CTH) VOGA is offering a final opportunity for feedback.
    - VOGA asked University of Western Australia (UWA) to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that University of Western Australia has no comment at this time.	VOGA considers the measures and controls in the EP address University of Western Australia's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with University of Western Australia for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to University of Western Australia on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding University of Western Australia of the opportunity to provide feedback.

Commonwealth Scientific and Industrial Research Organisation (CSIRO)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the CSIRO by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.32).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 22 October 2025, CSIRO emailed VOGA and advised they had received the enquiry and would aim to respond as soon as possible and provided an enquiry reference number CAS-112984-B8D4D8 (SI Report, reference 1.7.1).
- On 13 November 2025, VOGA emailed CSIRO following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.16).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025, VOGA advised CSIRO that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, 5.14).
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (CTH) VOGA is offering a final opportunity for feedback.
    - VOGA asked CSIRO to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that the CSIRO has no comment at this time.	VOGA considers the measures and controls in the EP the CSIRO's functions, interests or activities.
Consultation demonstration statement			

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with the CSIRO for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to the CSIRO on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding the CSIRO of the opportunity to provide feedback.

Western Australian Marine Science Institution (WAMSI)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the WAMSI by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.32).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed WAMSI following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.16).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025, VOGA advised WAMSI that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, 5.14).

- The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
- Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (CTH) VOGA is offering a final opportunity for feedback.
- VOGA asked WAMSI to review previous information and provide any feedback by 24 December 2025.
- VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that WAMSI has no comment at this time.	VOGA considers the measures and controls in the EP address WAMSI's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with WAMSI for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to WAMSI on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding WAMSI of the opportunity to provide feedback.

Australian Institute of Marine Science (AIMS)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the AIMS by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.31).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed AIMS following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.16).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025, VOGA advised AIMS that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, 5.14).
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (CTH) VOGA is offering a final opportunity for feedback.
    - VOGA asked AMCS to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts that AIMS has no comment at this time.	VOGA considers the measures and controls in the EP AIMS' functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with AIMS for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to AIMS on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding AIMS of the opportunity to provide feedback.

Australian Marine Sciences Association (WA Branch)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the Australian Marine Sciences Association (WA Branch) by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.31).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed Australian Marine Sciences Association (WA Branch) following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.16).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025, VOGA advised Australian Marine Sciences Association (WA Branch) that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, 5.14).
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (CTH) VOGA is offering a final opportunity for feedback.
    - VOGA asked Australian Marine Sciences Association (WA Branch) to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts Australian Marine Sciences Association (WA Branch) has no comment at this time.	VOGA considers the measures and controls in the EP address Australian Marine Sciences Association (WA Branch)'s functions, interests or activities.
Consultation demonstration statement			

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation Australian Marine Sciences Association (WA Branch) for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Australian Marine Sciences Association (WA Branch) on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 13 November 2025, reminding Australian Marine Sciences Association (WA Branch) of the opportunity to provide feedback.

Local environment and conservation groups or organisations

Protect Ningaloo

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised Protect Ningaloo by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.33).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 18 November 2025, VOGA emailed Protect Ningaloo following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.18).

- The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.

- On 18 December 2025, VOGA advised Protect Ningaloo that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, 5.16).
  - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
  - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (CTH) VOGA is offering a final opportunity for feedback.
  - VOGA asked Protect Ningaloo to review previous information and provide any feedback by 24 December 2025.
  - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts Protect Ningaloo has no comment at this time.	VOGA considers the measures and controls in the EP address Protect Ningaloo's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Protect Ningaloo for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Protect Ningaloo on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 18 November 2025, reminding Protect Ningaloo of the opportunity to provide feedback.

The Conservation Council of WA (CCWA)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the CCWA by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.34).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 22 October 2025, VOGA received an automatic response from CCWA which confirmed receipt of their email (SI Report, reference 16.2.1).
- On 18 November 2025, VOGA emailed the CCWA following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.19).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025, VOGA advised CCWA that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, 5.17).
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (CTH) VOGA is offering a final opportunity for feedback.
    - VOGA asked CCWA to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts CCWA has no comment at this time.	VOGA considers the measures and controls in the EP address CCWA's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with CCWA for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to CCWA on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 18 November 2025, reminding CCWA of the opportunity to provide feedback.

Care for Hedland

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the Care for Hedland by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.34).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 18 November 2025, VOGA emailed the Care for Hedland following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.19).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 November 2025, Care for Hedland emailed VOGA and thanked them for the information and that it will not be providing any feedback at this stage (SI Report, reference 16.1.1).
- On 20 November 2025, VOGA emailed Care for Hedland and thanked them for their response and advice (SI Report, reference 16.1.2).
- On 18 December 2025, VOGA advised Care for Hedland that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, 5.17).
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (CTH) VOGA is offering a final opportunity for feedback.
    - VOGA asked Care for Hedland to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
Care for Hedland reported it had no concerns with the activities associated with the EP. Whilst feedback has been received, there were no objections or claims.	VOGA engages in ongoing consultation throughout the life of an EP. VOGA notes that further feedback may be received as part of ongoing consultation and where appropriate, VOGA will apply its Management of Change and Revision process (Section 8.8 of the EP).	VOGA notes Care for Hedland has advised it has no comments on the proposed activities under this EP.	VOGA considers the measures and controls in the EP are appropriate. No additional measures or controls are required.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with Care for Hedland for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to Care for Hedland on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 18 November 2025, reminding Care for Hedland of the opportunity to provide feedback.

Western Australian Marine Conservation Society (AMCS)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the AMCS by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.34).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 18 November 2025, VOGA emailed AMCS following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.19).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025, VOGA advised AMCS that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, 5.17).

- The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
- Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (CTH) VOGA is offering a final opportunity for feedback.
- VOGA asked AMCS to review previous information and provide any feedback by 24 December 2025.
- VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted
No response was received on this EP despite follow up.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received, VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA accepts AMCS has no comment at this time.	VOGA considers the measures and controls in the EP address AMCS's functions, interests or activities.

Consultation demonstration statement

VOGA has discharged its obligations for consultation under regulation 25 of the Environment Regulations, and consultation with AMCS for the purpose of regulation 25 is complete. Sufficient information, a reasonable period and a reasonable opportunity have been provided, as described in Section 10 of the EP and regulation 25 (2) and (3). Specifically:

Sufficient Information

- Consultation information provided to AMCS on 22 October 2025 based on their function, interest and activities.
- Consultation Information Sheet has been publicly available on the VOGA website since October 2025.

Reasonable period

- A consultation period was noted in the initial consultation correspondence, and consultation material was sent.
- Consultation for this EP commenced in October 2025.

Reasonable opportunity

- VOGA published advertisements in six national, state, and relevant local newspapers (see Appendix F, Consultation Activities), from 28 October 2025 – 19 November 2025 advising of the proposed activities and requesting consultation from relevant persons.
- From 22 October 2025 to 24 November 2025, VOGA ran two social media advertisement campaigns (See Appendix F, Consultation Activities) targeting potentially relevant persons within the project EMBA.
- VOGA sent a follow-up consultation email on 18 November 2025, reminding AMCS of the opportunity to provide feedback.

Table 7: Consultation Report with Non-Relevant Persons or Organisations

Section 25(1)(d) of the OPGGS(E)R: Persons or organisations whose functions, interests or activities may be affected by the activities to be carried out under the environment plan
Commonwealth commercial fishing - representative bodies
Australian Southern Bluefin Tuna Fishery Association (ASBITA)
Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the ASBITA by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.39).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
    - The Commercial Fisher Information Sheet included an overview of the proposed activities; key information for the commercial fishing sector about the activities; coordinates for operational areas; an activity summary; assessment of commercial fishing, potential effects and impacts; and VOGA's impact assessment (Record of Consultation, reference 1.2).
- On 13 November 2025, VOGA emailed the ASBITA following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.23).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 16 December 2025 VOGA emailed ASBITA and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.10)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked ASBITA to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA has reviewed the potential impact and ensures that the activities of this EP have minimal impact on the ASBITA.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA considers the measures and controls in the EP address ASBITA's functions, interests or activities.
Consultation demonstration statement			

While ASBITA is not a relevant person under regulation 25 of the Environment Regulations, VOGA chose to contact them and considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for ASBITA to provide feedback during the consultation process.

Commonwealth Fisheries Association (CFA)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the CFA by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.39).
  - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
  - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
  - The Commercial Fisher Information Sheet included an overview of the proposed activities; key information for the commercial fishing sector about the activities; coordinates for operational areas; an activity summary; assessment of commercial fishing, potential effects and impacts; and VOGA's impact assessment (Record of Consultation, reference 1.2).
- On 13 November 2025, VOGA emailed the CFA following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.23).
  - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 16 December 2025 VOGA emailed CFA and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.10)
  - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
  - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
  - VOGA asked CFA to review previous information and provide any feedback by 24 December 2025.
  - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

No response was received on this EP despite follow up.	VOGA has reviewed the potential impact and ensures that the activities of this EP have minimal impact on the CFA.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA considers the measures and controls in the EP address CFA's functions, interests or activities.

Consultation demonstration statement

While CFA is not a relevant person under regulation 25 of the Environment Regulations, VOGA chose to contact them and considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for CFA to provide feedback during the consultation process.

Pearl Producers Association (PPA)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the PPA by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.39).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
    - The Commercial Fisher Information Sheet included an overview of the proposed activities; key information for the commercial fishing sector about the activities; coordinates for operational areas; an activity summary; assessment of commercial fishing, potential effects and impacts; and VOGA's impact assessment (Record of Consultation, reference 1.2).
- On 13 November 2025, VOGA emailed the PPA following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.23).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.

- On 16 December 2025 VOGA emailed PPA and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.10)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked PPA to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA has reviewed the potential impact and ensures that the activities of this EP have minimal impact on the PPA.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA considers the measures and controls in the EP address PPA's functions, interests or activities.

Consultation demonstration statement

While PPA is not a relevant person under regulation 25 of the Environment Regulations, VOGA chose to contact them and considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for PPA to provide feedback during the consultation process.

Tuna Australia (TA)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised Tuna Australia (TA) by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.39).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
    - The Commercial Fisher Information Sheet included an overview of the proposed activities; key information for the commercial fishing sector about the activities; coordinates for operational areas; an activity summary; assessment of commercial fishing, potential effects and impacts; and VOGA's impact assessment (Record of Consultation, reference 1.2).
- On 27 October 2025, TA emailed VOGA, seeking further information regarding compensations plans given the importance of the commercial species spawning aggregations adjacent to the EMBA, in the unlikely event of a hydrocarbon spill (SI Report, reference 3.1.1).
- On 11 November 2025, VOGA emailed TA to thank them for their reply and advised that VOGA has a process in place to manage any impacts that a spill may have on affected stakeholders which is outlined in Section 7 of the accepted Wandoo Facility Oil Pollution Emergency Plan (OPEP).
    - The email included a link to the OPEP and asked TA to clarify if the comments were for the Wandoo Facility EP and/or the Well Construction EP to ensure comments were applied correctly.
    - VOGA also advised that it would welcome any information on species or industries that may have a presence within the EMBA (SI Report, reference 3.1.2).
- On 15 November 2025, TA emailed VOGA, confirming that the feedback provided was for both the Wandoo Facility and Well Construction EPs.
    - TA claimed that The EMBAs are both overlapping or very close to Australia's most important southern bluefin tuna spawning area.
    - The email sought clarification regarding financial support in the event of worst case spill scenarios.
    - The email also sought historical information about the original consultation reports which TA no longer had on file (SI Report, reference 3.1.3).
- On 21 November 2025, TA emailed VOGA to advise it was unable to locate any agreement between TA and VOGA.
    - The email reiterated the sensitivity of the spawning ground which are very close to the EMBA and included TA's Industry Position Statement and Consulting Services Agreement (SI Report, reference 3.1.4).
- On 4 December 2025, VOGA emailed TA thanking them for providing the industry position statement and noted TA's advice and reiterated that it has an existing process in place to manage any impacts that a spill and/or associated response activities may have on affected stakeholders. VOGA stated that it did not expect any impact to the WTBF or West Australian Skipjack Fishery as it determined there has not been active fishing from these fisheries in the operational areas of the proposed activities for the past 10 years (SI Report, reference 3.1.5).
- On 8 December 2025, TA emailed VOGA to thank and note VOGA's position on the service agreement.
    - TA accepts VOGA's position on the service agreement for the current EP renewal
    - Despite no recent fishing activity, tuna fishing grounds have shifted significantly over the past decade
    - Wandoo activities are located within the Western Tuna and Billfish Fishery (WTBF) area
    - Tuna Australia remains open to supporting VOGA's environmental approvals for future projects (SI Report, reference 3.1.6).
- On 16 December 2025, VOGA emailed TA to thank them for their response and views regarding consultation and the potential for future activity changes and has assessed the potential impacts to WTBF operators as follows:

- VOGA does not expect impacts to fishing operations or resources based on the assessment
- A permanent 500m Petroleum Safety Zone (PSZ) exists around Wandoo Production Facilities with no vessel entry permitted
- No additional spatial restrictions are proposed beyond the existing PSZ
- Before considering a service agreement VOGA would need evidence of reasonable impacts to WTBF
- TA or its members can self-identify as stakeholders if fishing activity changes and they may be affected
- Stakeholders should provide details on changes to fishing activity and how proposed activities could result in impacts
- VOGA appreciates TA's engagement and willingness to support consultation where impacts may arise (SI Report, reference 3.1.7).

- On 6 January 2025, TA emailed VOGA to thank them for their response and reiterated that TA supports constructive engagement with offshore petroleum proponents, but seeks to clarify consultation requirements stating that the absence of recent fishing activity does not eliminate the need to assess potential future impacts.
  - The WTBF involves highly migratory stocks influenced by environmental factors, stock rebuilding, market conditions and management decisions.
  - Fishing activity may return to areas with historically low effort
  - TA engages where fishing activities or ocean resources may be affected presently or in the future
  - TA reiterates its willingness to assist VOGA through a services agreement (SI Report, reference 3.1.8).
- On 21 January 2025, VOGA emailed TA to thank them for their response and views and assessed the potential impacts further as follows:
  - Acknowledges consultation obligations with affected parties under the Act
  - Reiterated that Wandoo Facility is a long established production facility with a permanent 500m Petroleum Safety Zone (PSZ)
  - The renewal does not involve new activities, spatial exclusions or changes to existing operations or controls
  - VOGA assessed potential impacts on WTBF based on activity nature, scale, longstanding spatial constraints and historic/current fishing data
  - Concluded there are no credible or reasonably foreseeable impact pathways to WTBF operations beyond those already managed
  - Environmental assessments, including fisheries activity are reviewed throughout the EP lifecycle and at each renewal
  - VOGA remains open to reassessing if circumstances change, e.g. fishing activity resumes near the Operational Area or specific impact pathways are identified and invites TA to submit information if identified (SI Report, reference 3.1.9).

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
TA claimed the EMBAs overlap with or are very close to Australia's most important southern bluefin tuna spawning area and emphasised the sensitivity of spawning grounds adjacent to the EMBA. TA emphasised need for assessment of commercial species spawning aggregations adjacent to EMBA in worst-case spill scenario.	The SBT spawning area is located 628 km northwest of the Hydrocarbon Area, with SBT known to migrate southwards down the Western Australian coastline to cooler temperate waters, an accidental release of MDO is not expected to impact population functioning.	Noted and assessed. VOGA reiterated that it does not expect impacts to WTBF or WA Skipjack Fishery and that spill impact management processes are in place under the OPEP.	VOGA has assessed impact to SBT in Section 5.13.3 of the EP. No additional measures adopted beyond existing spill response arrangements and impact assessment documented in the EP and OPEP.

TA sought clarification regarding compensation / financial support arrangements in the unlikely event of a hydrocarbon spill affecting commercial spawning aggregations near the EMBA.	Relevant to potential economic impacts on commercial fisheries in the event of a spill. Relevant for the OPEP and spill response arrangements rather than impact controls.	Noted and responded. VOGA advised it has an existing process to manage impacts to affected stakeholders, as outlined in Section 7 of the accepted Wandoo Facility OPEP.	Not required.
TA noted that despite no recent fishing activity, tuna fishing grounds have shifted over the past decade and that Wandoo activities are located within the WTBF area. TA stated that absence of recent fishing activity does not eliminate the need to assess potential future impacts, noting migratory stock variability and possible return of fishing effort.	Considered in reviewing historic and current fishing data and spatial constraints.	Noted and assessed. VOGA reiterated assessment considered activity nature, scale, longstanding spatial constraints (including PSZ) and historic/current fishing data, and concluded no credible impact pathways. VOGA assessed potential impacts to WTBF and associated fisheries and advised it does not expect impacts to fishing operations or resources based on the assessment. VOGA confirmed environmental and fisheries assessments are reviewed throughout the EP lifecycle and at each renewal, and remains open to reassessing if circumstances change. VOGA appreciated TA's engagement and willingness to support consultation where impacts may arise.	No additional measures are required.

Tuna Australia provided an industry position statement for consultation with energy companies and advised it has the authority to act on behalf of concession holders. TA reiterated willingness to assist VOGA via a services agreement. While feedback has been received, there were no objections or claims on this EP.	VOGA accepts Tuna Australia's position statement. Titleholders are not required to enter into commercial agreements, consulting services arrangements, or compensation agreements as a condition of undertaking consultation	VOGA acknowledged Tuna Australia's consultation advice and would consider and apply this for future EPs where TA concession holders are considered relevant for consultation. VOGA appreciated TA's engagement and willingness to support consultation where impacts may arise. VOGA engages in ongoing consultation throughout the life of an EP. VOGA notes that further feedback may be received as part of ongoing consultation and where appropriate, VOGA will apply its Management of Change and Revision process (Section 8.8 of the EP).	VOGA considers the measures and controls in the EP address Tuna Australia's functions, interests or activities.
Consultation demonstration statement			
While TA is not a relevant person under regulation 25 of the Environment Regulations, VOGA chose to contact them and considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for TA to provide feedback during the consultation process.			
Seafood Industry Australia (SIA)			
Consultation overview and summary of response on this EP			
• On 22 October 2025, VOGA advised SIA by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.39). o The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation. o The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information. o The Commercial Fisher Information Sheet included an overview of the proposed activities; key information for the commercial fishing sector about the activities; coordinates for operational areas; an activity summary; assessment of commercial fishing, potential effects and impacts; and VOGA's impact assessment (Record of Consultation, reference 1.2).		

- On 13 November 2025, VOGA emailed SIA following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.23).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 16 December 2025 VOGA emailed SIA and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.10)
    - The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
    - Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
    - VOGA asked SIA to review previous information and provide any feedback by 24 December 2025.
    - VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA has reviewed the potential impact and ensures that the activities of this EP have minimal impact on the SIA.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA considers the measures and controls in the EP address SIA's functions, interests or activities.

Consultation demonstration statement

While SIA is not a relevant person under regulation 25 of the Environment Regulations, VOGA chose to contact them and considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for SIA to provide feedback during the consultation process.

Commonwealth commercial fisheries			
Southern Bluefin Tuna Fishery			
Consultation overview and summary of response on this EP			

• On 22 October 2025, VOGA advised the Southern Bluefin Tuna Fishery by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.39).
  ○ The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
  ○ The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
• On 13 November 2025, VOGA emailed Southern Bluefin Tuna Fishery following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.23).
  ○ The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
• On 16 December 2025 VOGA emailed Southern Bluefin Tuna Fishery and advised that the formal consultation period regarding the EP concluded on 21 November 2025 (Record of Consultation, reference 5.10)
  ○ The email confirmed that VOGA is now preparing the EP for submission to the National Offshore Petroleum Safety Environmental Management Authority (NOPSEMA).
  ○ Under the Offshore Petroleum and Greenhouse Gas Storage (Environment Regulations 2023 (Cth) VOGA is offering a final opportunity for feedback.
  ○ VOGA asked Southern Bluefin Tuna Fishery to review previous information and provide any feedback by 24 December 2025.
  ○ VOGA confirmed that feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered and addressed as part of ongoing consultation.			

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**

No response was received on this EP despite follow up.	VOGA has reviewed the potential impact and ensures that the activities of this EP have minimal impact on the Southern Bluefin Tuna Fishery.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA considers the measures and controls in the EP address Southern Bluefin Tuna Fishery's functions, interests or activities.

Consultation demonstration statement

While Southern Bluefin Tuna Fishery is not a relevant person under regulation 25 of the Environment Regulations, VOGA chose to contact them and considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for Southern Bluefin Tuna Fishery to provide feedback during the consultation process.

Traditional Custodians and First Nations nominated representative corporations

Karajarri Traditional Lands Association (Aboriginal Corporation) RNTBC (KTLA)

Consultation overview and summary of response on this EP

- On 25 August 2025, VOGA emailed KTLA to introduce their operations and upcoming activities in the Wandoo Field (Record of Consultation, reference 2.9).
  - VOGA advised it welcomes consultation with KTLA regarding these activities.
  - VOGA outlined the purpose of consultation and that it values the integration of cultural heritage of Native Title Holders and aims to integrate these values into their planning.
  - VOGA requested KTLA's advice on preferred contact and consultation methods and if the board would consider allocating time for a meeting to discuss the planned activities and provide information.
- On 22 October 2025, VOGA emailed KTLA advising of proposed activities in the Wandoo Field. VOGA provided a Summary Information Sheet and a link to a Consultation Information Sheet on its website (Record of Consultation, reference 1.1 and 3.8).
  - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date, and a link to VOGA's website with additional resources on EP consultation.
  - VOGA advised it had determined that KTLA is not relevant for consultation because the planning area for the activities are not in close proximity to KTLA's native title determination.
  - VOGA provided information on confidentiality and the ability to opt out of the consultation.

- VOGA attached a map of the native title determination in respect to location of operations and EMBA for this EP (Record of Consultation, reference 3.8.1).

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted
No response was received on this EP.	VOGA has reviewed the potential impact and ensures that the activities of this EP have minimal impact on the KTLA.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA considers the measures and controls in the EP address KTLA's functions, interests or activities.

Consultation demonstration statement

While KTLA is not a relevant person under regulation 25 of the Environment Regulations, VOGA chose to contact them and considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for KTLA to provide feedback during the consultation process.

Malgana Aboriginal Corporation (MAC)

Consultation overview and summary of response on this EP

- On 25 August 2025, VOGA emailed MAC to introduce their operations and upcoming activities in the Wandoo Field (Record of Consultation, reference 2.12).
  - VOGA advised it welcomes consultation with MAC regarding these activities.
  - VOGA outlined the purpose of consultation and that it values the integration of cultural heritage of Native Title Holders and aims to integrate these values into their planning.
  - VOGA requested MAC's advice on preferred contact and consultation methods and if the board would consider allocating time for a meeting to discuss the planned activities and provide information.
- On 22 October 2025, VOGA emailed MAC advising of proposed activities in the Wandoo Field. VOGA provided a Summary Information Sheet and a link to a Consultation Information Sheet on its website (Record of Consultation, reference 1.1 and 3.9).
  - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date, and a link to VOGA's website with additional resources on EP consultation.

- VOGA advised it had determined that MAC is not relevant for consultation because the planning area for the activities are not in close proximity to MAC's native title determination.
- VOGA provided information on confidentiality and the ability to opt out of the consultation.
- VOGA attached a map of the native title determination in respect to location of operations and EMBA for this EP (Record of Consultation, reference 3.9.1).

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted
No response was received on this EP.	VOGA has reviewed the potential impact and ensures that the activities of this EP have minimal impact on the MAC.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA considers the measures and controls in the EP address MAC's functions, interests or activities.

Consultation demonstration statement

While MAC is not a relevant person under regulation 25 of the Environment Regulations, VOGA chose to contact them and considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for MAC to provide feedback during the consultation process.

Nanda Aboriginal Corporation RNTBC (NAC)

Consultation overview and summary of response on this EP

- On 25 August 2025, VOGA emailed NAC to introduce their operations and upcoming activities in the Wandoo Field (Record of Consultation, reference 2.13).
- VOGA advised it welcomes consultation with NAC regarding these activities.
  - VOGA outlined the purpose of consultation and that it values the integration of cultural heritage of Native Title Holders and aims to integrate these values into their planning.
  - VOGA requested NAC's advice on preferred contact and consultation methods and if the board would consider allocating time for a meeting to discuss the planned activities and provide information.
- On 22 October 2025, VOGA emailed NAC advising of proposed activities in the Wandoo Field. VOGA provided a Summary Information Sheet and a link to a Consultation Information Sheet on its website (Record of Consultation, reference 1.1 and 3.10).
  - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date, and a link to VOGA's website with additional resources on EP consultation.
  - VOGA advised it had determined that NAC is not relevant for consultation because the planning area for the activities are not in close proximity to MAC's native title determination.
  - VOGA provided information on confidentiality and the ability to opt out of the consultation.
  - VOGA attached a map of the native title determination in respect to location of operations and EMBA for this EP (Record of Consultation, reference 3.10.1).

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP.	VOGA has reviewed the potential impact and ensures that the activities of this EP have minimal impact on the NAC.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA considers the measures and controls in the EP address NAC's functions, interests or activities.

Consultation demonstration statement

While NAC is not a relevant person under regulation 25 of the Environment Regulations, VOGA chose to contact them and considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for NAC to provide feedback during the consultation process.

Nyangumarta Karajarri Aboriginal Corporation RNTBC (NKAC)

Consultation overview and summary of response on this EP

- On 25 August 2025, VOGA emailed NKAC to introduce their operations and upcoming activities in the Wandoo Field (Record of Consultation, reference 2.11).
  - VOGA advised it welcomes consultation with NKAC regarding these activities.
  - VOGA outlined the purpose of consultation and that it values the integration of cultural heritage of Native Title Holders and aims to integrate these values into their planning.
  - VOGA requested NKAC's advice on preferred contact and consultation methods and if the board would consider allocating time for a meeting to discuss the planned activities and provide information.
- On 22 October 2025, VOGA emailed NKAC advising of proposed activities in the Wandoo Field. VOGA provided a Summary Information Sheet and a link to a Consultation Information Sheet on its website (Record of Consultation, reference 1.1 and 3.11).
  - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date, and a link to VOGA's website with additional resources on EP consultation.
  - VOGA advised it had determined that NKAC is not relevant for consultation because the planning area for the activities are not in close proximity to NKAC's native title determination.
  - VOGA provided information on confidentiality and the ability to opt out of the consultation.
  - VOGA attached a map of the native title determination in respect to location of operations and EMBA for this EP (Record of Consultation, reference 3.11.1).
- On 23 October 2025, KLC advised VOGA by courtesy email that VOGA's email had been forwarded to the directors of the corporation for their attention and action (SI Report, reference 12.1.1).

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP.	VOGA has reviewed the potential impact and ensures that the activities of this EP have minimal impact on the NKAC.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA considers the measures and controls in the EP address NKAC's functions, interests or activities.

Consultation demonstration statement

While NKAC is not a relevant person under regulation 25 of the Environment Regulations, VOGA chose to contact them and considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for NKAC to provide feedback during the consultation process.

Nyangumarta Warrarn Aboriginal Corporation RNTBC (NWAC)

Consultation overview and summary of response on this EP

- On 25 August 2025, VOGA emailed NWAC to introduce their operations and upcoming activities in the Wandoo Field (Record of Consultation, reference 2.10).
  - VOGA advised it welcomes consultation with NWAC regarding these activities.
  - VOGA outlined the purpose of consultation and that it values the integration of cultural heritage of Native Title Holders and aims to integrate these values into their planning.
  - VOGA requested NWAC's advice on preferred contact and consultation methods and if the board would consider allocating time for a meeting to discuss the planned activities and provide information.
- On 5 September 2025, NWAC emailed to thank them for their email and providing the information. NWAC advised that it is currently working to develop a Consultation Protocol with VOGA (SI Report, reference 11.10.1).
- On 21 October 2025, VOGA emailed NWAC advising of proposed activities in the Wandoo Field. VOGA provided a Summary Information Sheet and a link to a Consultation Information Sheet on its website (Record of Consultation, reference 1.1 and 3.12).
  - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date, and a link to VOGA's website with additional resources on EP consultation.
  - VOGA advised it had determined that NWAC is not relevant for consultation because the planning area for the activities are not in close proximity to NWAC's native title determination.
  - VOGA provided information on confidentiality and the ability to opt out of the consultation.
  - VOGA attached a map of the native title determination in respect to location of operations and EMBA for this EP (Record of Consultation, reference 3.12.1).

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

No response was received on this EP.	VOGA has reviewed the potential impact and ensures that the activities of this EP have minimal impact on the NWAC.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA considers the measures and controls in the EP address NWAC's functions, interests or activities.

Consultation demonstration statement

While NWAC is not a relevant person under regulation 25 of the Environment Regulations, VOGA chose to contact them and considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for NWAC to provide feedback during the consultation process.

Yawuru Native Title Holders Aboriginal Corporation RNTBC (Yawuru)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA emailed Yawuru advising of proposed activities in the Wandoo Field. VOGA provided a Summary Information Sheet and a link to a Consultation Information Sheet on its website (Record of Consultation, reference 1.1 and 3.13).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date, and a link to VOGA's website with additional resources on EP consultation.
    - VOGA advised it had determined that Yawuru is not relevant for consultation because the planning area for the activities are not in close proximity to MAC's native title determination.
    - VOGA provided information on confidentiality and the ability to opt out of the consultation.
    - VOGA attached a map of the native title determination in respect to location of operations and EMBA for this EP (Record of Consultation, reference 3.13.1).

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

No response was received on this EP.	VOGA has reviewed the potential impact and ensures that the activities of this EP have minimal impact on the Yawuru.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA considers the measures and controls in the EP address Yawuru's functions, interests or activities.

Consultation demonstration statement

While Yawuru is not a relevant person under regulation 25 of the Environment Regulations, VOGA chose to contact them and considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for Yawuru to provide feedback during the consultation process.

Native Title representative bodies

Kimberley Land Council (KLC)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA emailed KLC advising of proposed activities in the Wandoo Field. VOGA provided a Summary Information Sheet and a link to a Consultation Information Sheet on its website (Record of Consultation, reference 1.1 and 3.41).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date, and a link to VOGA's website with additional resources on EP consultation.
        - VOGA advised it recognised the importance of cultural heritage to Native Title Holders and was committed to integrating these values into their environmental planning.
        - VOGA advised it had determined that KLC is not relevant for consultation because the planning area for the activities are not in close proximity to KCL's native title determination.
        - VOGA stated in some circumstances, KLC may act as a conduit or formal contact point for PBCs and may provide advice on groups that could be relevant for consultation. VOGA requested guidance on this.
    - VOGA invited KLC to participate in the consultation process if believes its functions and interests could be impacted by the proposed activities.
    - VOGA advised that the consultation period is open until 21 November 2025, and Vermilion intends to submit the EPs to NOPSEMA for assessment.

- On 18 November 2025, VOGA emailed KLC following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.25).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted
No response was received on this EP despite follow up.	VOGA has reviewed the potential impact and ensures that the activities of this EP have minimal impact on the YMAC and their activities.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA considers the measures and controls in the EP address YMAC's functions, interests or activities.

Consultation demonstration statement

While KLC is not a relevant person under regulation 25 of the Environment Regulations, VOGA chose to contact them and considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for KLC to provide feedback during the consultation process.

Yamatji Marlpa Aboriginal Corporation (YMAC)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA emailed YMAC advising of proposed activities in the Wandoo Field. VOGA provided a Summary Information Sheet and a link to a Consultation Information Sheet on its website (Record of Consultation, reference 1.1 and 3.40).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date, and a link to VOGA's website with additional resources on EP consultation.

- VOGA advised it recognised the importance of cultural heritage to Native Title Holders and was committed to integrating these values into their environmental planning.
- VOGA advised it had determined that YMAC is not relevant for consultation because the planning area for the activities are not in close proximity to YMAC's native title determination.
- VOGA stated in some circumstances, YMAC may act as a conduit or formal contact point for PBCs and may provide advice on groups that could be relevant for consultation. VOGA requested guidance on this.

- VOGA invited YMAC to participate in the consultation process if believes its functions and interests could be impacted by the proposed activities.
- VOGA advised that the consultation period is open until 21 November 2025, and Vermilion intends to submit the EPs to NOPSEMA for assessment.

- On 18 November 2025, VOGA emailed YMAC following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.24).
  - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 11 February 2026, VOGA emailed YMAC following up on its previous email and advising that consultation is proposed to close and confirming that VOGA would continue to receive feedback through ongoing consultation through the life of the EP (SI Report, reference 12.2.1).

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP.	VOGA has reviewed the potential impact and ensures that the activities of this EP have minimal impact on the YMAC and their activities.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA considers the measures and controls in the EP address YMAC's functions, interests or activities.

Consultation demonstration statement

While YMAC is not a relevant person under regulation 25 of the Environment Regulations, VOGA chose to contact them and considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for YMAC to provide feedback during the consultation process.

Local environment and conservation groups or organisations			
Australian Conservation Foundation (ACF)			
Consultation overview and summary of response on this EP			

• On 22 October 2025, VOGA advised the ACF by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.35).
  ○ The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
  ○ The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
• On 13 November 2025, VOGA emailed ACF following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.20).
  ○ The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
• On 18 December 2025, VOGA emailed the ACF following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 5.15).
  ○ The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.			

Relevant person objections, claims or other feedback	**VOGA's assessment of the merits**	**VOGA's statement of response**	**Details of the measures adopted**
No response was received on this EP despite follow up.	VOGA has reviewed the potential impact and ensures that the activities of this EP have minimal impact on the ACF and their activities.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA considers the measures and controls in the EP address ACF's functions, interests or activities.
Consultation demonstration statement			

While ACF is not a relevant person under regulation 25 of the Environment Regulations, VOGA chose to contact them and considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for ACF to provide feedback during the consultation process.

Greenpeace Australia Pacific (GAP)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the GAP by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.35).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 22 October 2025, VOGA received an automatic response from Greenpeace confirming receipt of its email (SI Report, reference 16.4.1).
- On 13 November 2025, VOGA emailed Greenpeace following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.20).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025, VOGA emailed the GAP following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 5,15).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025, VOGA received an automatic response from Greenpeace confirming receipt of its email (SI Report, reference 16.4.2).

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted

No response was received on this EP despite follow up.	VOGA has reviewed the potential impact and ensures that the activities of this EP have minimal impact on the GAP and their activities.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA considers the measures and controls in the EP address GAP's functions, interests or activities.

Consultation demonstration statement

While GAP is not a relevant person under regulation 25 of the Environment Regulations, VOGA chose to contact them and considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for GAP to provide feedback during the consultation process.

Wilderness Society (WS)

Consultation overview and summary of response on this EP

- On 22 October 2025, VOGA advised the WS by email of the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 1.1 and 3.35).
    - The email included an activity summary, directions for how to provide input into the EP development through consultation, the consultation closing date and that it intends to prepare and submit the EP following that date, and a link to VOGA's website with additional resources on EP consultation.
    - The Consultation Information sheet included an overview of the proposed activities; potential impacts, risks and management measures; and the presence, of environmental, social, economic and cultural features and/or values within the Operational Area and the environment that may be affected based on a review of publicly available information.
- On 13 November 2025, VOGA emailed WS following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 4.20).
    - The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.
- On 18 December 2025, VOGA emailed the WS following up on the proposed activity and provided a Consultation Information Sheet (Record of Consultation, reference 5.15).

- The email included an activity summary, directions for how to provide input into the EP through consultation, a reminder of the date that consultation is proposed to close and confirmation that VOGA would continue to receive feedback through ongoing consultation through the life of the EP.

Relevant person objections, claims or other feedback	VOGA's assessment of the merits	VOGA's statement of response	Details of the measures adopted
No response was received on this EP despite follow up.	VOGA has reviewed the potential impact and ensures that the activities of this EP have minimal impact on the WS and their activities.	VOGA engages in ongoing consultation throughout the life of an EP. Should feedback be received VOGA will apply its Management of Change and Revision process, where appropriate (Section 8.8 of the EP).	VOGA considers the measures and controls in the EP address WS's functions, interests or activities.

Consultation demonstration statement

While WS is not a relevant person under regulation 25 of the Environment Regulations, VOGA chose to contact them and considers it has still provided sufficient information and a reasonable period outside of regulatory requirements for WS to provide feedback during the consultation process.

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Record Of Consultation

Wandoo Facility Environment Plan

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1. Consultation Materials

1.1. Consultation Information Sheet

VERMILION ENERGY

INFORMATION SHEET

Wandoo Field

Wandoo Facility Environment Plan

October 2025

About Vermilion Energy

Vermilion Energy is an international energy producer with a 30-year track record. It has operations in North America, Europe and Australia.

Vermilion Oil and Gas Australia (Vermilion) is a subsidiary of Vermilion Energy and has operated in Australia for 20 years. Our Australian operations focus on producing and developing oil at the Wandoo Field, off the shore of Western Australia.

About Wandoo Field

The Wandoo Field was discovered in 1991 and the extraction of oil started in 1993. Vermilion has been the operator since November 2005 and the sole titleholder since 2007.

The Wandoo Field is located within the Permit Area WA-14-L in Commonwealth waters within the Carnarvon Basin, approximately 80 km northwest of the port of Dampier and 110 km northeast of Barrow Island (**Figure 1**). The water depth at the field location is in the range from 50–60 m.

Operational Area

The Operational Area for the activities detailed in the Wandoo Facility Environment Plan (EP) is defined as the area within the existing 500 m Petroleum Safety Zone (PSZ) within the Permit Area of WA-14-L, surrounding the Wandoo Production Facilities (see **Table 1**).

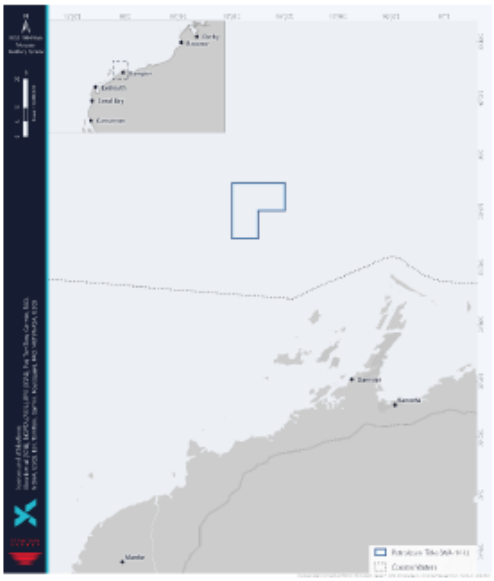


Figure 1. Location of WA-14-L

Activity overview

The Wandoo Field currently operates under an approved EP for production at the facility. The Wandoo Facility EP is updated and reassessed every 5 years, as per Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023.

Vermilion currently operates the Wandoo Facility within the production licence area WA-14-L under the Wandoo Facility EP. The purpose of this EP is to document the potential environmental impacts and risks and planned mitigation measures associated with the operation of the Wandoo Production Facilities. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field.

The well fluids produced from Wandoo A are piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform (see **Figure 2**). A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.

Total field production is currently in the order of 5,000 bbls/day.



Pictured: Wandoo Production Facilities, Wandoo A (left) and Wandoo B (right)

Produced Formation Water

Like all offshore oil platforms, the Wandoo Production Facility recovers fluids that are then treated to remove water, known as Produced Formation Water (PFW). Once the oil and water have been separated, the PFW is treated to further maximise oil recovery, before being discharged to the ocean. This is standard industry practice and is done in line with the accepted Wandoo Facility Environment Plan, which meets the requirements of the offshore environmental regulations.

Wandoo may discharge up to 36,000 m³/day of PFW into the ocean. Over the years, it has been extensively analysed and found to contain trace quantities of organic compounds (liquid hydrocarbons), dissolved and suspended salts and minerals from the reservoir (heavy metals, ammonia) and production process chemicals.

Vermilion has undertaken extensive research to improve the performance of the water treatment system and reduce the concentration of hydrocarbons in the PFW discharge. Sensitivity analysis confirms this provides a more effective environmental impact reduction compared to other solutions such as reinjection back into the reservoir.

On discharge to the ocean, the PFW is diluted rapidly, however, it can cause a visible plume on the ocean surface, particularly on calm days. Dilution reduces hydrocarbons concentrations to levels below which they could possibly cause environmental harm. Over a longer timeframe hydrocarbons are reduced to their constituent parts through microbial biodegradation and will not accumulate in the environment.

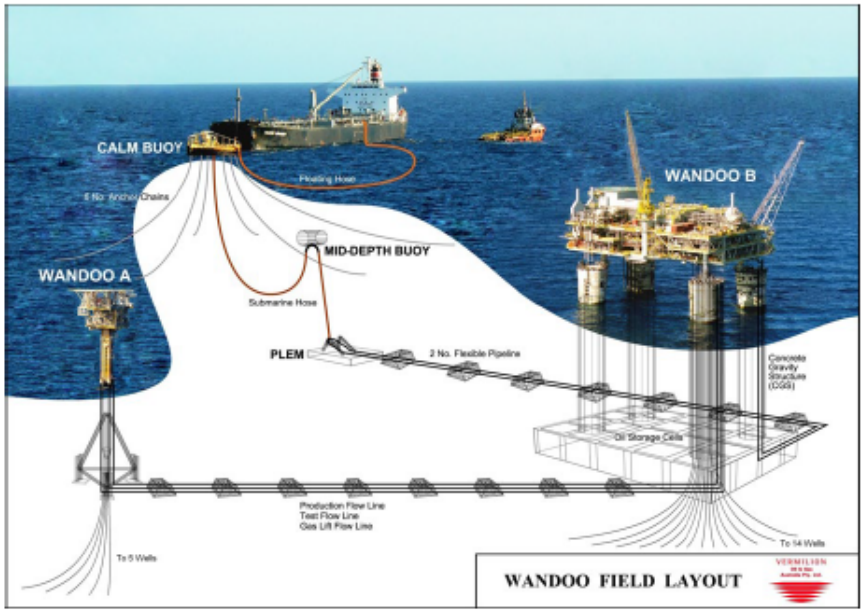


Figure 2. Schematic of the Wandoo Production

Table 1. Coordinates of the Wandoo Production Facilities (GDA2020/MGA2020)

Facility	Latitude	Longitude
Wandoo A	20° 08' 14.61" S	116° 25' 22.43" E
Wandoo B	20° 07' 37.12" S	116° 26' 08.23" E
CALM Buoy	20° 06' 57.43" S	116° 26' 06.51" E

Communications with mariners

A 500 m PSZ applies around the Wandoo Production Facilities. Commercial fishers and other marine users are not permitted to enter the Operational Area.

Environment that may be affected

As part of our environmental assessment and consultation process, Vermilion create an environment that may be affected (EMBA) map to provide geographical context for stakeholders to determine if their functions, interests or activities may be affected by an offshore activity during operations or in an emergency scenario.

Figure 3 shows the EMBA, which is based on a worst-case environmental scenario, which in this case is an unplanned release (oil spill) from the Wandoo Production Facility.

The EMBA has been defined through combining 100 simulations for each unplanned release scenario under different weather and ocean conditions. This means that in the highly unlikely event an unplanned release does occur, a geographical area much smaller than the EMBA would be affected.

The majority of the impacts or risks directly arising from planned activities would occur within close proximity of the operational area.

Vermilion has systematic control measures to prevent and mitigate emergencies and to reduce the impact of planned activities on the environment, including ecological, social and cultural sensitivities.

Tables 2 and **3** summarises the key impacts or risks and proposed control measures to manage these to levels that are as low as reasonably practicable (ALARP) and acceptable.



Figure 3. Operational area and environment that may be affected

Assessment

Vermilion has undertaken an assessment of the potential impacts and risks to the environment as well as potential risks to relevant persons arising from the planned activities and unplanned events. This assessment considers the timing, duration and location of the activities. A number of mitigation and management measures will be implemented and are summarised in **Tables 2** and **3**. Further details will be provided in the Wandoo Facility EP.

In preparing the EP, Vermilion's intent is to minimise environmental, social and cultural risks and impacts associated with the proposed activities, and Vermilion seeks your feedback to inform our decision making.

Mitigation and management measures

Vermilion has undertaken an assessment to identify potential impacts and risks to the environment arising from the activity. A number of mitigation and management measures for the activity are outlined in **Tables 2** and **3.** Further details will be provided in the Wandoo Facility EP.

Table 2. Summary of key risks and/or impacts and preliminary management measures

Potential impact/risk	Source of potential impact/risk	Description of potential impact/risk	Preliminary draft mitigation and/or management measure
Planned activities (routine and non-routine)			
Light emissions	Wandoo Production Facilities and support vessels	• Navigation and operational lighting from the operational area may result in a localised change in ambient light. • Change in ambient light may result in the temporary attraction or deterrence of light-sensitive species.	• Potential impacts from lighting are assessed as occurring within 20 km of a vessel or facility based on the National Light Pollution Guidelines for Wildlife (Commonwealth of Australia, 2019). • Facility and vessel navigation lights are compliant with the *Navigation Act 2012*.
Acoustic emissions	Wandoo Production Facilities, support vessels and helicopters	• Offshore activities within the operational area may result in a localised and temporary change to ambient underwater sound.	• Vessels and helicopters comply with relevant parts of Environment Protection and Biodiversity Conservation (EPBC) Regulation (2000) Part 8. • Vessel and machinery are maintained in accordance with Flag State certification requirements. • All engines, compressors and machinery on the facilities are maintained via a maintenance management system.
Atmospheric and greenhouse gas emissions	Wandoo Production Facilities, support vessels and helicopters	• Combustion of fuel may result in a localised and temporary reduction in air quality. • Greenhouse gas emissions within the operational area may result in contribution to the reduction of the global atmospheric carbon budget.	• Reduced sulphur content fuel will be used. • Flag State Certificate and/or IAPP certifies measures are in place to manage air emissions. • All engines, compressors and machinery on the facilities are maintained via a maintenance management system.
Routine discharges	Wandoo Production Facilities and support vessels	• Planned discharges from operations (e.g. sewage, food waste) may result in a localised and temporary change in water and/or sediment quality, and subsequent impacts to marine life.	• Emissions and discharges of liquid waste to sea are in accordance with legislative requirements. • Compliance with Vermilion Waste Management Plan. • Produced water discharges are monitored and recorded, with adaptive management processes applied if significant changes are identified.
Discharge of produced water	Wandoo Production Facilities	• Planned discharges from operations (e.g. sewage, food waste, produced water) may result in a localised and temporary change in water and/or sediment quality, and subsequent impacts to marine life.	• Routine external laboratory testing to ensure produced water chemistry is within assumed levels. • Produced water discharge flow rates are monitored. • Oil in water concentrations are monitored and alarmed. • Compliance with chemical assessment and selection process.

Potential impact/risk	Source of potential impact/risk	Description of potential impact/risk	Preliminary draft mitigation and/or management measure
Interaction with other marine users	Wandoo Production Facilities and support vessels	• Potential displacement of commercial fishing activities and commercial shipping vessels.	• A pre-existing 500 m PSZ is in place around the Wandoo Production Facilities and will remain in place for Wandoo Production Facilities the duration of operations under the proposed EP. No vessels are to enter this zone. • Consultation is undertaken with all relevant persons.
Disturbance to seabed	Wandoo Production Facilities	• Localised increase in turbidity. • Potential impacts to benthic habitat and communities.	• Seabed disturbance limited to planned activities and defined locations.

Table 3. Summary of potential risks and management measures associated with unplanned events

Potential risk	Source of potential risk	Description of potential risk	Preliminary draft mitigation and/or management measure
Unplanned events (accidents/incidents)			
Unplanned release from wells	Production wells	• A release of hydrocarbons (e.g. oil, fuel) may result in marine pollution, change to water quality, smothering of subtidal and intertidal habitats and subsequent impacts to marine life, indirect impacts to fisheries, and reduction in amenity.	• Well control shall be maintained at all times during well construction and intervention operations. • Well Control and Pressure Control Equipment shall be appropriate for providing control of the well. • Casing and other well equipment shall be designed to contain any anticipated pressure during the lifecycle of the well.
Unplanned release from export system	Offtake tanker station keeping failure or failure of floating hose assembly		• Structural integrity of CALM Buoy mooring. • Weather restrictions apply to offtake activities. • Wandoo Mooring Master on board tanker during offtake. • Marine breakaway coupling on floating hose assembly.
Unplanned release from Wandoo B shaft 2	Structural damage to shaft 2		• Asset integrity management. • Management of change processes for changes to structural loading. • Structural design of the Wandoo B facility.
Unplanned release from vessel collision	Support vessels		• Wandoo Production Facilities are marked on marine charts and any changes notified via Notices to Mariners. • 500 m PSZ surrounding the Wandoo Production Facilities. • Vessel operations restricted in adverse weather. • Dynamic positioning requirements. • Navigation aids. • Emergency communications.
Invasive marine pests	Support vessels	• Planned discharge of ballast water or the presence of biofouling on vessels may result in the introduction of an invasive marine pest.	Support vessels will comply with: • Australian Ballast Water Management Requirements consistent with the International Convention for the Control and Management of Ships' Ballast Water and

Potential risk	Source of potential risk	Description of potential risk	Preliminary draft mitigation and/or management measure
			Sediments (Ballast Water Management Convention). • Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships. • National Biofouling Guidelines for the Petroleum Production and Exploration Industry and IMO Guidelines for the control and management of a ship's biofouling to minimise the transfer of invasive aquatic species.
Vessel collision or disturbance of fauna	Support vessels	• Potential injury of marine fauna.	• Vessels contracted by Vermilion operating in the Operational Areas must have procedures that adhere to Part 8 of EPBC Regulation 2000 to minimise exposure of marine fauna.
Unplanned release during handling/ storage of hazardous materials or wastes	Wandoo Production Facilities and support vessels	• A release of hazardous material or waste (e.g. fuel, sewage) may result in change to water quality, marine pollution and subsequent impacts to marine fauna, potentially resulting in injury or mortality.	Work procedures for lifts, bulk transfers and cargo loading will require: • The security of loads to be checked prior to commencing lifts • Loads to be covered if there is a risk of losing loose materials • Lifting operations to consider weather and sea state.
Hydrocarbon spill response activities	Spill response	• Potential impacts to marine fauna from dispersants, disturbance to benthic habitat, scouring of sediments, and decrease in water quality.	• Vermilion maintains contracts with oil spill response organisations, operational and scientific monitoring providers, and logistics operators for support in the event of a hydrocarbon spill. • Vermilion tests response arrangements annually to ensure preparedness for unplanned hydrocarbon spills. • Where required, implementation of response strategies will be undertaken as per the NOPSEMA-accepted Oil Pollution Emergency Plan (OPEP) and in consultation with or under direction of the Commonwealth or State Control Agency.

Consultation

Consultation provides Vermilion with an opportunity to receive feedback from authorities, persons and organisations whose functions, interests or activities may be affected by proposed petroleum activities. This feedback helps us to refine or change the management measures we are planning to address potential activity impacts and risks. Vermilion's objective for the proposed activities is to ensure the activity is carried out in a manner that is consistent with the principles of Ecologically Sustainable Development (ESD) and reduce environmental impacts and risks to a level that is As Low As Reasonably Practicable (ALARP) and acceptable over the life of the activity.

Consultation also helps us to identify values and sensitivities where information is not publicly available, such as spiritual and cultural connection to land and sea country, as well as first-hand feedback on commercial and recreational fishing, tourism and local community activities and interests.

Feedback

If you consider you may be a relevant person, please contact us as soon as possible if you require any further information or if you think you are not on our consultation list.

We are asking for relevant persons to provide feedback by **21 November 2025.**

Feedback provided by relevant persons will be considered in an addendum to the Wandoo Facility EP and through the life of the activity. Feedback from relevant persons will be included in the EP submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

Please let us know if you would like your personal/organisational details or any part of your feedback to remain private and we will ensure this remains confidential to NOPSEMA.

Contact us

Website: www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities

Email: abu.consultation@vermilionenergy.com

Phone: (08) 9217 5858

To visit our website, scan the QR code

1.2. Commercial Fisher Information Sheet

VERMILION ENERGY

COMMERCIAL FISHER INFORMATION SHEET

Wandoo Field

Wandoo Facility Environment Plan

October 2025

More information is available in the general Wandoo Facility Environment Plan Consultation Information Sheet

Information overview

This Commercial Fisher Information Sheet provides supplementary information to the Vermilion Oil and Gas Australia (Vermilion) general information sheet about the production operations in the Wandoo Field.

This Information Sheet provides supplementary information for the needs of commercial fishers who may be active around the Wandoo Field.

It summarises the ongoing assessment of potential impacts and risks to the commercial fishing industry and provides information for the needs of commercial fishers, who may be around the operational area, about the proposed activities.

Activity overview

Vermilion currently operates the Wandoo Facility within the production licence area WA-14-L under the Wandoo Facility EP. The purpose of this EP is to document the potential environmental impacts and risks and planned mitigation measures associated with the operation of the Wandoo Production Facilities. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field.

The well fluids produced from Wandoo A are piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform (see **Figure 2**). A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.

Total field production is currently in the order of 5,000 bbls/day.

About Vermilion Energy

Vermilion Energy is an international energy producer with a 30-year track record. It has operations in North America, Europe and Australia.

Vermilion is a subsidiary of Vermilion Energy and has operated in Australia for 20 years. Our Australian operations focus on producing oil at the Wandoo Field, off the coast of Western Australia.

About Wandoo Field

The Wandoo Field was discovered in 1991 and the extraction of oil started in 1993. Vermilion has been the operator of Wandoo Field since November 2005 and the sole titleholder since 2007.

The Wandoo Facility operates under existing accepted EPs in place for production and well construction.



Pictured: Wandoo B (left) and a Wandoo A (right)

Key information

- **Location:** The Wandoo Field is located in Commonwealth waters within the Carnarvon Basin, approximately 80 km northwest of the port of Dampier and 110 km northeast of Barrow Island (**Figure 1**).
- **Exclusion zone:** A 500 m Petroleum Safety Zone (PSZ) is currently in place around the Wandoo production facilities. This defines the operational area.
- **Operational area:** Commercial fishers and other marine users are **not** permitted to use the operational area and should take care around operations by adhering to standard navigation rules.
- **Vessels:** One support vessel typically visits the Wandoo Field every week.

Wandoo Field location

The Wandoo Field is located in Commonwealth waters within the Carnarvon Basin, approximately 80 km northwest of the port of Dampier and 110 km northeast of Barrow Island (**Figure 1**). The water depth at the field location is in the range from 50–60 m.

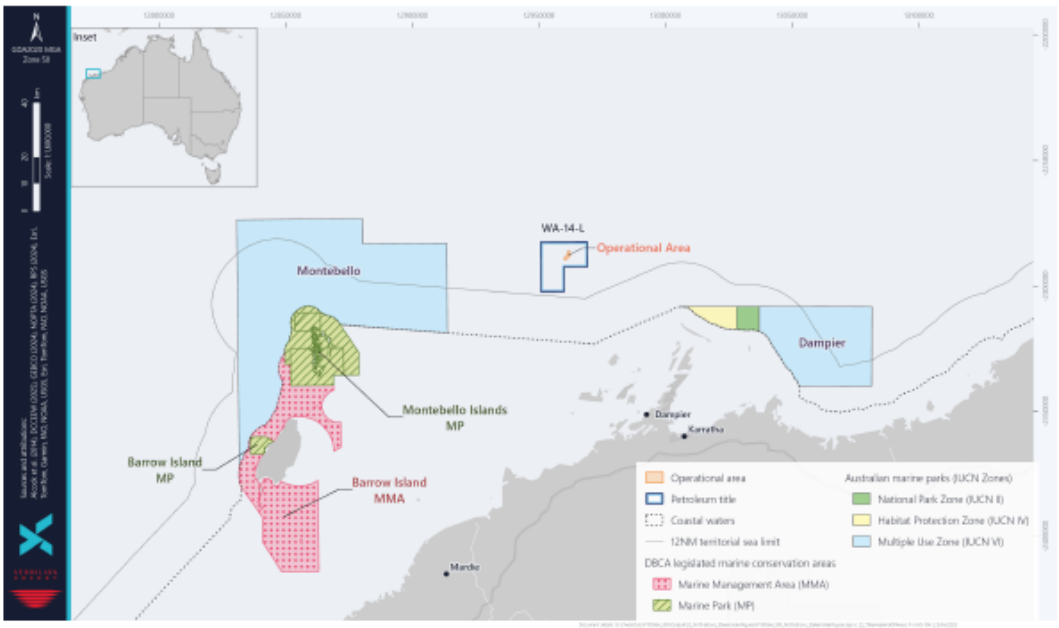


Figure 1. Location of WA-14-L and operational area

Operational area

The operational area for the activities outlined in the Wandoo Facility EP is defined as the area within the existing 500 m Petroleum Safety Zone (PSZ), surrounding the Wandoo Production Facilities (**Table 1**).

Table 1. Coordinates of the Wandoo Production Facilities (GDA2020/MGA2020)

Facility	Latitude	Longitude
Wandoo A	20° 08' 14.61" S	116° 25' 22.43" E
Wandoo B	20° 07' 37.12" S	116° 26' 08.23" E
CALM Buoy	20° 06' 57.43" S	116° 26' 06.51" E

Assessment of commercial fishing, potential effects and impacts

Commonwealth managed fisheries

There are three Commonwealth managed commercial fisheries that have a defined management area overlapping the operational area (**Table 2**).

Table 2. Commonwealth managed fisheries

Commonwealth managed fisheries	Summary of fishery in relation to operational area	Assessment of potential impacts
Southern Bluefin Tuna Fishery	The Southern Bluefin Tuna Fishery operates around Australia and extends to the high seas fishing zone (out to 200 nm from the coast). The fishery targets southern bluefin tuna only. Fishing activity is focused in southern Australian waters with no activity expected surrounding the operational area.	No impact to the fishery expected.
Western Skipjack Tuna Fishery	The Western Skipjack Tuna Fishery extends west from Cape York Peninsula and around Australia to the South Australian/Victorian border, out to the edge of the Australian Fishing Zone. Little fishing activity has been undertaken in this fishery since 2008. No fishing activity associated with this fishery is expected to occur surrounding the operational area.	No impact to the fishery expected.
Western Tuna and Billfish Fishery	The Western Tuna and Billfish Fishery management area extends over a large area westward from Cape York Peninsula off Queensland, around the west coast of Western Australia and eastward, across the Great Australian Bight to 141°E at the South Australian/Victorian border. The fishery has operated at low levels of effort since the early 2000's. Target species include albacore, bigeye tuna, yellowfin tuna, swordfish and striped marlin. No fishing activity associated with this fishery is expected to occur surrounding the operational area.	No impact to the fishery expected.

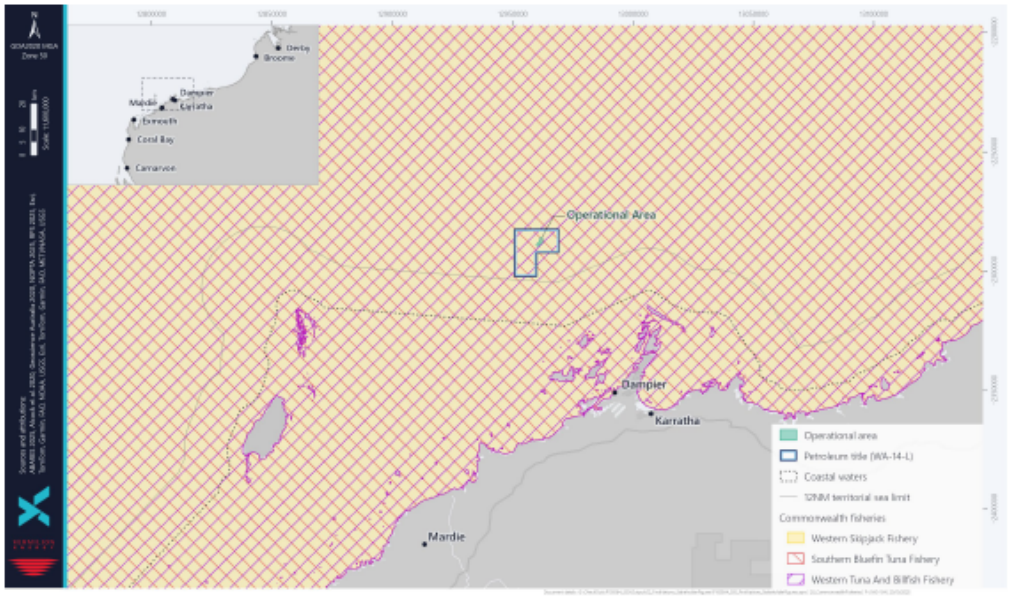


Figure 2. Commonwealth managed fisheries

State managed fisheries

State managed commercial fisheries that have historical fishing activity intersecting the operational area within the last 5 years include:

- Hermit Crab Fishery
- Mackerel Managed Fishery
- Marine Aquarium Managed Fishery
- Nickol Bay Prawn Fishery
- Onslow Prawn Limited Entry Fishery
- Pilbara Crab Managed Fishery
- Pilbara Line Fishery
- Pilbara Fish Trawl Interim Managed Fishery
- Pilbara Trap Managed Fishery
- Specimen Shell Managed Fishery, and
- Western Australian Sea Cucumber Fishery.

Figure 3 depicts the state managed commercial fisheries that had three or more vessels (per year) active around the operational area.

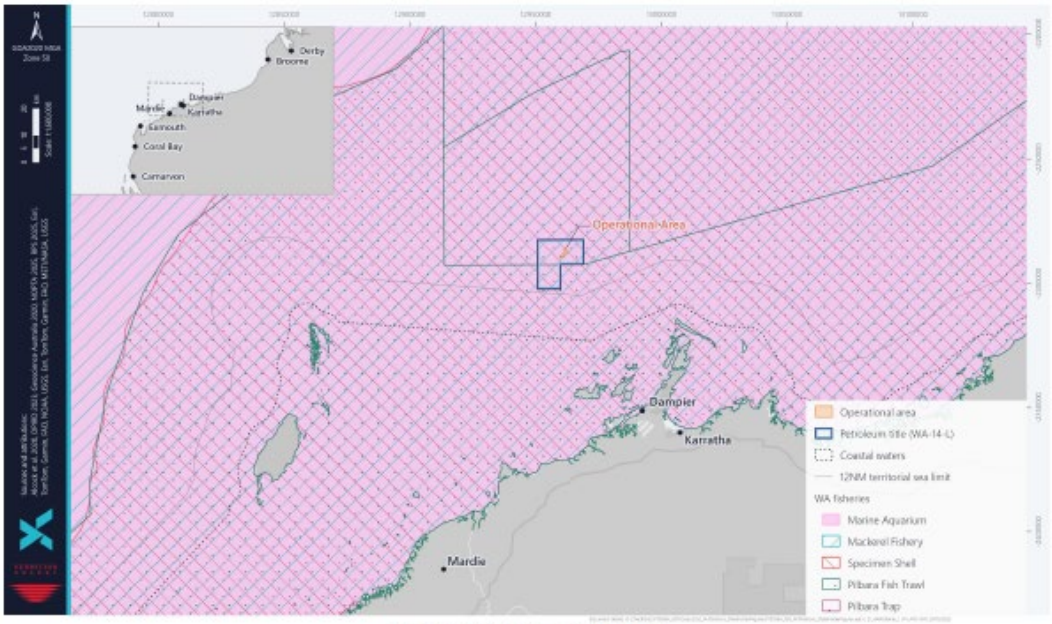


Figure 3. State managed fisheries

Vermilion impact assessment

Vermilion has undertaken an assessment to identify potential impacts and risks to commercial fishers from the activity. A number of mitigation and management measures for the activity are outlined in **Table 3.** Further details will be provided in the Wandoo Facility EP.

Table 3. Potential interactions with commercial fishing

Potential impact	Description of potential impact/risk	Proposed control measures
Interference with commercial fishing activities	Potential displacement of commercial fishing activities.	• Vessel communication equipment will be maintained to allow for communication with commercial fishing vessels. • The operational area will have an exclusion zone of 500 m.
Introduction and establishment of invasive marine species	Potential reduction in commercial species abundance due to competition or predation.	Vessels will comply with: • Australian Ballast Water Management Requirements consistent with the International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Management Convention). • Annex 1 of the International Convention on the Control of Harmful Anti-Fouling Systems on Ships. • National Biofouling Guidelines for the Petroleum Production and Exploration Industry and IMO Guidelines for the control and management of a ship's biofouling to minimise the transfer of invasive aquatic species.
Vessel collision	Decrease in water quality. Potential toxic effects to commercial species.	• Vessels will have navigational lights. • Vessels will have dynamic positioning capability. • Vessels will be equipped and crewed in accordance with the *Navigation Act 2012* and Marine Orders. • Vessels will have a dedicated Ship Oil Pollution Prevention Plan (SOPEP). • An Oil Pollution Emergency Plan (OPEP) will be prepared and implemented as required.

VERMILION ENERGY

Consultation

Consultation provides Vermilion with an opportunity to receive feedback from authorities, persons and organisations whose functions, interests or activities may be affected by proposed petroleum activities. This feedback helps us to refine or change the management measures we are planning to address potential activity impacts and risks. Vermilion's objective for the proposed activities is to ensure the activity is carried out in a manner that is consistent with the principles of Ecologically Sustainable Development (ESD) and reduce environmental impacts and risks to a level that is As Low As Reasonably Practicable (ALARP) and acceptable over the life of the activity.

Consultation also helps us to identify values and sensitivities where information is not publicly available, such as spiritual and cultural connection to land and sea country, as well as first-hand feedback on commercial and recreational fishing, tourism and local community activities and interests.

Feedback

Vermilion is committed to working together with the commercial fishing industry so that we can all proceed with business in a safe and efficient manner.

If you consider you may be a relevant person, please contact us as soon as possible if you require any further information or if you think you are not on our consultation list.

We are asking for relevant persons to provide feedback by **21 November 2025.**

Feedback provided by relevant persons will be considered in an addendum to the Wandoo Facility EP and through the life of the activity. Feedback from relevant persons will be included in the EP submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

Please let us know if you would like your personal/organisational details or any part of your feedback to remain private and we will ensure this remains confidential to NOPSEMA.

Contact us

Website: www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities

Email: abu.consultation@vermilionenergy.com

Phone: (08) 9217 5858

To visit our website, scan the QR code

1.3. Summary Information Sheet

VERMILION ENERGY

SUMMARY INFORMATION SHEET

Wandoo Field

Wandoo Facility Environment Plan

October 2025

More information is available in the general Wandoo Facility Environment Plan Consultation Information Sheet

Introduction

Vermilion Energy is an international energy producer with 30 years of experience. It operates in North America, Europe and Australia. Vermilion Oil and Gas Australia (the Australian branch) has been in Australia for 20 years. Our Australian operations focus on producing oil from the Wandoo Field off the shore of Western Australia.

The Wandoo Field was discovered in 1991, and oil extraction started in 1993. Vermilion has managed the Wandoo Field since November 2005 and has been the sole titleholder since 2007.

The Wandoo Field currently operates under approved Environment Plans (EPs) for production and well construction at the facility. The Wandoo Facility EP is updated and reassessed every 5 years, as per Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023.

Location

The Wandoo Field is located within the Permit Area WA-14-L in Commonwealth waters within the Carnarvon Basin, approximately 80 km northwest of the port of Dampier and 110 km northeast of Barrow Island (**Figure 1**). The water depth at the field location is in the range from 50–60 m.

The Wandoo Facility EP Consultation Information Sheet lists the geographical coordinates of the Wandoo Production Facilities.

Operational Area

The Operational Area for the activities outlined in the Wandoo Facility EP is defined as the area within the existing 500 m Petroleum Safety Zone (PSZ) within the Permit Area of WA-14-L, surrounding the Wandoo Production Facilities.

Activity overview

Vermilion currently operates the Wandoo Facility within the production licence area WA-14-L. The purpose of the Wandoo Facility EP is to document the potential environmental impacts and risks and planned mitigation measures associated with the operation of the Wandoo facilities. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field.

The well fluids produced from Wandoo A and Wandoo B wells are piped to the Wandoo B platform. After treatment, the fluids are stored on Wandoo B and then, when sufficient volumes are available, offloaded to export tankers through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers. Export tankers are used to offload the oil and no pipeline to shore is required.

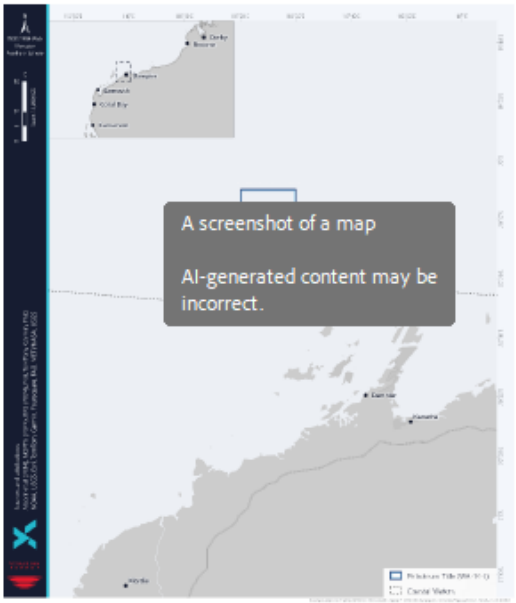


Figure 1. Location of WA-14-L



Pictured: Wandoo facilities, Wandoo A (left) and Wandoo B (right)

Environmental impacts and management

The operation of the Wandoo facilities includes planned activities, but may also result in unplanned activities. Both may potentially impact the environment.

A table showing all planned and unplanned activities, potential impacts, and management measures for each is included in the general Wandoo Facility EP Information Sheet. Further details will also be provided in the Wandoo Facility EP.

The objective is to manage the work program to reduce impacts and risks to as low as reasonably practicable.

The total area over which unplanned events could have an environmental impact is shown in **Figure 2**. This is referred to as the environment that may be affected (EMBA).

In the highly unlikely event that an unplanned activity, such as a hydrocarbon release from the Wandoo Production Facilities, the entire EMBA would not be affected. The area of the EMBA that may be affected would only be determined at the time of the event.

Consultation

Consultation provides Vermilion with an opportunity to receive feedback from those whose functions, interests or activities may be affected by proposed activities. This feedback helps us to refine the management measures to address potential activity impacts and risks.

Consultation also helps us to identify values and sensitivities where information is not publicly available.

Feedback

If you consider you may be a relevant person, please get in touch with us as soon as possible if you require any further information or if you think you are not on our consultation list.

Feedback provided by relevant persons will be considered in an addendum to the Wandoo Facility EP and throughout the life of the activities. Feedback from relevant persons will be included in the EP submitted to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

Please let us know if you would like your personal/organisational details or any part of your feedback to remain private and we will ensure this remains confidential to NOPSEMA.



Figure 2. Operational area and environment that may be affected

Contact us

Website: www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities

Email: abu.consultation@vermilionenergy.com

Phone: (08) 9217 5858

2. Initial Consultation Outreach – August 2025

2.1. Email to Wanparta Aboriginal Corporation (WAC) on 25 August 2025

Dear [redacted]

Subject: Upcoming Consultation - Wandoo Offshore Oil Field Well Construction and Facility Operations Environment Plans (EPs)

We are contacting you on behalf of Vermilion Oil and Gas Australia Ltd (Vermilion) which has operations in the Wandoo Field located offshore approximately 80km northwest of Dampier and 110km northeast of Barrow Island.

Meeting request

As part of our ongoing engagement, we are reaching out to Wanparta Aboriginal Corporation to arrange a consultation meeting with the group to discuss the next two EPs. We hope to arrange these meetings during September, October or November subject to your availability.

Vermilion has operated the Wandoo Field since 2005, and these activities are current and ongoing. The revised EPs will cover the continued operation of the Wandoo production facility for the next five years, as well as potential routine well construction using an offshore drilling rig.

These upcoming EP revisions do not represent new projects, but are part of a standard five-year review required for long-term activities. The revised EPs will assess the environmental impacts and risks associated with ongoing facility operations and well construction activities, and outline how these will continue to be avoided, mitigated, or managed.

Seeking your input

Even where no significant changes have occurred, the review process provides an opportunity to reassess environmental risks and management measures, and to invite feedback and input from relevant persons. The nature and scale of these activities differ from shorter-term exploration drilling previously consulted on, as they involve longer-term operations and permanent infrastructure.

We will follow up shortly with consultation information for the revised EPs once available. In the meantime, we wanted to reach out to see if your board could consider allocating time to engage in this process, as we are mindful that agendas tend to fill up quickly.

Vermilion recognises the importance of cultural heritage to the group and are committed to ensuring that these values are respected and integrated into the project planning.

We look forward to hearing from you and working together to ensure a collaborative consultation process.

Yours sincerely

2.2. Email to Kariyarra Aboriginal Corporation (KAC) on 25 August 2025

Dear [redacted] and [redacted]

Subject: Upcoming Consultation - Wandoo Offshore Oil Field Well Construction and Facility Operations Environment Plans (EPs)

We are contacting you on behalf of Vermilion Oil and Gas Australia Ltd (Vermilion) which has operations in the Wandoo Field located offshore approximately 80km northwest of Dampier and 110km northeast of Barrow Island.

Meeting request

As part of our ongoing engagement, we are reaching out to Kariyarra Aboriginal Corporation to arrange a consultation meeting with the group to discuss the next two EPs.

We hope to arrange these meetings during September, October or November subject to your availability.

Vermilion has operated the Wandoo Field since 2005, and these activities are current and ongoing. The revised EPs will cover the continued operation of the Wandoo production facility for the next five years, as well as potential routine well construction using an offshore drilling rig.

These upcoming EP revisions do not represent new projects, but are part of a standard five-year review required for long-term activities. The revised EPs will assess the environmental impacts and risks associated with ongoing facility operations and well construction activities, and outline how these will continue to be avoided, mitigated, or managed.

Seeking your input

Even where no significant changes have occurred, the review process provides an opportunity to reassess environmental risks and management measures, and to invite feedback and input from relevant persons. The nature and scale of these activities differ from shorter-term exploration drilling previously consulted on, as they involve longer-term operations and permanent infrastructure.

We will follow up shortly with consultation information for the revised EPs once available. In the meantime, we wanted to reach out to see if your board could consider allocating time to engage in this process, as we are mindful that agendas tend to fill up quickly.

Vermilion recognises the importance of cultural heritage to the group and are committed to ensuring that these values are respected and integrated into the project planning.

We look forward to hearing from you and working together to ensure a collaborative consultation process.

Yours sincerely

2.3. Email to Ngarluma Aboriginal Corporation (NAC) on 25 August 2025

Dear [redacted]

Subject: Upcoming Consultation - Wandoo Offshore Oil Field Well Construction and Facility Operations Environment Plans (EPs)

We are contacting you on behalf of Vermilion Oil and Gas Australia Ltd (Vermilion) which has operations in the Wandoo Field located offshore approximately 80km northwest of Dampier and 110km northeast of Barrow Island.

Meeting request

As part of our ongoing engagement, we are reaching out to Ngarluma Aboriginal Corporation to arrange a consultation meeting with the group to discuss the next two EPs. We understand that you also act for Yindjibarndi Aboriginal Corporation.

We hope to arrange these meetings during September, October or November subject to your availability.

Vermilion has operated the Wandoo Field since 2005, and these activities are current and ongoing. The revised EPs will cover the continued operation of the Wandoo production facility for the next five years, as well as potential routine well construction using an offshore drilling rig.

These upcoming EP revisions do not represent new projects, but are part of a standard five-year review required for long-term activities. The revised EPs will assess the environmental impacts and risks associated with ongoing facility operations and well construction activities, and outline how these will continue to be avoided, mitigated, or managed.

Seeking your input

Even where no significant changes have occurred, the review process provides an opportunity to reassess environmental risks and management measures, and to invite feedback and input from relevant persons. The nature and scale of these activities differ from shorter-term exploration drilling previously consulted on, as they involve longer-term operations and permanent infrastructure.

We will follow up shortly with consultation information for the revised EPs once available. In the meantime, we wanted to reach out to see if your board could consider allocating time to engage in this process, as we are mindful that agendas tend to fill up quickly.

Vermilion recognises the importance of cultural heritage to the group and are committed to ensuring that these values are respected and integrated into the project planning.

We look forward to hearing from you and working together to ensure a collaborative consultation process.

Yours sincerely

2.4. Email to Yindjibarndi Aboriginal Corporation (YAC) on 25 August 2025

Dear [redacted]

Subject: Upcoming Consultation - Wandoo Offshore Oil Field Well Construction and Facility Operations Environment Plans (EPs)

We are contacting you on behalf of Vermilion Oil and Gas Australia Ltd (Vermilion) which has operations in the Wandoo Field located offshore approximately 80km northwest of Dampier and 110km northeast of Barrow Island.

As part of our ongoing engagement, we are reaching out to Ngarluma Aboriginal Corporation to arrange a consultation meeting with the group to discuss the next two EPs. We hope to arrange these meetings during September, October or November subject to their availability.

As per our previous email and telephone correspondence, we have engaged with Ngarluma Aboriginal Corporation and will seek to engage with Ngarluma on behalf of the Yindjibarndi Aboriginal Corporation (YAC) as we understand that YAC does not need to be consulted in relation to offshore oil operations and that YAC defers this consultation to Ngarluma.

We are sending this email for your information as we assume this is your preferred method for our next two EPs submissions, but welcome the opportunity if that has changed and you want to engage directly with us.

Vermilion has operated the Wandoo Field since 2005, and these activities are current and ongoing. The revised EPs will cover the continued operation of the Wandoo production facility for the next five years, as well as potential routine well construction using an offshore drilling rig.

These upcoming EP revisions do not represent new projects, but are part of a standard five-year review required for long-term activities. The revised EPs will assess the environmental impacts and risks associated with ongoing facility operations and well construction activities, and outline how these will continue to be avoided, mitigated, or managed.

Welcome your input

Even where no significant changes have occurred, the review process provides an opportunity to reassess environmental risks and management measures, and to invite feedback and input from relevant persons. The nature and scale of these activities differ from shorter-term exploration drilling previously consulted on, as they involve longer-term operations and permanent infrastructure.

We will follow up shortly with consultation information for the revised EPs once available. Vermilion recognises the importance of cultural heritage to the group and are committed to ensuring that these values are respected and integrated into the project planning.

We welcome any further discussion with you to ensure a collaborative consultation process.

Yours sincerely

2.5. Email to Wirrawandi Aboriginal Corporation (WAC) on 25 August 2025

Dear [redacted] and [redacted]

Subject: Upcoming Consultation - Wandoo Offshore Oil Field Well Construction and Facility Operations Environment Plans (EPs)

We are contacting you on behalf of Vermilion Oil and Gas Australia Ltd (Vermilion) which has operations in the Wandoo Field located offshore approximately 80km northwest of Dampier and 110km northeast of Barrow Island.

Meeting request

As part of our ongoing engagement, we are reaching out to Wirrawandi Aboriginal Corporation to arrange a consultation meeting with the group to discuss the next two EPs. We hope to arrange these meetings during September, October or November subject to your availability.

Vermilion has operated the Wandoo Field since 2005, and these activities are current and ongoing. The revised EPs will cover the continued operation of the Wandoo production facility for the next five years, as well as potential routine well construction using an offshore drilling rig.

These upcoming EP revisions do not represent new projects, but are part of a standard five-year review required for long-term activities. The revised EPs will assess the environmental impacts and risks associated with ongoing facility operations and well construction activities, and outline how these will continue to be avoided, mitigated, or managed.

Seeking your input

Even where no significant changes have occurred, the review process provides an opportunity to reassess environmental risks and management measures, and to invite feedback and input from relevant persons. The nature and scale of these activities differ from shorter-term exploration drilling previously consulted on, as they involve longer-term operations and permanent infrastructure.

We will follow up shortly with consultation information for the revised EPs once available. In the meantime, we wanted to reach out to see if your board could consider allocating time to engage in this process, as we are mindful that agendas tend to fill up quickly.

Vermilion recognises the importance of cultural heritage to the group and are committed to ensuring that these values are respected and integrated into the project planning.

We look forward to hearing from you and working together to ensure a collaborative consultation process.

Yours sincerely

2.6. Email to Buurabalayji Thalanyji Aboriginal Corporation (BTAC) on 25 August 2025

Dear [redacted]

Subject: Upcoming Consultation - Wandoo Offshore Oil Field Well Construction and Facility Operations Environment Plans (EPs)

We are contacting you on behalf of Vermilion Oil and Gas Australia Ltd (Vermilion) which has operations in the Wandoo Field located offshore approximately 80km northwest of Dampier and 110km northeast of Barrow Island.

Meeting request

As part of our ongoing engagement, we are reaching out to Buurabalayji Thalanyji Aboriginal Corporation to arrange a consultation meeting with the group to discuss the next two EPs. We hope to arrange these meetings during September, October or November subject to your availability.

Vermilion has operated the Wandoo Field since 2005, and these activities are current and ongoing. The revised EPs will cover the continued operation of the Wandoo production facility for the next five years, as well as potential routine well construction using an offshore drilling rig.

These upcoming EP revisions do not represent new projects, but are part of a standard five-year review required for long-term activities. The revised EPs will assess the environmental impacts and risks associated with ongoing facility operations and well construction activities, and outline how these will continue to be avoided, mitigated, or managed.

Seeking your input

Even where no significant changes have occurred, the review process provides an opportunity to reassess environmental risks and management measures, and to invite feedback and input from relevant persons. The nature and scale of these activities differ from shorter-term exploration drilling previously consulted on, as they involve longer-term operations and permanent infrastructure.

We will follow up shortly with consultation information for the revised EPs once available. In the meantime, we wanted to reach out to see if your board could consider allocating time to engage in this process, as we are mindful that agendas tend to fill up quickly.

Vermilion recognises the importance of cultural heritage to the group and are committed to ensuring that these values are respected and integrated into the project planning.

We look forward to hearing from you and working together to ensure a collaborative consultation process.

Yours sincerely

2.7. Email to Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC) on 25 August 2025

Dear [redacted] and [redacted]

Subject: Upcoming Consultation - Wandoo Offshore Oil Field Well Construction and Facility Operations Environment Plans (EPs)

We are contacting you on behalf of Vermilion Oil and Gas Australia Ltd (Vermilion) which has operations in the Wandoo Field located offshore approximately 80km northwest of Dampier and 110km northeast of Barrow Island.

Meeting request

As part of our ongoing engagement, we are reaching out to Nganhurra Thanardi Garrbu Aboriginal Corporation and Yinggarda Aboriginal Corporation to arrange a consultation meeting with the group to discuss the next two EPs. We hope to arrange these meetings during September, October or November subject to your availability.

Vermilion has operated the Wandoo Field since 2005, and these activities are current and ongoing. The revised EPs will cover the continued operation of the Wandoo production facility for the next five years, as well as potential routine well construction using an offshore drilling rig.

These upcoming EP revisions do not represent new projects, but are part of a standard five-year review required for long-term activities. The revised EPs will assess the environmental impacts and risks associated with ongoing facility operations and well construction activities, and outline how these will continue to be avoided, mitigated, or managed.

Seeking your input

Even where no significant changes have occurred, the review process provides an opportunity to reassess environmental risks and management measures, and to invite feedback and input from relevant persons. The nature and scale of these activities differ from shorter-term exploration drilling previously consulted on, as they involve longer-term operations and permanent infrastructure.

We will follow up shortly with consultation information for the revised EPs once available. In the meantime, we wanted to reach out to see if your board could consider allocating time to engage in this process, as we are mindful that agendas tend to fill up quickly.

Vermilion recognises the importance of cultural heritage to your groups and are committed to ensuring that these values are respected and integrated into the project planning.

We look forward to hearing from you and working together to ensure a collaborative consultation process.

Yours sincerely

2.8. Email to Murujuga Aboriginal Corporation (MAC) on 25 August 2025

Dear [redacted]

Subject: Upcoming Consultation - Wandoo Offshore Oil Field Well Construction and Facility Operations Environment Plans (EPs)

We are contacting you on behalf of Vermilion Oil and Gas Australia Ltd (Vermilion) which has operations in the Wandoo Field located offshore approximately 80km northwest of Dampier and 110km northeast of Barrow Island.

Meeting request

As part of our ongoing engagement, we are reaching out to Murujuga Aboriginal Corporation to arrange a consultation meeting with the group to discuss the next two EPs. We hope to arrange these meetings during September, October or November subject to your availability.

Vermilion has operated the Wandoo Field since 2005, and these activities are current and ongoing. The revised EPs will cover the continued operation of the Wandoo production facility for the next five years, as well as potential routine well construction using an offshore drilling rig.

These upcoming EP revisions do not represent new projects, but are part of a standard five-year review required for long-term activities. The revised EPs will assess the environmental impacts and risks associated with ongoing facility operations and well construction activities, and outline how these will continue to be avoided, mitigated, or managed.

Seeking your input

Even where no significant changes have occurred, the review process provides an opportunity to reassess environmental risks and management measures, and to invite feedback and input from relevant persons. The nature and scale of these activities differ from shorter-term exploration drilling previously consulted on, as they involve longer-term operations and permanent infrastructure.

We will follow up shortly with consultation information for the revised EPs once available. In the meantime, we wanted to reach out to see if your board could consider allocating time to engage in this process, as we are mindful that agendas tend to fill up quickly.

As mentioned at our July meeting this year, we look forward to continuing the conversation with you and welcome the opportunity to meet with the Circle of Elders in the coming months.

Vermilion recognises the importance of cultural heritage to the group and are committed to ensuring that these values are respected and integrated into the project planning.

We look forward to hearing from you and working together to ensure a collaborative consultation process.

Yours sincerely

2.9. Email to Karajarri Traditional Lands Association (Aboriginal Corporation) RNTBC (KTLA) on 25 August 2025

Dear [redacted]

Subject: Upcoming Consultation - Wandoo Offshore Oil Field Well Construction Environment Plan (EP)

We are contacting you on behalf of Vermilion Oil and Gas Australia Ltd (Vermilion) which has operations in the Wandoo Field located offshore approximately 80km northwest of Dampier and 110km northeast of Barrow Island.

Meeting request

As part of our ongoing engagement, we are reaching out to Karajarri Traditional Lands Association (Aboriginal Corporation) to arrange a consultation meeting with the group to discuss the next EP. We hope to arrange these meetings during September, October or November subject to your availability.

Vermilion has operated the Wandoo Field since 2005, and these activities are current and ongoing. The revised EP will cover the continued operation of the Wandoo production facility for the next five years, as well as potential routine well construction using an offshore drilling rig.

These upcoming EP revisions do not represent new projects, but are part of a standard five-year review required for long-term activities. The revised EPs will assess the environmental impacts and risks associated with ongoing facility operations and well construction activities, and outline how these will continue to be avoided, mitigated, or managed.

Seeking your input

Even where no significant changes have occurred, the review process provides an opportunity to reassess environmental risks and management measures, and to invite feedback and input from relevant persons. The nature and scale of these activities differ from shorter-term exploration drilling previously consulted on, as they involve longer-term operations and permanent infrastructure.

We will follow up shortly with consultation information for the revised EP once available. In the meantime, we wanted to reach out to see if your board could consider allocating time to engage in this process, as we are mindful that agendas tend to fill up quickly.

Vermilion recognises the importance of cultural heritage to the group and are committed to ensuring that these values are respected and integrated into the project planning.

We look forward to hearing from you and working together to ensure a collaborative consultation process.

Yours sincerely

2.10. Email to Nyangumarta Warrarn Aboriginal Corporation RNTBC (NWAC) on 25 August 2025

Dear [redacted]

Subject: Upcoming Consultation - Wandoo Offshore Oil Field Well Construction Environment Plan (EP)

We are contacting you on behalf of Vermilion Oil and Gas Australia Ltd (Vermilion) which has operations in the Wandoo Field located offshore approximately 80km northwest of Dampier and 110km northeast of Barrow Island.

Meeting request

As part of our ongoing engagement, we are reaching out to Nyangumarta Warrarn Aboriginal Corporation to arrange a consultation meeting with the group to discuss the next EP. We hope to arrange these meetings during September, October or November subject to your availability.

Vermilion has operated the Wandoo Field since 2005, and these activities are current and ongoing. The revised EP will cover the continued operation of the Wandoo production facility for the next five years, as well as potential routine well construction using an offshore drilling rig.

These upcoming EP revisions do not represent new projects, but are part of a standard five-year review required for long-term activities. The revised EPs will assess the environmental impacts and risks associated with ongoing facility operations and well construction activities, and outline how these will continue to be avoided, mitigated, or managed.

Seeking your input

Even where no significant changes have occurred, the review process provides an opportunity to reassess environmental risks and management measures, and to invite feedback and input from relevant persons. The nature and scale of these activities differ from shorter-term exploration drilling previously consulted on, as they involve longer-term operations and permanent infrastructure.

We will follow up shortly with consultation information for the revised EP once available. In the meantime, we wanted to reach out to see if your board could consider allocating time to engage in this process, as we are mindful that agendas tend to fill up quickly.

Vermilion recognises the importance of cultural heritage to the group and are committed to ensuring that these values are respected and integrated into the project planning.

We look forward to hearing from you and working together to ensure a collaborative consultation process.

Yours sincerely

2.11. Email to Nyangumarta Karajarri Aboriginal Corporation RNTBC (NKAC) on 25 August 2025

Dear [redacted]

Subject: Upcoming Consultation - Wandoo Offshore Oil Field Well Construction Environment Plan (EP)

We are contacting you on behalf of Vermilion Oil and Gas Australia Ltd (Vermilion) which has operations in the Wandoo Field located offshore approximately 80km northwest of Dampier and 110km northeast of Barrow Island.

Meeting request

As part of our ongoing engagement, we are reaching out to Nyangumarta Karajarri Aboriginal Corporation to arrange a consultation meeting with the group to discuss the next EP. We hope to arrange these meetings during September, October or November subject to your availability.

Vermilion has operated the Wandoo Field since 2005, and these activities are current and ongoing. The revised EP will cover the continued operation of the Wandoo production facility for the next five years, as well as potential routine well construction using an offshore drilling rig.

These upcoming EP revisions do not represent new projects, but are part of a standard five-year review required for long-term activities. The revised EPs will assess the environmental impacts and risks associated with ongoing facility operations and well construction activities, and outline how these will continue to be avoided, mitigated, or managed.

Seeking your input

Even where no significant changes have occurred, the review process provides an opportunity to reassess environmental risks and management measures, and to invite feedback and input from relevant persons. The nature and scale of these activities differ from shorter-term exploration drilling previously consulted on, as they involve longer-term operations and permanent infrastructure.

We will follow up shortly with consultation information for the revised EP once available. In the meantime, we wanted to reach out to see if your board could consider allocating time to engage in this process, as we are mindful that agendas tend to fill up quickly.

Vermilion recognises the importance of cultural heritage to the group and are committed to ensuring that these values are respected and integrated into the project planning.

We look forward to hearing from you and working together to ensure a collaborative consultation process.

Yours sincerely

2.12. Email to Malgana Aboriginal Corporation (MAC) on 25 August 2025

Dear [redacted]

Subject: Upcoming Consultation - Wandoo Offshore Oil Field Well Construction Environment Plan (EP)

We are contacting you on behalf of Vermilion Oil and Gas Australia Ltd (Vermilion) which has operations in the Wandoo Field located offshore approximately 80km northwest of Dampier and 110km northeast of Barrow Island.

Meeting request

As part of our ongoing engagement, we are reaching out to Malgana Aboriginal Corporation to arrange a consultation meeting with the group to discuss the next EP. We hope to arrange these meetings during September, October or November subject to your availability.

Vermilion has operated the Wandoo Field since 2005, and these activities are current and ongoing. The revised EP will cover the continued operation of the Wandoo production facility for the next five years, as well as potential routine well construction using an offshore drilling rig.

These upcoming EP revisions do not represent new projects, but are part of a standard five-year review required for long-term activities. The revised EPs will assess the environmental impacts and risks associated with ongoing facility operations and well construction activities, and outline how these will continue to be avoided, mitigated, or managed.

Seeking your input

Even where no significant changes have occurred, the review process provides an opportunity to reassess environmental risks and management measures, and to invite feedback and input from relevant persons. The nature and scale of these activities differ from shorter-term exploration drilling previously consulted on, as they involve longer-term operations and permanent infrastructure.

We will follow up shortly with consultation information for the revised EP once available. In the meantime, we wanted to reach out to see if your board could consider allocating time to engage in this process, as we are mindful that agendas tend to fill up quickly.

Vermilion recognises the importance of cultural heritage to the group and are committed to ensuring that these values are respected and integrated into the project planning.

We look forward to hearing from you and working together to ensure a collaborative consultation process.

Yours sincerely

2.13. Email to Nanda Aboriginal Corporation RNTBC (NAC) on 25 August 2025

Dear [redacted]

Subject: Upcoming Consultation - Wandoo Offshore Oil Field Well Construction Environment Plan (EP)

We are contacting you on behalf of Vermilion Oil and Gas Australia Ltd (Vermilion) which has operations in the Wandoo Field located offshore approximately 80km northwest of Dampier and 110km northeast of Barrow Island.

As part of our ongoing engagement, we are reaching out to Nanda Aboriginal Corporation to arrange a consultation meeting with the group, if it would like one, to discuss the next EP. We hope to arrange these meetings during September, October or November subject to your availability.

Vermilion has operated the Wandoo Field since 2005, and these activities are current and ongoing. The revised EP will cover the continued operation of the Wandoo production facility for the next five years, as well as potential routine well construction using an offshore drilling rig.

These upcoming EP revisions do not represent new projects, but are part of a standard five-year review required for long-term activities. The revised EPs will assess the environmental impacts and risks associated with ongoing facility operations and well construction activities, and outline how these will continue to be avoided, mitigated, or managed.

Seeking your input

Even where no significant changes have occurred, the review process provides an opportunity to reassess environmental risks and management measures, and to invite feedback and input from relevant persons. The nature and scale of these activities differ from shorter-term exploration drilling previously consulted on, as they involve longer-term operations and permanent infrastructure.

We will follow up shortly with consultation information for the revised EP once available. In the meantime, we wanted to reach out to see if your board could consider allocating time to engage in this process if it was interested, as we are mindful that agendas tend to fill up quickly.

Vermilion recognises the importance of cultural heritage to the group and are committed to ensuring that these values are respected and integrated into the project planning.

We look forward to hearing from you and working together to ensure a collaborative consultation process.

Yours sincerely

3. Consultation – October 2025

3.1. Email to Buurabalayji Thalanyji Aboriginal Corporation (BTAC) on 21 October 2025

Dear [redacted],

Re: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

We reached out in August to advise that Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the Wandoo Facility Environment Plan and Well Construction Environment Plan (EP). We are now providing further information, with the consultation period starting from today.

Relevance for Buurabalayji Thalanyji Aboriginal Corporation (BTAC)

Vermilion recognises the importance of cultural heritage to the Thalanyji people and are committed to ensuring that these values are respected and integrated into our project planning.

We have determined that BTAC might be a relevant person to the Environment Plans because the planning area for those activities (particularly the 'environment that may be affected' (EMBA)) modelling shows proximity to the Thalanyji native title determination area.

We have attached a map for your consideration.

Reach out directly via email if this is of interest to you. Alternatively, if BTAC does not have an interest in the proposed activities or determines consultation is not required beyond receipt of this information, please let us know.

About these Environment Plan revisions

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when

	sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Attached are summary and detailed consultation information sheets that explain the activities we plan to undertake.

Our website includes consultation information and resources for further information, including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed **here**.

Request: Please bring this to the attention of the appropriate representatives from BTAC.

Please feel free to forward this email and the attached documents to BTAC's members or other people who you think may be interested as required.

BTAC has previously advised that consultation is usually with the CEO and/or Heritage and Native Title Manager in the first instance, and that BTAC may also request consultation through its board of directors or broader group of common law holders.

We had previously discussed the possibility of a meeting between BTAC and Vermilion, though didn't progress on this topic.

Please let us know if there is interest from BTAC's representatives to discuss the Wandoo operations and EPs if BTAC has considered or may consider itself a relevant person to be consulted.

Feedback on the proposed activities

Our standard consultation period is 30-days, however we are affording additional time to stakeholders like BTAC to engage in the process as we are aware there may be limited capacity to engage during the standard 30-day period.

The consultation period is open from today until 17 February 2026.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

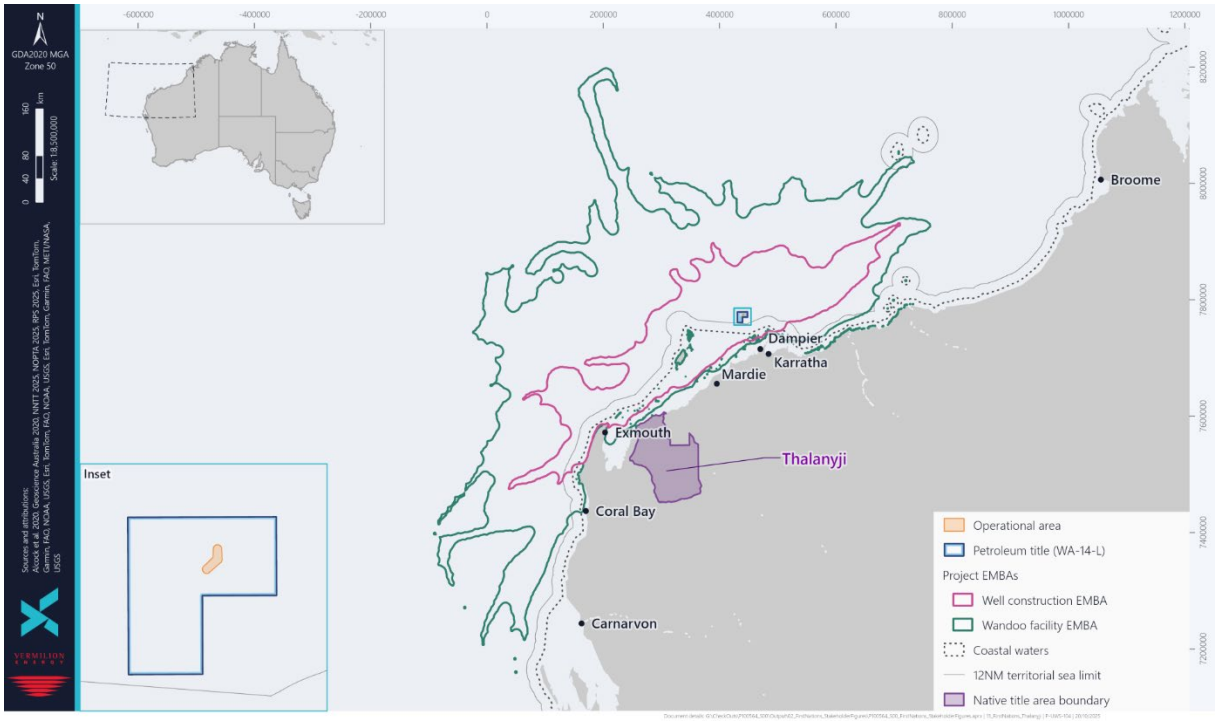
If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at **abu.consultation@vermilionenergy.com** or by phone at **(08) 9217 5858**.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.1.1. Attachment to email to Buurabalayji Thalanyji Aboriginal Corporation (BTAC) on 21 October 2025



3.2. Email to Kariyarra Aboriginal Corporation (KAC) on 21 October 2025

Hi [redacted] and [redacted]

Re: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

It was great to meet with you and the Kariyarra Directors a couple of weeks back.

At the meeting, we advised that Vermilion is planning to submit five yearly revisions of the Wandoo Facility Environment Plan and Well Construction Environment Plan (EP). We provided an overview of those EPs at the meeting and are now providing further information, with the consultation period starting from today.

Relevance for Kariyarra

Vermilion recognises the importance of cultural heritage to the Kariyarra People and are committed to ensuring that these values are respected and integrated into our project planning.

We have determined that Kariyarra might be a relevant person to the EPs because the planning area, particularly the 'environment that may be affected' (**EMBA**)) modelling shows an overlap and close proximity with the Kariyarra native title determination.

We have attached a map for your consideration.

About these Environment Plan revisions

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Attached are detailed and summary consultation information sheets that explain the activities we plan to undertake.

Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Request: Please bring this to the attention of the Kariyarra Board and appropriate representatives.

Please feel free to forward this email and the attached documents to Kariyarra's members or other people who you think may be interested as required.

Acknowledging our previous and ongoing engagement, we would be happy to provide you with a summary of our understanding of your functions, interests and activities, to be documented in the EPs. Providing the option for Kariyarra to review and build upon this with any feedback on the EP.

Please let us know if this approach is still suitable, and we can ensure to have this to you ahead of the next Directors' meeting.

Feedback on the proposed activities

Our standard consultation period is 30-days, however we are affording additional time to stakeholders like Kariyarra to engage in the process as we are aware there may be limited capacity to engage during the standard 30-day period.

The consultation period is open from today until 17 February 2026.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

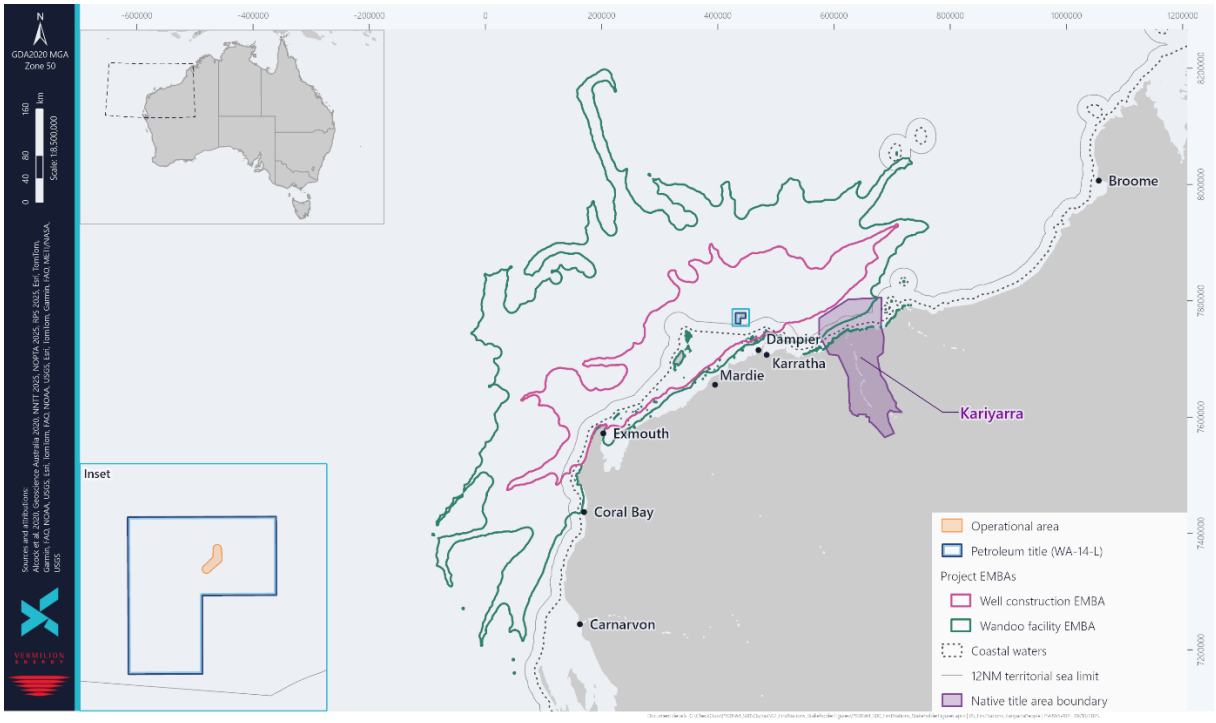
If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at **abu.consultation@vermilionenergy.com** or by phone at **(08) 9217 5858**.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.2.1. Attachment to email to Kariyarra Aboriginal Corporation (KAC) on 21 October 2025



3.3. Email to Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC) on 21 October 2025

Dear [redacted] and NTGAC engagement team

Re: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

We reached out in August to advise that Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the Wandoo Facility Environment Plan and Well Construction Environment Plan (EP). We are now providing further information, with the consultation period starting from today.

Relevance for Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC), Yinggarda Aboriginal Corporation

Vermilion recognises the importance of cultural heritage to First Nations people and are committed to ensuring that these values are respected and integrated into our project planning.

We have determined that NTGAC might be a relevant person to the EPs because the planning area for those activities (particularly the 'environment that may be affected' (**EMBA**)) modelling shows an overlap with the The Gnulli, Gnulli #2 and Gnulli #3 - Yinggarda, Baiyungu and Thalanyji Peoples' native title determination.

We have attached a map for your consideration.

Reach out directly via email if this is of interest to you. Alternatively, if NTGAC does not have an interest in the proposed activities or determines consultation is not required beyond receipt of this information please let us know.

About these Environment Plan Revisions

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when

	sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Attached are summary and detailed consultation information sheets that explain the activities we plan to undertake.

Our website includes resources for further information including detailed consultation information sheets and frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Request: Please bring this to the attention of the appropriate representatives from NTGAC.

Please feel free to forward this email and the attached documents to NTGAC's members or other people who you think may be interested as required.

Feedback on the proposed activities

Our standard consultation period is 30-days, however we are affording additional time to stakeholders like NTGAC to engage in the process as we are aware there may be limited capacity to engage during the standard 30-day period.

The consultation period is open from today until 17 February 2026.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

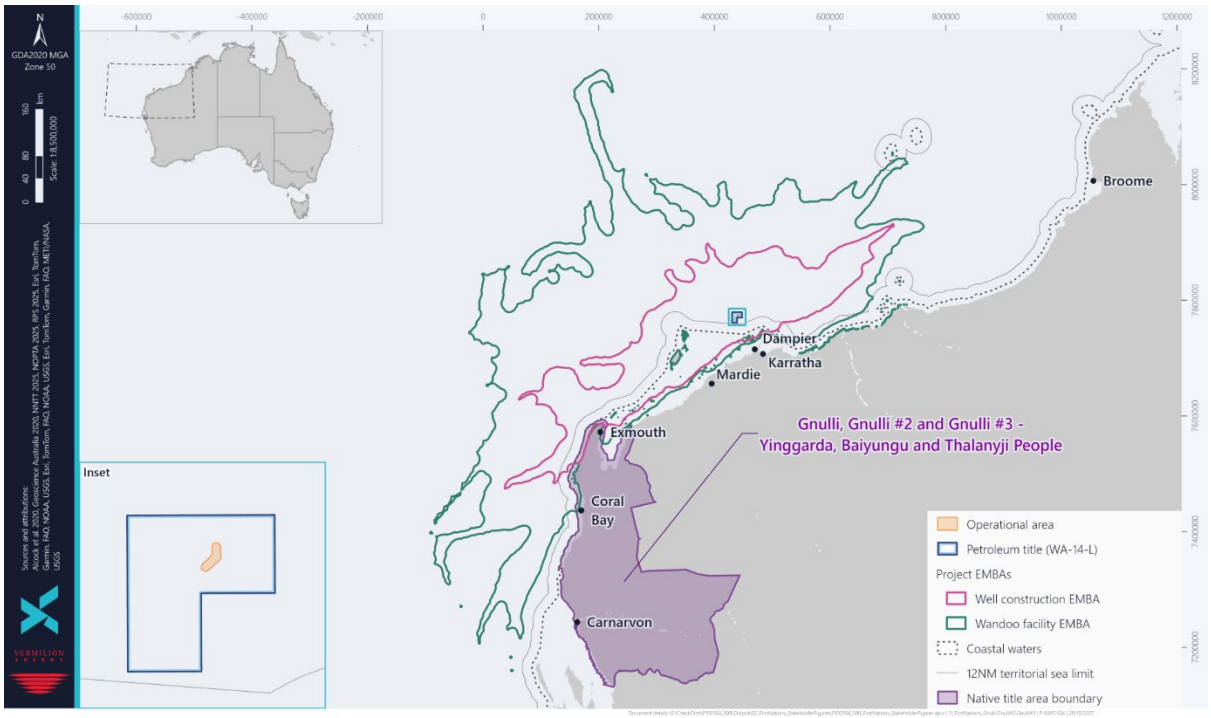
If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at **abu.consultation@vermilionenergy.com** or by phone at **(08) 9217 5858**.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.3.1. Attachment to email to Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC) on 21 October 2025



3.4. Email to Ngarluma Aboriginal Corporation (NAC) on 21 October 2025

Dear [redacted] and Ngarluma representatives

Re: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Dear Jeff and Ngarluma representatives

We reached out in August to advise that Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the Wandoo Facility Environment Plan and Well Construction Environment Plan (EP). We are now providing further information, with the consultation period starting from today.

Relevance for Ngarluma Aboriginal Corporation (NAC)

Vermilion recognises the importance of cultural heritage to the Ngarluma people and are committed to ensuring that these values are respected and integrated into our project planning.

We have determined that Ngarluma Aboriginal Corporation might be a relevant person to the EPs because the planning area for those activities (particularly the 'environment that may be affected' (**EMBA**)) modelling shows:

- an overlap with the Ngarluma/Yindjibarndi People's native title determination; and
- a close proximity to the Ngarluma People's native title determination.

We have attached maps for your consideration.

Reach out directly via email or phone call if this is of interest to you. Alternatively, if NAC does not have an interest in the proposed activities or determines consultation is not required beyond receipt of this information, please let us know.

About these Environment Plan Revisions

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field.

	The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Attached are summary and detailed consultation information sheets that explain the activities we plan to undertake.

Our website includes resources for further information including detailed consultation information sheets and frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Request: Please bring this to the attention of the appropriate representatives from NAC.

Please feel free to forward this email and the attached documents to NAC's members or other people who you think may be interested as required.

Acknowledging our previous and ongoing engagement, we would be happy to provide you a summary of our understanding of your functions, interests and activities, to be documented in the EPs. Providing the option for NAC to review and build upon this with any feedback on the EP.

Feedback on the proposed activities

Our standard consultation period is 30-days, however we are affording additional time to stakeholders like NAC to engage in the process as we are aware there may be limited capacity to engage during the standard 30 day period.

The consultation period is open from today until 17 February 2026.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

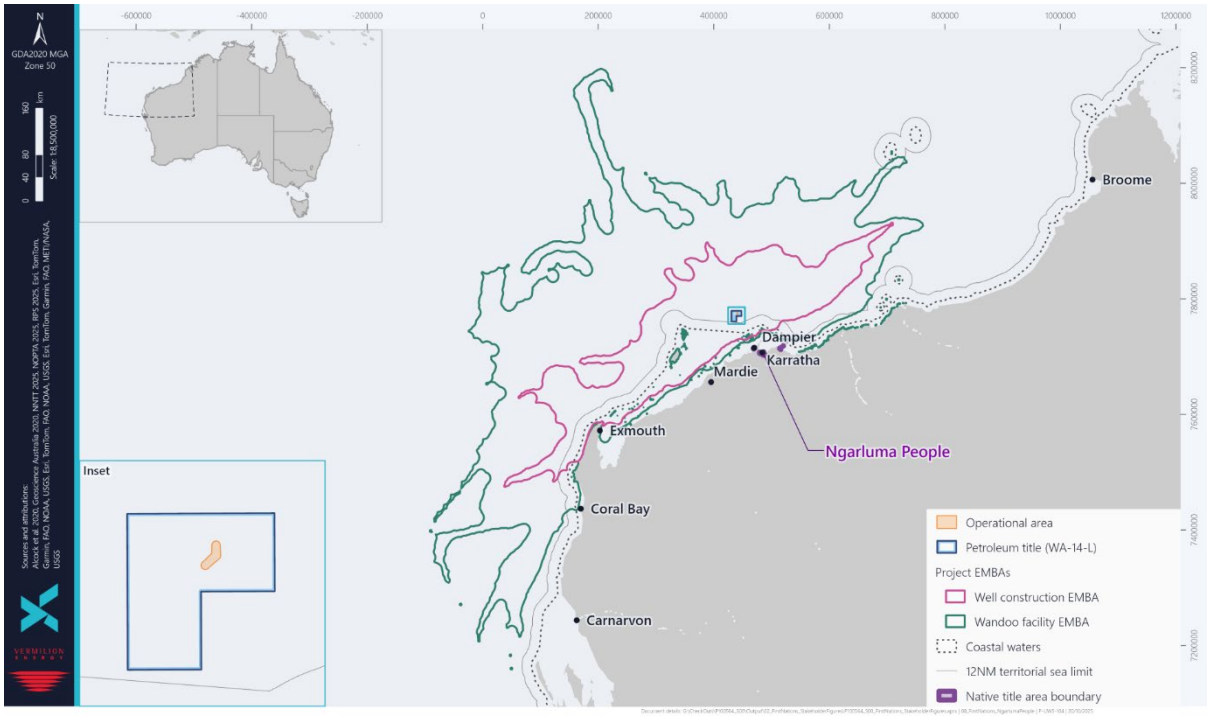
If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at **abu.consultation@vermilionenergy.com** or by phone at **(08) 9217 5858**.

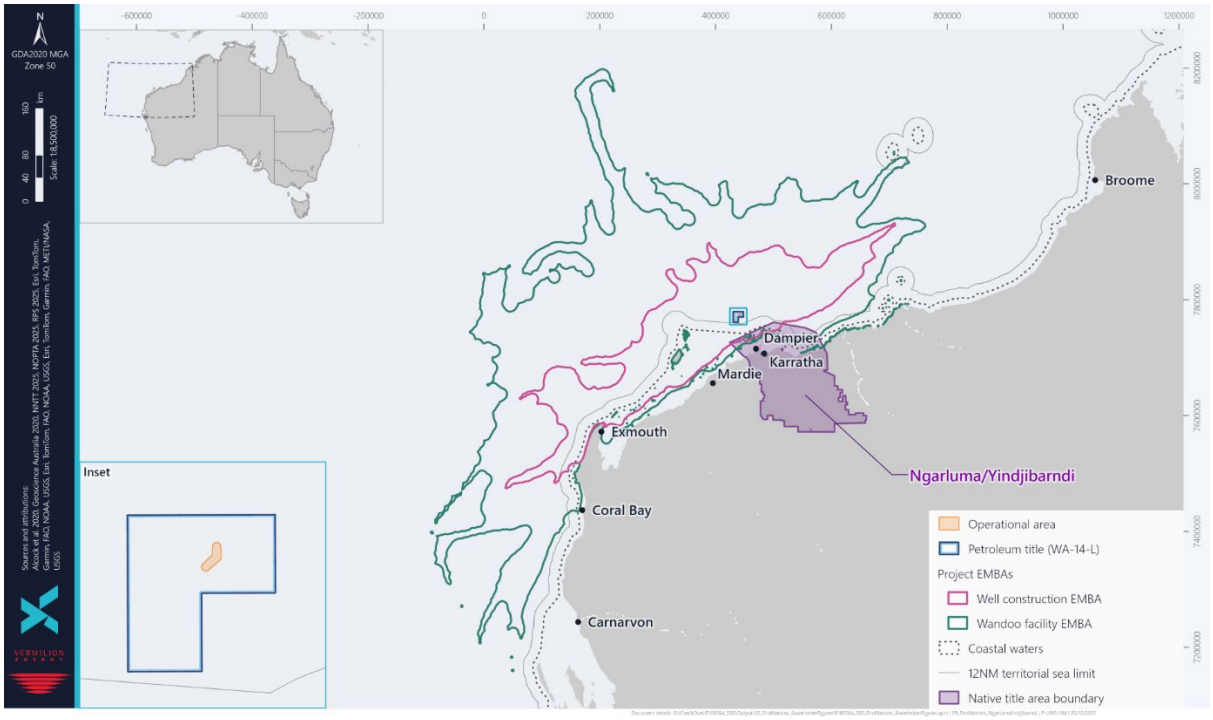
Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.4.1. Attachment to email to Ngarluma Aboriginal Corporation (NAC) on 21 October 2025





3.5. Email to Wanparta Aboriginal Corporation (WAC) on 21 October 2025

Dear [redacted]

Re: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

We reached out in August to advise that Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the Wandoo Facility Environment Plan and Well Construction Environment Plan (EP). We are now providing further information, with the consultation period starting from today.

Relevance for Wanparta Aboriginal Corporation (WAC)

Vermilion recognises the importance of cultural heritage to the Ngarla people and are committed to ensuring that these values are respected and integrated into our project planning.

We have determined that WAC might be a relevant person to the EPs because the planning area for those activities (particularly the 'environment that may be affected' (**EMBA**)) modelling shows an overlap and close proximity with the Ngarla people's native title determination.

We have attached a map for your consideration.

We propose to include an overview and consultation discussion for these two EPs in the agenda at our upcoming meeting in Perth on 28 November 2025.

Of course, if Wanparta does not have an interest in the proposed activities or determines consultation is not required beyond receipt of this information please let us know.

About these Environment Plan Revisions

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Attached are summary and detailed information sheets that explain the activities we plan to undertake.

Our website includes resources for further information including detailed consultation information sheets and frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Request: Please bring this to the attention of the appropriate representatives from Wanparta.

Please feel free to forward this email and the attached documents to Wanparta's members or other people who you think may be interested as required.

Acknowledging our previous and ongoing engagement, we would be happy to provide you a summary of our understanding of your functions, interests and activities, to be documented in the EPs. Providing the option for Wanparta to review and build upon this with any feedback on the EP.

Feedback on the proposed activities

Our standard consultation period is 30-days, however we are affording additional time to stakeholders like Wanparta to engage in the process as we are aware there may be limited capacity to engage during the standard 30 day period.

The consultation period is open from today until 17 February 2026.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

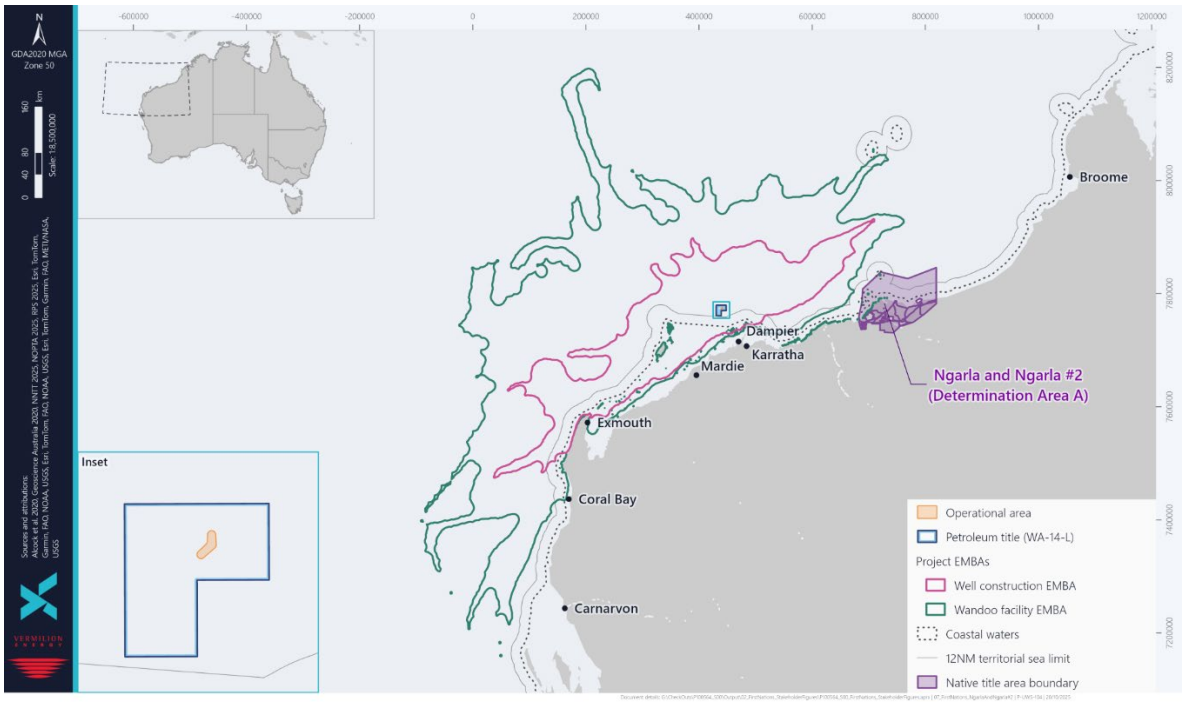
If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at **abu.consultation@vermilionenergy.com** or by phone at **(08) 9217 5858**.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.5.1. Attachment to email to Wanparta Aboriginal Corporation (WAC) on 21 October 2025



3.6. Email to Wirrawandi Aboriginal Corporation (WAC) on 21 October 2025

Dear [redacted] and [redacted]

Re: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

We reached out in August to advise that Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the Wandoo Facility Environment Plan and Well Construction Environment Plan (EP). We are now providing further information, with the consultation period starting from today.

Relevance for Wirrawandi Aboriginal Corporation (WAC)

Vermilion recognises the importance of cultural heritage to the Yaburara & Mardudhunera People and is committed to ensuring that these values are respected and integrated into our project planning.

We have determined that WAC might be a relevant person to the EPs because the planning area for those activities (particularly the 'environment that may be affected' (**EMBA**)) modelling shows an overlap with the Yaburara & Mardudhunera People's native title determination.

We have attached a map for your consideration.

Reach out directly via email if this is of interest to you. Alternatively, if WAC does not have an interest in the proposed activities or determines consultation is not required beyond receipt of this information please let us know.

About these Environment Plan Revisions

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field.

	The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Attached are summary and detailed consultation information sheets that explain the activities we plan to undertake.

Our website includes resources for further information including detailed consultation information sheets and frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Request: Please bring this to the attention of the appropriate representatives from WAC.

Please feel free to forward this email and the attached documents to WAC members or other people who you think may be interested as required.

Feedback on the proposed activities

Our standard consultation period is 30-days, however we are affording additional time to stakeholders like WAC to engage in the process as we are aware there may be limited capacity to engage during the standard 30 day period.

The consultation period is open from today until 17 February 2026.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at **abu.consultation@vermilionenergy.com** or by phone at **(08) 9217 5858**.

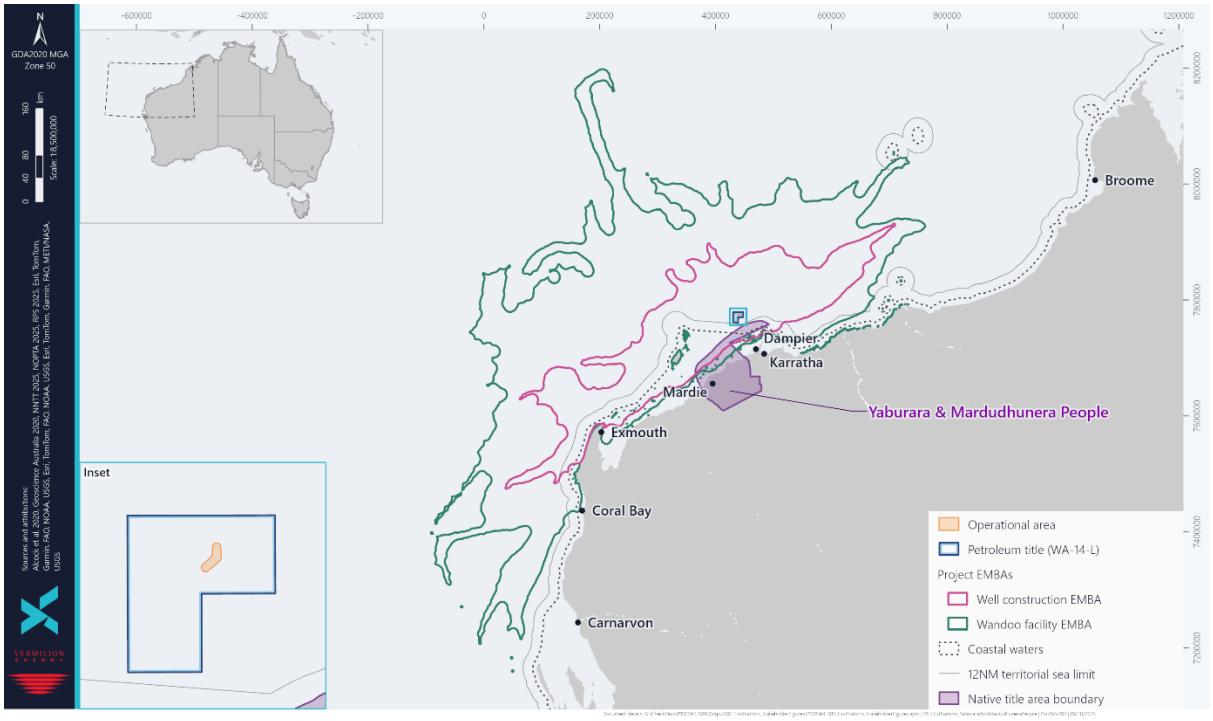
Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in

accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.6.1. Attachment to email to Wirrawandi Aboriginal Corporation (WAC) on 21 October 2025



3.7. Email to Murujuga Aboriginal Corporation (MAC) on 21 October 2025

Dear [redacted] and [redacted]

Re: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

We reached out in August to advise that Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the Wandoo Facility Environment Plan and Well Construction Environment Plan (EP). We are now providing further information, with the consultation period starting from today.

Relevance for Murujuga Aboriginal Corporation (MAC)

Vermilion recognises the importance of cultural heritage to MAC's members and First Nations people. We and are committed to ensuring that these values are respected and integrated into our project planning.

We have determined that MAC might be a relevant person to the EPs because the planning area for those activities (particularly the 'environment that may be affected' (**EMBA**)) modelling shows an overlap with the Murujuga National Park.

We have attached a map for your consideration.

Your previous email that a meeting is not considered necessary by MAC to discuss these matters.

Reach out directly via email or phone call if this is of interest to you. Alternatively, if MAC does not have an interest in the proposed activities or determines consultation is not required beyond receipt of this information please confirm and let us know.

About these Environment Plan Revisions

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Attached are summary and detailed information sheets that explain the activities we plan to undertake.

Our website includes resources for further information including detailed consultation information sheets and frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Request: Please bring this to the attention of the appropriate representatives from MAC. We note from your previous email it may be reviewed by the environment and heritage teams.

Please feel free to forward this email and the attached documents to other MAC representatives or members or other people who you think may be interested as required.

Feedback on the proposed activities

Our standard consultation period is 30-days, however we are affording additional time to stakeholders like MAC to engage in the process as we are aware there may be limited capacity to engage during the standard 30 day period.

The consultation period is open from today until 17 February 2026.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

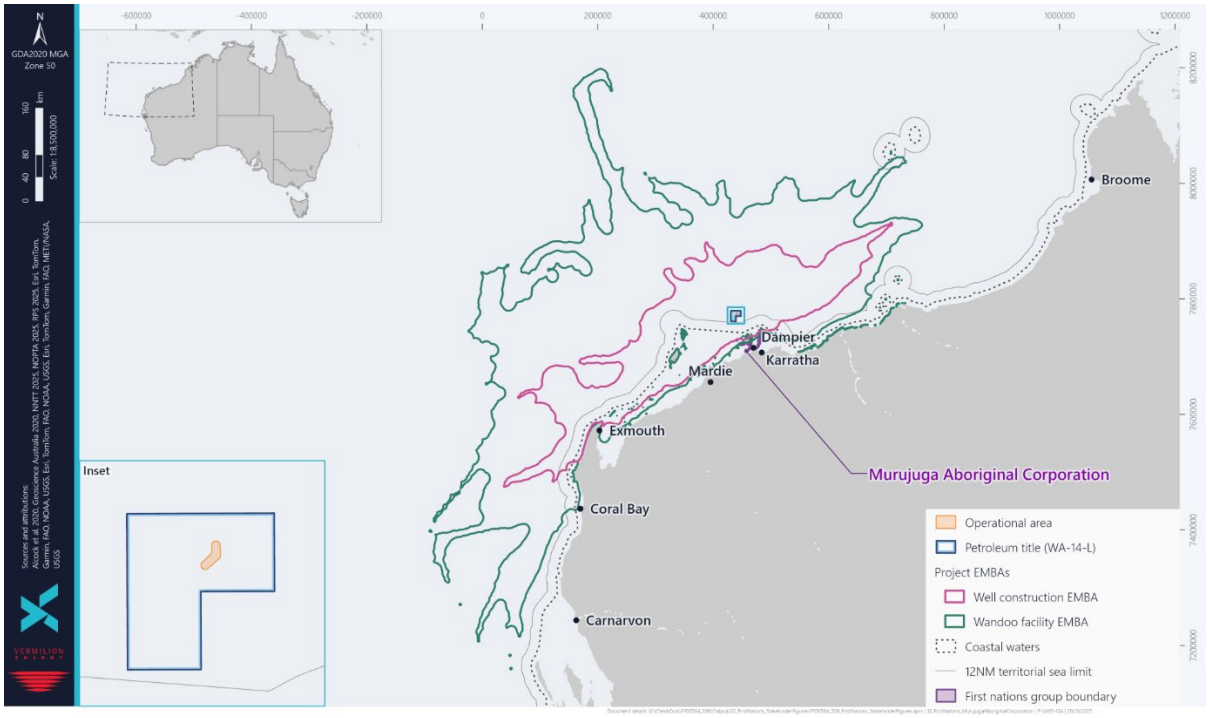
If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at **abu.consultation@vermilionenergy.com** or by phone at **(08) 9217 5858**.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.7.1. Attachment to email to Murujuga Aboriginal Corporation (MAC) on 21 October 2025



3.8. Email to Karajarri Traditional Lands Association (Aboriginal Corporation) RNTBC (KTLA) on 22 October 2025

Dear [redacted]

We reached out in August to advise that Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the Wandoo Facility Environment Plan and Well Construction Environment Plan. We are now providing further information, with the consultation period starting from today.

Relevance for Karajarri Traditional Lands Association

We have determined that Karajarri is not a relevant person to the Environment Plans because the planning area for those activities (particularly the 'environment that may be affected' (**EMBA**)) modelling shows no close proximity to the Karajarri native title determination.

However, If KTLA considers it is relevant to the proposed activities and would like to participate in the process or provide feedback, Vermilion welcomes consulting with representatives for the KTLA.

We have attached a map for your consideration. Reach out directly via email or phone call if this is of interest to you.

About these Environment Plan Revisions

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM

	Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Attached are summary and detailed information sheets that explain the activities we plan to undertake.

Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Request: Please bring this to the attention of the appropriate representatives from KTLA.

Please feel free to forward this email and the attached documents to KTLA members or other people who you think may be interested as required.

Feedback on the proposed activities

Our standard consultation period is 30-days, however we are affording additional time to stakeholders like KTLA to engage in the process as we are aware there may be limited capacity to engage during the standard 30-day period.

The consultation period is open from today until 17 February 2026.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

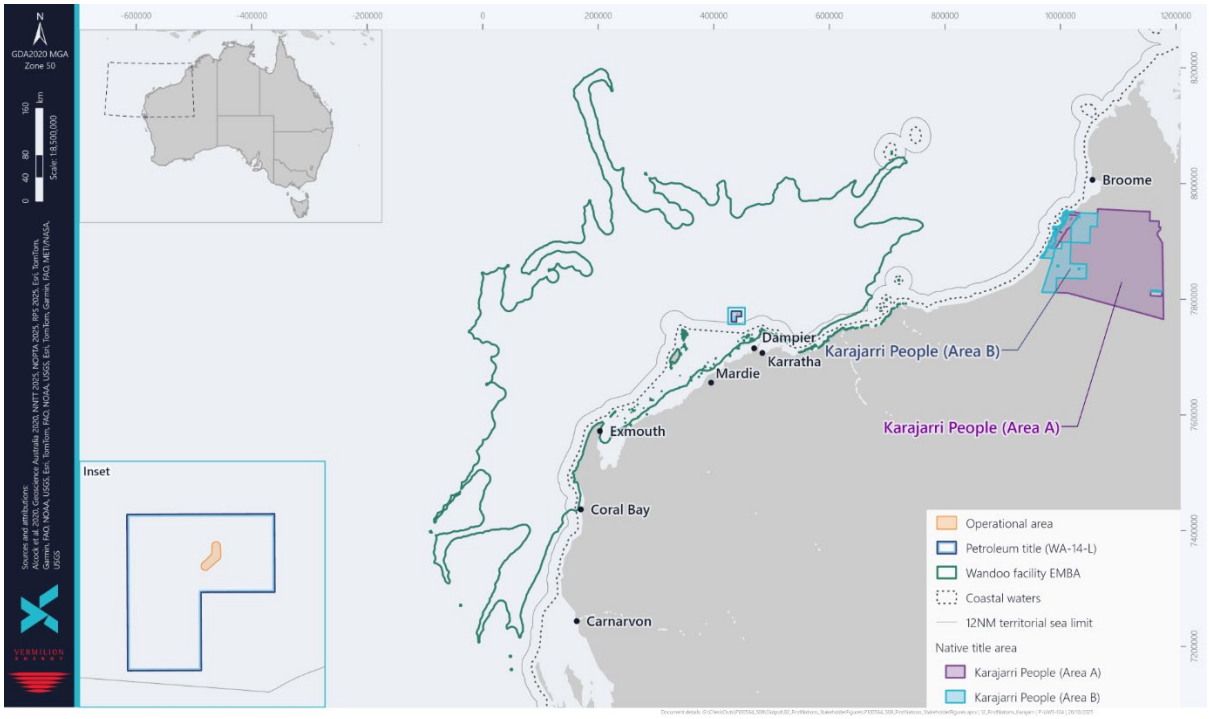
If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at **abu.consultation@vermilionenergy.com** or by phone at **(08) 9217 5858**.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.8.1. Attachment to email to Karajarri Traditional Lands Association (Aboriginal Corporation) RNTBC (KTLA) on 22 October 2025



3.9. Email to Malgana Aboriginal Corporation (MAC) on 22 October 2025

Dear Malgana Aboriginal Corporation

We reached out in August to advise that Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the Wandoo Facility Environment Plan and Well Construction Environment Plan. We are now providing further information, with the consultation period starting from today.

Relevance for Malgana Aboriginal Corporation

We have determined that Malgana Aboriginal Corporation is not a relevant person to the Environment Plans because the planning area for those activities (particularly the 'environment that may be affected' (**EMBA**)) modelling shows no proximity to the Malgana people's native title determination.

However, If Malgana Aboriginal Corporation considers it is relevant to the proposed activities and would like to participate in the process or provide feedback, Vermilion welcomes consulting with representatives from the Malgana Aboriginal Corproation.

We have attached a map for consideration. Reach out directly via email or phone call if this is of interest to Malgana.

About these Environment Plan Revisions

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the

	Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Attached are summary and detailed information sheets that explain the activities we plan to undertake.

Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Request: Please bring this to the attention of the appropriate representatives from Malgana Aboriginal Corporation.

Please feel free to forward this email and the attached documents to Malgana members or other people who you think may be interested as required.

Feedback on the proposed activities

Our standard consultation period is 30-days, however we are affording additional time to stakeholders like Malgana Aboriginal Corporation to engage in the process as we are aware there may be limited capacity to engage during the standard 30 day period.

The consultation period is open from today until 17 February 2026.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

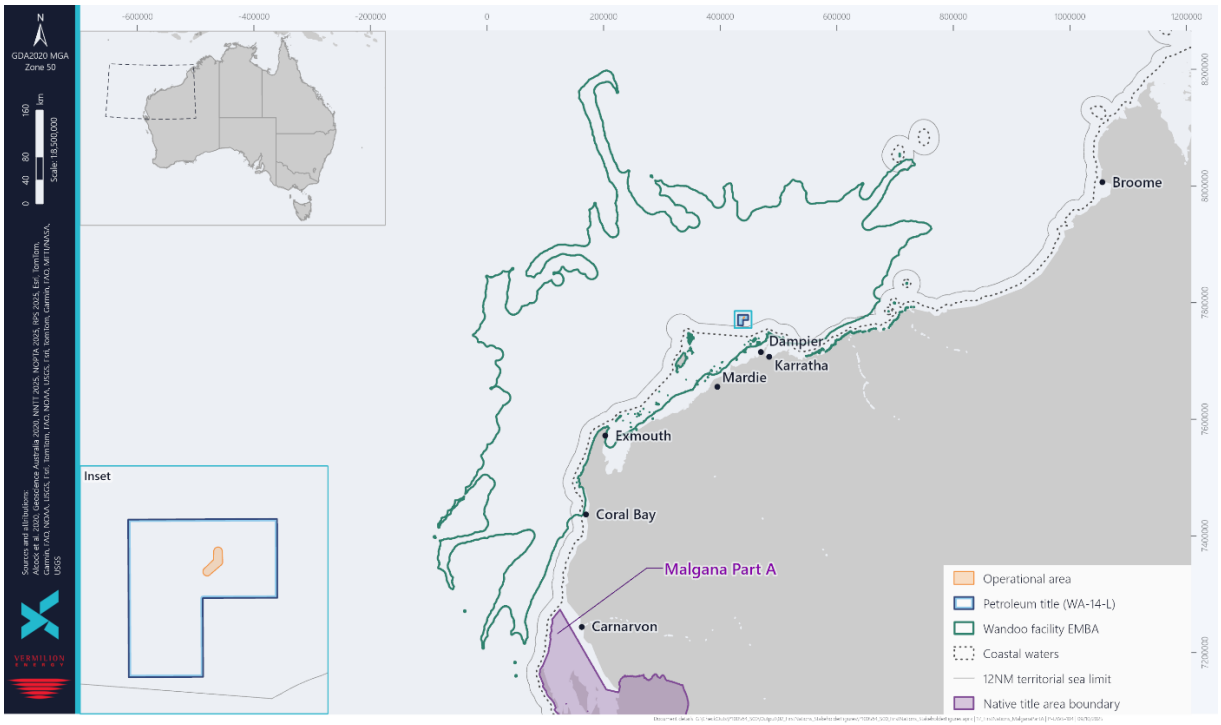
If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at **abu.consultation@vermilionenergy.com** or by phone at **(08) 9217 5858**.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.9.1. Attachment to email to Malgana Aboriginal Corporation (MAC) on 22 October 2025



3.10. Email to Nanda Aboriginal Corporation RNTBC (NAC) on 22 October 2025

Dear [redacted]

We reached out in August to advise that Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the Wandoo Facility Environment Plan and Well Construction Environment Plan. We are now providing further information, with the consultation period starting from today.

Relevance for Nanda Aboriginal Corporation

We have determined that Nanda Aboriginal Corporation is not a relevant person to the Environment Plan(s) because the planning area for those activities (particularly the 'environment that may be affected' (**EMBA**)) modelling shows no proximity to the Nanda People's native title determination.

However, If Nanda Aboriginal Corporation considers it is relevant to the proposed activities and would like to participate in the process or provide feedback, Vermilion welcomes consulting with representatives from Nanda.

We have attached a map for your consideration. Reach out directly via email or phone call if this is of interest to you.

About these Environment Plan Revisions

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM

	Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Attached are summary and detailed information sheets that explain the activities we plan to undertake.

Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Request: Please bring this to the attention of the appropriate representatives from the Nanda Aboriginal Corporation.

Please feel free to forward this email and the attached documents to Nanda members or other people who you think may be interested as required.

Feedback on the proposed activities

Our standard consultation period is 30-days, however we are affording additional time to stakeholders like Nanda to engage in the process as we are aware there may be limited capacity to engage during the standard 30 day period.

The consultation period is open from today until 17 February 2026.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

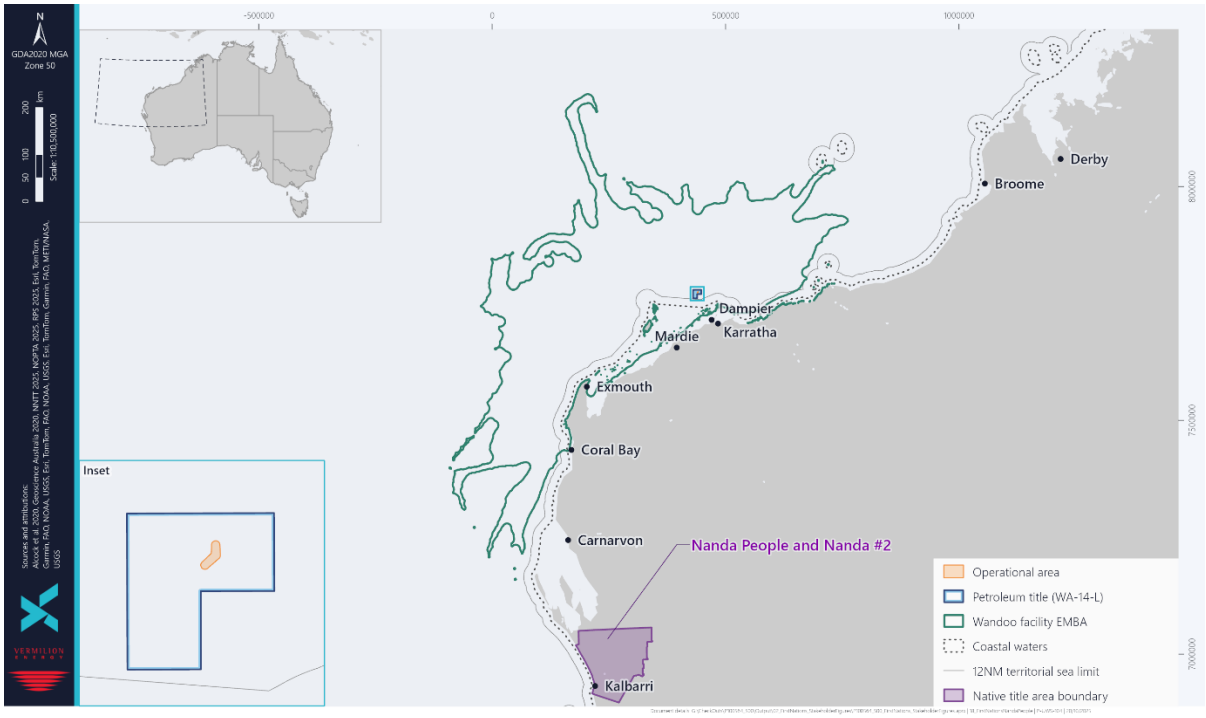
If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at **abu.consultation@vermilionenergy.com** or by phone at **(08) 9217 5858**.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.10.1. Attachment to email to Nanda Aboriginal Corporation RNTBC (NAC) on 22 October 2025



3.11. Email to Nyangumarta Karajarri Aboriginal Corporation RNTBC (NKAC) on 22 October 2025

Dear [redacted] and [redacted]

We reached out in August to advise that Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the Wandoo Facility Environment Plan and Well Construction Environment Plan. We are now providing further information, with the consultation period starting from today.

Relevance for Nyangumarta Karajarri Aboriginal Corporation (NKAC)

We have determined that NKAC is not a relevant person to the Environment Plans because the planning area for those activities (particularly the 'environment that may be affected' (**EMBA**)) modelling shows no proximity to the Nyangumarta Karajarri People's native title determination.

However, If NKAC considers it is relevant to the proposed activities and would like to participate in the process or provide feedback, Vermilion welcomes consulting with representatives from NKAC.

We have attached a map for consideration. Reach out directly via email or phone call if this is of interest to NKAC.

About these Environment Plan Revisions

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Attached are summary and detailed information sheets that explain the activities we plan to undertake.

Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Request: Please bring this to the attention of the appropriate representatives from NKAC.

Please feel free to forward this email and the attached documents to NKAC members or other people who you think may be interested as required.

Feedback on the proposed activities

Our standard consultation period is 30-days, however we are affording additional time to stakeholders like NKAC to engage in the process as we are aware there may be limited capacity to engage during the standard 30 day period.

The consultation period is open from today until 17 February 2026.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

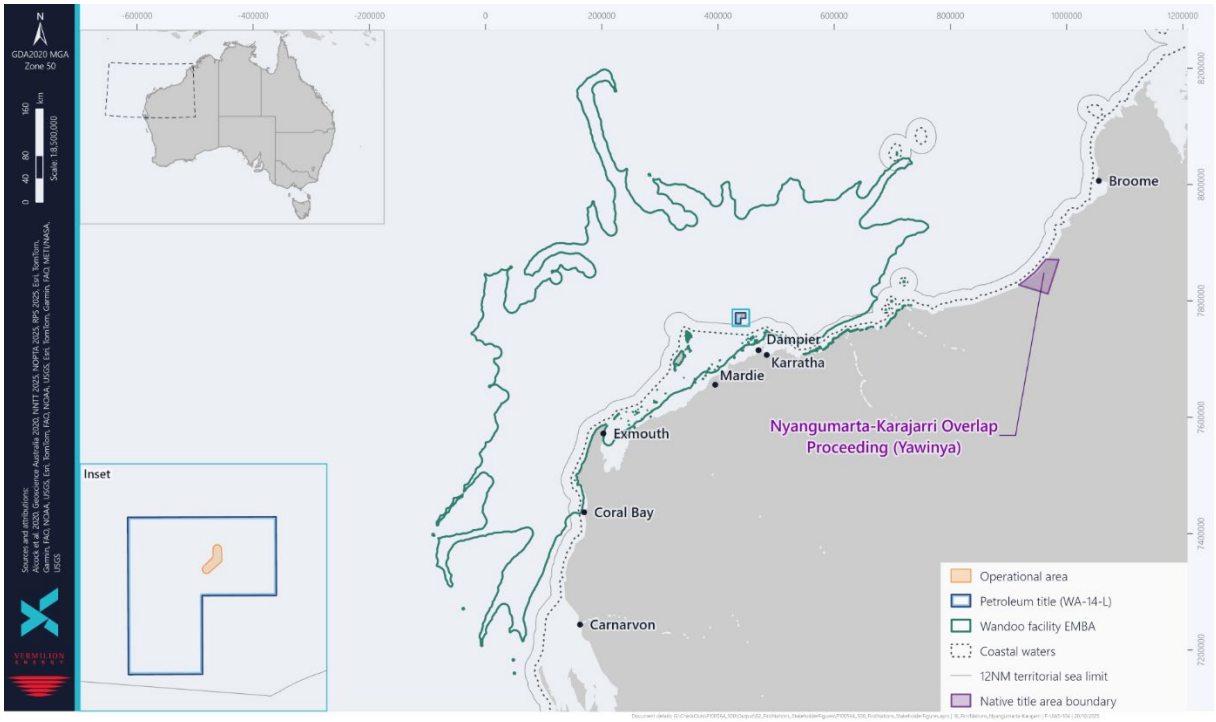
If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at **abu.consultation@vermilionenergy.com** or by phone at **(08) 9217 5858**.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.11.1. Attachment to email to Nyangumarta Karajarri Aboriginal Corporation RNTBC (NKAC) on 22 October 2025



3.12. Email to Nyangumarta Warrarn Aboriginal Corporation RNTBC (NWAC) on 21 October 2025

Dear [redacted] and the NWAC engagement team

We reached out in August to advise that Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the Wandoo Facility Environment Plan and Well Construction Environment Plan. We are now providing further information, with the consultation period starting from today.

Relevance for Nyangumarta Warrarn Aboriginal Corporation (NWAC)

We have determined that Nyangumarta Warrarn Aboriginal Corporation is not a relevant person to the Environment Plans because the planning area for those activities (particularly the 'environment that may be affected' (**EMBA**)) modelling shows no proximity to the Nyangumarta People (Part A)'s native title determination.

However, If NWAC considers it is relevant to the proposed activities and would like to participate in the process or provide feedback, Vermilion welcomes consulting with representatives of NWAC.

We have attached a map for your consideration. Reach out directly via email or phone call if this is of interest to NWAC.

About these Environment Plan Revisions

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a

	Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Attached are summary and detailed information sheets that explain the activities we plan to undertake.

Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Request: Please bring this to the attention of the appropriate representatives from NWAC.

Please feel free to forward this email and the attached documents to NWAC members or other people who you think may be interested as required.

Feedback on the proposed activities

Our standard consultation period is 30-days, however we are affording additional time to stakeholders like NWAC to engage in the process as we are aware there may be limited capacity to engage during the standard 30-day period.

The consultation period is open from today until 17 February 2026.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

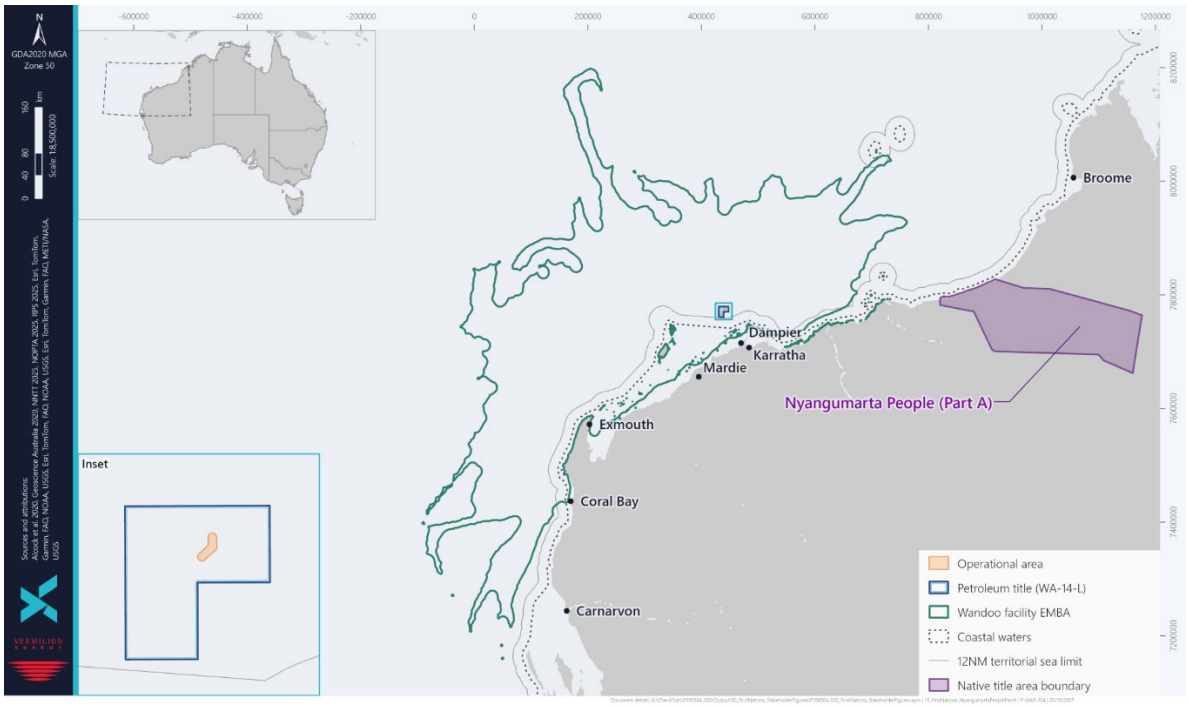
If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at **abu.consultation@vermilionenergy.com** or by phone at **(08) 9217 5858**.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.12.1. Attachment to email to Nyangumarta Warrarn Aboriginal Corporation RNTBC (NWAC) on 21 October 2025



3.13. Email to Yawuru Native Title Holders Aboriginal Corporation RNTBC (Yawuru) on 22 October 2025

Dear [redacted]

We reached out to you previously about Consultation on Vermilion Oil and Gas Australia Pty Ltd (Vermilion)'s Wandoo Field Exploration Drilling Environment Plan, see email attached.

This email is a general follow up and to also advise that Vermilion is planning to submit five yearly revisions of the Wandoo Facility Environment Plan and Well Construction Environment Plan.

We are providing information about these EPs, with the consultation period starting from today.

Relevance for Yawuru Native Title Holders Aboriginal Corporation (Yawuru)

We have determined that Yawuru is not a relevant person to the Environment Plans because the planning area for those activities (particularly the 'environment that may be affected' (**EMBA**)) modelling shows no proximity to the Rubibi Community's native title determination.

However, If Yawuru considers it is relevant to the proposed activities and would like to participate in the process or provide feedback, Vermilion welcomes consulting with representatives of Yawuru.

We have attached a map for your consideration. Reach out directly via email or phone call if this is of interest to Yawuru.

Also, please let us know if there is any outcome and response to the correspondence attached for the Wandoo Field Exploration Drilling Environment Plan.

About these Environment Plan Revisions

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field.

	The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Attached are summary and detailed information sheets that explain the activities we plan to undertake.

Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Request: Please bring this to the attention of the appropriate representatives from Yuwuru.

Please feel free to forward this email and the attached documents to Yuwuru members or other people who you think may be interested as required.

Feedback on the proposed activities

Our standard consultation period is 30-days, however we are affording additional time to stakeholders like Yuwuru to engage in the process as we are aware there may be limited capacity to engage during the standard 30-day period.

The consultation period is open from today until 17 February 2026.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

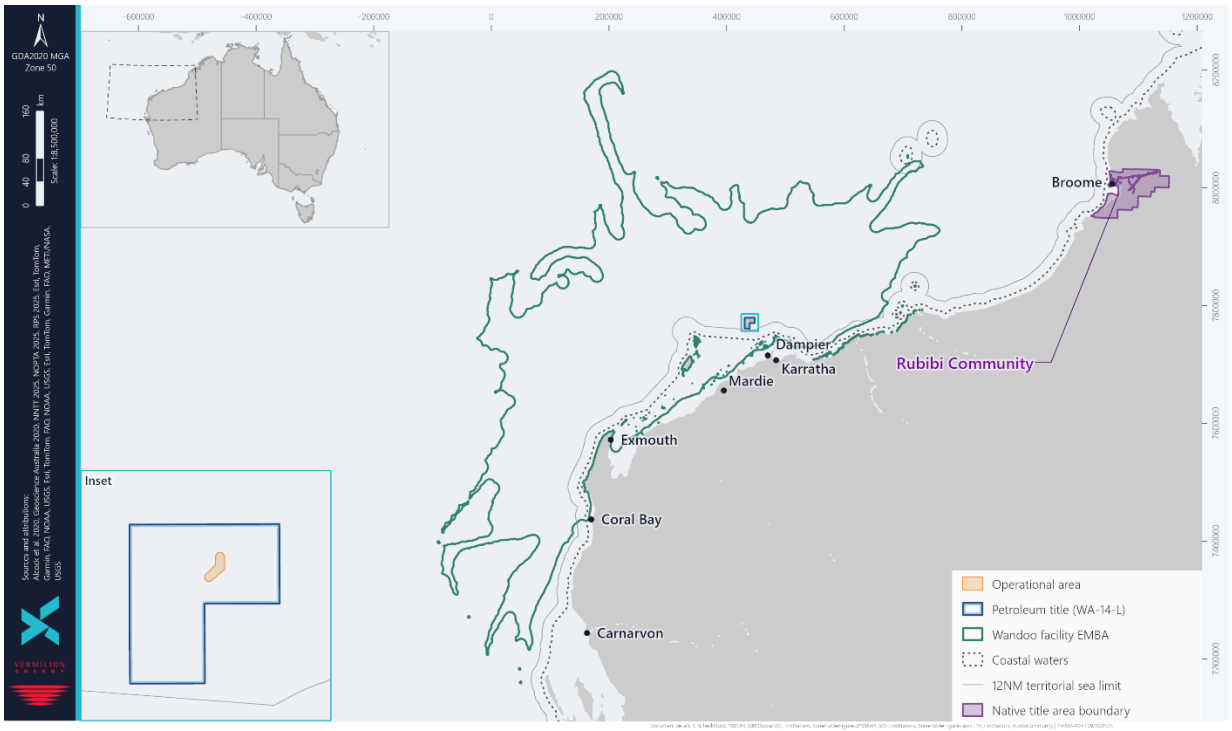
If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at **abu.consultation@vermilionenergy.com** or by phone at **(08) 9217 5858**.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.13.1. Attachment to email to Yawuru Native Title Holders Aboriginal Corporation RNTBC (Yawuru) on 22 October 2025



3.14. Email to Australian Border Force (ABF) (Maritime Border Command) on 22 October 2025

Dear ABF,

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete.

	As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.15. Email to Australian Fisheries Management Authority (AFMA) on 22 October 2025

Dear AFMA,

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Information for the commercial fishing sector

Fisheries have been identified as relevant to the proposed activity based on fishing licence overlap, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth. A summary of the relevant commonwealth and state managed fisheries are included in the Commercial Fishing Information Sheets attached.

We have identified potential impacts to active commercial fishers and the environment, which are also summarised in the Commercial Fishing Information Sheets. We have endeavoured to reduce these risks to as low as reasonably practicable (ALARP).

Information about exclusionary and cautionary zones and communication with fishers and mariners are included in the attached documents.

Vermilion has acknowledged consultation guidance from Commonwealth commercial fishing industry associations, where applicable and has contacted relevant industry associations directly. Fishing industry associations we have contacted include: **Australian Southern Bluefin Tuna Fishery Association; Commonwealth Fisheries Association; Pearl Producers Association; Tuna Australia; Seafood Industry Australia.**

Vermilion also consults with **WAFIC** and has acknowledged WAFIC's consultation guidance and has applied this by consulting state managed fisheries assessed as having a potential for interaction surrounding the operational area via WAFIC.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.16. Email to Australian Maritime Safety Authority (AMSA) – maritime safety, Australian Maritime Safety Authority (AMSA) – marine pollution, and Australian Hydrographic Office (AHO) on 22 October 2025

Dear AMSA and AHO,

Re: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

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These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells.

	The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

We acknowledge your advice and confirm that we will provide a minimum of four working weeks' notice to the AHO prior to any activity. A shipping lane map is also attached.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

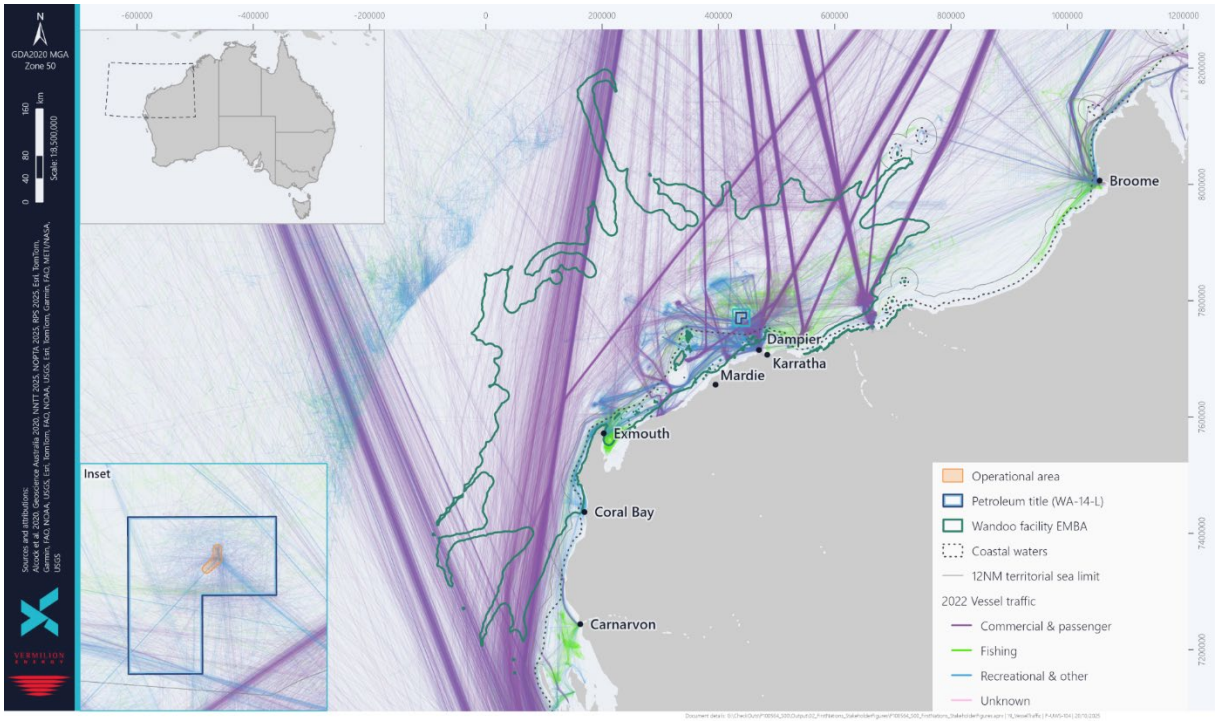
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Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.16.1. Attachment to email to Australian Maritime Safety Authority (AMSA) – maritime safety, Australian Maritime Safety Authority (AMSA) – marine pollution, and Australian Hydrographic Office (AHO) on 22 October 2025



3.17. Email to Department of Agriculture, Forestry and Fisheries (DAFF) – Fisheries and Department of Agriculture, Forestry and Fisheries (DAFF) – Biosecurity (marine pests) (vessels, aircraft and personnel) on 22 October 2025

Dear DAFF,

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
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Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Biosecurity

With respect to the biosecurity matters, please note the following information below outlines our proposed biosecurity risk management to prevent the introduction of invasive marine species:

Environment Description and Assessment
The Operational Area is located in a deep-water (50-60 m) open-ocean environment that is ~63 km (34 nm) from the nearest shoreline and has a lack of hard substrate. Values and sensitivities of benthic habitats and communities within the operational area are limited to soft sediment benthic habitats that are widespread and homogenous in the North West Shelf (NWS). ROV surveys on the NWS, at similar water depths to those in the operational area, have indicated the seafloor is comprised of fine silt/sand substrates and benthic communities were generally sparse with low densities of organisms (e.g. crustaceans, molluscs, and polychaetes). Further, no key ecological features, often associated with provided hard substrate habitats are located within the operational area. Therefore, it is considered that the operational area does not provide a location conducive to marine pest establishment and survival, and that there is little potential for invasive organisms to accumulate and multiply. Displacement of native marine species or a reduction in abundance from predation, competition or interspecies breeding is not expected to occur.
Invasive Marine Species Prevention Controls
Vessels will have an approved ballast water management plan and valid ballast water management certificate, unless an exemption applies or is obtained, as specified in the Australian Ballast Water Management Requirements. Vessels will complete a Vermilion Biofouling Risk Assessment, identifying a low risk before mobilisation to the Operational Area: • Biofouling risk based on a range of information including presence of a biofouling management plan and record book, last port of call, age of anti-fouling coating etc. If a risk category of moderate, uncertain or high is scored, the process requires an independent IMS expert to be engaged and further risk assessment and/or management measures undertaken. Anti-fouling Systems on vessels are maintained in compliance with International Convention on the Control of Harmful Anti-Fouling Systems on Ships (IMO, 2001): • Prohibits the use of harmful organotins in antifouling paints used on ships and establishes a mechanism to prevent the potential future use of other harmful substances in anti-fouling systems.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.18. Email to Department of Defence (DoD) on 22 October 2025

Dear Department of Defence

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
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These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the

	Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Information on defence training area and restricted airspace

There are no defence related uses within the operational area. The EMBAs encompasses the military installations near Exmouth, including a naval communication station. The Department of Defence has several offshore training areas including the North West Exercise Area (NWXA) (approximately 95 km southwest of the operational area) and Learmonth Air Weapons Range (approximately 275 km west-southwest of the operational area) in the EMBAs. These areas are used for Defence Force training exercises, including live firing. No unexploded ordnance (UXO) potential has been identified within the operational area.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.19. Email to Department of Industry, Science and Resources (DISR) on 22 October 2025

Dear DISR,

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
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Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the

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Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

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Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.20. Email to Director of National Parks (DNP) on 22 October 2025

Dear Director of National Parks,

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
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These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

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These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
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Australian Marine Parks (AMPs)

We note Australian Government Guidance on consultation activities and confirm that:

- No Australian Marine Parks (AMPs) are within the operational area. The nearest AMPs to the operational area are:
    - Montebello AMP ~37 km to the west
    - Dampier AMP ~47 km to the south east
    - Montebello Islands Marine Part (State) ~ 75 km to the west-south west
    - Barrow Island Marine Management Area (State) ~89 km to the west-south west.
- We have assessed potential risks to AMPs in the development of the proposed EPs and believe that there are no credible risks as part of planned activities that have potential to impact the values of the Marine Parks.

A National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) approved oil spill response plan will be in place for the duration of the activities, which will include notification to relevant agencies and organisations as to the nature and scale of the event, as soon as practicable following an occurrence. The Director of National Parks will be advised if an environmental incident occurs that may impact on the values of the Marine Park.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the NOPSEMA for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.21. Email to Department of Mines, Petroleum and Exploration (DMPE) on 22 October 2025

Dear DMPE,

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM

	Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.22. Email to Department of Primary Industries and Regional Development (DPIRD) – Fisheries on 22 October 2025

Dear DPIRD,

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete.

	As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Information relating to commercial fisheries

Fisheries have been identified as relevant to the proposed activity based on fishing licence overlap, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth. A summary of the relevant commonwealth and state managed fisheries are included in the Commercial Fishing Information Sheets attached.

We have identified potential impacts to active commercial fishers and the environment, which are also summarised in the Commercial Fishing Information Sheets. We have endeavoured to reduce these risks to an as low as reasonably practicable (ALARP).

Information about exclusionary and cautionary zones and communication with fishers and mariners are included in the attached documents.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.23. Email to Department of Biodiversity, Conservation and Attractions (DBCA) on 22 October 2025

Dear DBCA

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete.

	As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Environmental Management and Regulatory Commitments

- Vermilion appreciates the guidance provided by DBCA in previous consultations about ecologically important areas within the Environment that May Be Affected (EMBA). We confirm that these areas have been assessed as part of the Environment Plan development. Vermilion maintains a strong understanding of ecological values within and adjacent to our operational areas, and within the EMBA.
- An assessment of potential management and mitigation measures has been undertaken, and relevant controls have been incorporated into the EPs to ensure impacts are reduced to as low as reasonably practicable (ALARP).
- In accordance with Regulations 21(1)–(7) of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, under the *Commonwealth Offshore Petroleum and Greenhouse Gas Storage Act 2006*, Vermilion includes in its EPs a description of the existing environment, including the particular values and sensitivities within and near operational areas and the EMBA, to support impact assessment and risk evaluation.
- Regarding the *National Light Pollution Guidelines for Wildlife*, Vermilion confirms that these guidelines, issued by the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW), have been referenced in the development of our EPs. We acknowledge these guidelines as industry best practice for managing potential impacts of light pollution on marine fauna.
- In relation to incidents and emergency response, Vermilion confirms that our Oil Pollution Emergency Plan (OPEP) includes notification to DBCA's Pilbara regional office in the event of a spill where marine wildlife may be affected. We also acknowledge that DBCA does not implement oiled wildlife response on behalf of petroleum operators.
- Finally, Vermilion advises that we have referred to guidance from the Department of Transport and Major Infrastructure (DTMI) and consulted with DTMI – Marine Pollution as the jurisdictional authority during the development of our OPEP.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.24. Email to Department of Transport and Major Infrastructure (DTMI) – marine pollution on 22 October 2025

Dear DTMI,

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

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These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field.

	The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Information for DTMI

Vermilion has provided the requested information as per Appendix 6 of the Department of Transport Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements (July 2020) for both EPs in an attachment.

Do let us know if you require further information following your review.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.25. Email to Pilbara Development Commission (PDC) on 22 October 2025

Dear Pilbara Development Commission

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM

	Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

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Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.26. Email to Pilbara Ports Authority (PPA) on 22 October 2025

Dear Pilbara Ports,

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

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These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete.

	As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

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Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.27. Email to Western Australian Fishing Industry Council (WAFIC) on 22 October 2025

Dear WAFIC,

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further

information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Information for the commercial fishing sector

Fisheries have been identified as relevant to the proposed activity based on fishing licence overlap, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth. A summary of the relevant commonwealth and state managed fisheries are included in the Commercial Fishing Information Sheet attached.

We have identified potential impacts to active commercial fishers and the environment, which are also summarised in the commercial fishing information sheet attached. We have endeavoured to reduce these risks to an as low as reasonably practicable (ALARP).

Information about exclusionary and cautionary zones and communication with fishers and mariners are included in the attached documents.

Vermilion acknowledges WAFIC's consultation guidance and has applied this, by consulting fisheries assessed as having a potential for interaction surrounding the operational area via WAFIC.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

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Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.28. Email to 3D Energi Limited, Beagle No. 1 Pty Ltd / Longreach Capital Investment, BP Developments Australia, Finder No 16 Pty Ltd, INPEX Browse E&P Pty Ltd, Jadestone Energy (Australia) Pty Ltd, Kato Energy (WA) Pty Ltd, Kufpec (Perth) Pty Ltd, MEO International Pty Ltd, Mobil Australia Resources Company Pty Limited, Santos Offshore Pty Ltd, Shell Australia Pty Ltd, Western Gas (474 P) Pty Ltd, and Woodside Energy (Australia) Pty Ltd on 22 October 2025

Dear Titleholder

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
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These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

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Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

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Feedback on the proposed activities

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The consultation period is open from today until 21 November 2025. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.29. Email to Australian Energy Producers (AEP) on 22 October 2025

Dear AEP

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.

Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until 21 November 2025. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.30. Email to Vocus Communications on 22 October 2025

Dear Vocus

Re: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells.

	The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until 21 November 2025. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.31. Email to Curtin University (Centre for Marine Science and Technology), University of Western Australia (UWA), Commonwealth Scientific and Industrial Research Organisation (CSIRO), Western Australian Marine Science Institution (WAMSI), Australian Institute of Marine Science (AIMS), and Australian Marine Sciences Association (WA Branch) on 22 October 2025

Dear Stakeholder,

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.

Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Vermilion is also seeking your feedback for the EP regarding any research activities that you may be undertaking that could be affected by our proposed activities.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.32. Email to City of Karratha, Town of Port Hedland, Shire of Ashburton, Shire of Exmouth, Port Hedland Chamber of Commerce and Industry, Onslow Chamber of Commerce and Industry, Western Australian Local Government Association (WALGA), Karratha and Districts Chamber of Commerce and Industry (KDCCI), Regional Development Australia (Pilbara) Karratha WA, WA Game Fishing Association (WAGFA), Recfishwest, Marine Tourism WA, Ashburton Anglers, Exmouth Game Fishing Club (EGFC), King Bay Game Fishing Club (KBFC), and Nickol Bay Sportsfishing Club (NBSC) on 22 October 2025

Dear Stakeholder

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
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These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

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Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

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These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until 21 November 2025. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

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Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.33. Email to Protect Ningaloo on 22 October 2025

Dear Protect Ningaloo

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

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Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.34. Email to The Conservation Council of WA (CCWA), Care for Hedland, and Western Australian Marine Conservation Society (AMCS) on 22 October 2025

Dear Stakeholder

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

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Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.35. Email to Australian Conservation Foundation (ACF), Greenpeace Australia Pacific (GAP), and Wilderness Society (WS) on 22 October 2025

Dear Stakeholder

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

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Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

As part of this process, we have assessed your functions, interests, and activities using publicly available information in relation to the proposed activities. Based on this assessment, we have determined that they are not likely to be affected by the potential risks and impacts of the planned activities, in line with the intended outcomes of the consultation process.

However, we acknowledge that stakeholders are best placed to determine whether their interests may be affected. If you believe your functions, interests, or activities could be impacted by the proposed activities, we invite you to self-identify with this information and participate in the consultation process.

The consultation period is open from today until 21 November 2025. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at **abu.consultation@vermilionenergy.com** or by phone at **(08) 9217 5858**.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.36. Email to Department of Climate Change, Energy, the Environment and Water (DCCEEW) – Underwater Cultural Heritage (UCH) on 22 October 2025

Dear DCCEEW,

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

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Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the operational area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Underwater cultural heritage

Vermilion is undertaking an assessment of underwater cultural heritage:

Well Construction Environment Plan	No cultural heritage artefacts have been identified within the operational area or EMBA. There are no historical wrecks within the operational area, however ~30 historical wrecks were identified within a 100 km buffer of the EMBA. The closest shipwrecks are located 40.6 km from the operational area (*McCormack* and *McDermott Derrick Barge No 20*). There are no registered Aboriginal cultural heritage sites within the operational area, ~50 registered sites are present within the EMBA.
Wandoo Facility Environment Plan	No cultural heritage artefacts have been identified within the operational area. Vermilion intends to undertake an assessment using The Australasian Underwater Cultural Heritage Database to identify any historic underwater cultural heritage artefact within the EMBA. Vermilion can follow up and provide this information if required. There are no historical wrecks within the operational area. However, historical wrecks are expected to have been identified within a 100 km buffer of the EMBA. Vermilion can follow up and advise the list of shipwrecks present if required. There are no registered Aboriginal cultural heritage sites within the operational area. Vermilion expects registered sites are present within the EMBA. Vermilion can follow up and advise of the quantity following its assessment.

Vermilion advises that:

Unlocated Underwater Cultural Heritage (UCH) may be present within the operational area and EMBA and that the AUCHD is useful for assessing located UCH sites and artefacts.

We acknowledge the legislation and protections that are outlined in *the Underwater Cultural Heritage Act 2018* and our obligations and key responsibilities under the act, namely that Vermilion is aware:

- Of the relevant UCH legislation
- All actions will be compliant with the relevant legislation
- That there is no adverse impact to protected UCH without a permit
- That in the event of suspect UCH that we notify the discovery within 21 days of discovery.

We are committed to ensuring compliance with the UCH Act and will take the necessary steps to avoid any adverse impact on protected UCH.

As part of Vermilion's consultation approach on EPs, we have engaged with Traditional Owners and Prescribed Body Corporates to gather input on environmental and cultural sensitivities, which would include any UCH. We also issued local area consultation notices and public advertisements through

traditional and social media to encourage participation from relevant stakeholders who could provide input in similar aspects.

We acknowledge the DCCEEW's recommendation that proponents engage a qualified maritime or underwater archaeologist to advise on mitigating risks associated with protected UCH. We also note the recommendation to undertake a desktop UCH assessment as part of our planning process.

Vermilion also advises that it has contacted the West Australian Museum as part of our consultation.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.37. Email to Department of Planning, Lands and Heritage (DPLH) on 22 October 2025

Dear DPLH,

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

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- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Underwater cultural heritage

Vermilion is undertaking an assessment of underwater cultural heritage:

Well Construction Environment Plan	No cultural heritage artefacts have been identified within the operational area or EMBA. There are no historical wrecks within the operational area, however ~30 historical wrecks were identified within a 100 km buffer of the EMBA. The closest shipwrecks are located 40.6 km from the operational area (*McCormack* and *McDermott Derrick Barge No 20*). There are no registered Aboriginal cultural heritage sites within the operational area, ~50 registered sites are present within the EMBA.
Wandoo Facility Environment Plan	No cultural heritage artefacts have been identified within the operational area. Vermilion intends to undertake an assessment using The Australasian Underwater Cultural Heritage Database to identify any historic underwater cultural heritage artefact within the EMBA. Vermilion can follow up and provide this information if required. There are no historical wrecks within the operational area. However, historical wrecks are expected to have been identified within a 100 km buffer of the EMBA. Vermilion can follow up and advise the list of shipwrecks if required. There are no registered Aboriginal cultural heritage sites within the operational area. Vermilion expects a number of registered sites are

	present within the EMBA. Vermilion can follow up and advise of the quantity following its assessment.

Vermilion also advises that it has contacted the West Australian Museum as part of our consultation.

Yours sincerely

3.38. Email to Western Australian Museum (WAM) on 22 October 2025

Dear WA Museum

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.

Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Underwater cultural heritage – historical shipwrecks

Well Construction Environment Plan	There are no historical wrecks within the operational area, however ~30 historical wrecks were identified within a 100 km buffer of the EMBA. The closest shipwrecks are located 40.6 km from the operational area (*McCormack* and *McDermott Derrick Barge No 20*).

Wandoo Facility Environment Plan	There are no historical wrecks within the operational area. However, historical wrecks are expected to have been identified within a 100 km buffer of the EMBA. Vermilion can follow up and advise the list of shipwrecks if required.

Vermilion also advises that it has contacted the Department of Planning, Lands and Heritage (DPLH) as part of our consultation.

Yours sincerely

3.39. Email to Australian Southern Bluefin Tuna Fishery Association (ASBITA), Southern Bluefin Tuna Fishery, Commonwealth Fisheries Association (CFA), Pearl Producers Association (PPA), Tuna Australia, and Seafood Industry Australia (SIA) on 22 October 2025

Dear Commonwealth Fishing Industry Association and / or Member Representative Body

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a

	Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Information for the commercial fishing sector

Fisheries have been identified as relevant to the proposed activity based on fishing licence overlap, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth. A summary of the relevant commonwealth and state managed fisheries are included in the Commercial Fishing Information Sheets attached.

We have identified potential impacts to active commercial fishers and the environment, which are also summarised in the Commercial Fishing Information Sheets. We have endeavoured to reduce these risks to an as low as reasonably practicable (ALARP).

Information about exclusionary and cautionary zones and communication with fishers and mariners are included in the attached documents.

Vermilion has acknowledged consultation guidance from Commonwealth commercial fishing industry associations and is contacting you as the representative industry association directly.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

We acknowledge that stakeholders are best placed to determine whether their functions, interests or activities may be affected. If you believe your functions, interests, or activities could be impacted by

the proposed activities, we invite you to self-identify with this information and participate in the consultation process.

The consultation period is open from today until 21 November 2025. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at **abu.consultation@vermilionenergy.com** or by phone at **(08) 9217 5858**.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.40. Email to Yamatji Marlpa Aboriginal Corporation (YMAC) on 22 October 2025

Dear YMAC

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field.

	The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

As part of this process, we have assessed your functions, interests, and activities using publicly available information in relation to the proposed activities. Based on this assessment, we have determined that they are not likely to be affected by the potential risks and impacts of the planned activities, in line with the intended outcomes of the consultation process.

Based on our understanding and engagements to date and a review of information online and documentation available from other proponents, we assume that individual consultation may not be required with YMAC for the purpose of providing feedback or input to the environmental planning process, particularly relating to cultural features of the environment.

Our assumption is that YMAC would not consider it appropriate to represent the views of groups and organisations that use their services. However, in some circumstances, YMAC may act as a conduit or formal contact point for PBCs and may provide advice on groups that could be relevant for consultation and to gather insights about preferred consultation approaches.

We would appreciate your confirmation or guidance on this. However, if you believe your functions, interests, or activities could be impacted by the proposed activities, we invite you to self-identify and participate in the consultation process.

The consultation period is open from today until 21 November 2025. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at **abu.consultation@vermilionenergy.com** or by phone at **(08) 9217 5858**.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.41. Email to Kimberley Land Council (KLC) on 22 October 2025

Dear KLC

Subject: Consultation - Wandoo Facility Environment Plan and Well Construction Environment Plan

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field.

	The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

As part of this process, we have assessed your functions, interests, and activities using publicly available information in relation to the proposed activities. Based on this assessment, we have determined that they are not likely to be affected by the potential risks and impacts of the planned activities, in line with the intended outcomes of the consultation process.

Based on our understanding and engagements to date and a review of information online and documentation available from other proponents, we assume that individual consultation may not be required with KLC for the purpose of providing feedback or input to the environmental planning process, particularly relating to cultural features of the environment.

Our assumption is that KLC would not consider it appropriate to represent the views of groups and organisations that use their services. However, in some circumstances, YMAC may act as a conduit or formal contact point for PBCs and may provide advice on groups that could be relevant for consultation and to gather insights about preferred consultation approaches.

We would appreciate your confirmation or guidance on this. However, if you believe your functions, interests, or activities could be impacted by the proposed activities, we invite you to self-identify and participate in the consultation process.

The consultation period is open from today until 21 November 2025. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at **abu.consultation@vermilionenergy.com** or by phone at **(08) 9217 5858**.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.42. Email to Department of Water and Environmental Regulation (DWER) on 11 November 2025

Dear DWER

It has been recommended by the Department of Planning, Lands and Heritage that we include you in our consultation to advise that Vermilion Oil and Gas Australia Pty Ltd (Vermilion) intends to submit five-yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage

	and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open for DWER from today until 11 December 2025. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.43. Email to Chevron Australia on 11 November 2025

Dear Titleholder

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells.

	The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from 21 October until 21 November 2025. As we have sent this to you today, Chevron can comment on this until December 11, 2025. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.44. Email to Ningaloo Coast World Heritage Advisory Committee (NCWHAC) on 11 November 2025

Dear NCWHAC

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan

- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

These revisions address the continued operations and activities for the next five years, reassess environmental impacts and risks and outline how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Wandoo Field. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.
Well Construction Environment Plan	Vermilion periodically conducts well construction operations in the Operational Area using a mobile offshore drilling rig. Well construction operations planned over the next five years involve the drilling and completing of new wells. The frequency of campaigns will vary depending on a range of operational and commercial factors. Each campaign will likely take between 30 to 100 days to complete. As drilling rig availability is unable to be predicted for the five-year period of operation of the Well Construction EP, well construction activities have been assessed on the basis that they may occur at any time during the calendar year.

Consultation information sheets for both activities are attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

These are also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open from 21 October until 21 November 2025. As we have sent this to you today, NCWHAC can comment on this until December 11, 2025. Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.45. Email to Western Rock Lobster Council and West Coast Rock Lobster Managed Fishery on 22 October 2025

Dear Western Rock Lobster Fishery and Council

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit a five yearly revision of the Wandoo Facility Environment Plan (EP).

The revised plan, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

The revision addresses continued production operations and supporting activities over the next five years, reassesses environmental impacts and risks and outlines how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to hydrocarbon production, storage and export activities, including supporting operations and maintenance activities.

	The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.

A consultation information sheet for the proposed activities is attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

This is also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Information relating to commercial fisheries

Fisheries have been identified as relevant to the proposed activity based on fishing licence overlap, assessment of government fishing effort data (including Fishcube and AFMA) from recent years, fishing methods and water depth. A summary of the relevant commonwealth and state managed fisheries are included in the Commercial Fishing Information Sheets attached.

We have identified potential impacts to active commercial fishers and the environment, which are also summarised in the Commercial Fishing Information Sheets. We have endeavoured to reduce these risks to an as low as reasonably practicable (ALARP).

Information about exclusionary and cautionary zones and communication with fishers and mariners are included in the attached documents.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under the EP.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EP to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

3.46. Letter sent to Pilbara Kimberley Recreational Marine Users and Gascoyne Recreational Marine Users on 27 October 2025

VERMILION
OIL & GAS
AUSTRALIA PTY LTD

LEVEL 5
30 THE ESPLANADE
PERTH
WESTERN AUSTRALIA 6000

TEL: 08 9217 5858
ABN: 29 113 023 591

27 October 2025

Dear Licence Holder

Consultation on Wandoo Facility Operations and Well Construction Environment Plans

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit two Environment Plans (EPs) related to its continued operations and production from the Wandoo Field in production licence area WA-14-L.

Location

The Wandoo Field is situated approximately 80 kilometres northwest of the port Dampier and 110 kilometres northeast of Barrow Island. The proposed activities will occur in Commonwealth waters within the Carnarvon Basin, operating at a water depth in the range from 50-60 metres.

1. **Wandoo Facility Environment Plan** – this revised EP supports continued hydrocarbon production at the Wandoo Facility and will cover production, processing, storage, export, and associated operations and maintenance activities.
2. **Well Construction Environment Plan** – the revised EP supports future routine drilling activities and addresses the environmental management of well construction, including drilling, completions and associated support operations.

Further information on both EPs is available in the attached information sheets. These provide background on the proposed activities, summaries of potential key impacts and risks, associated management measures, exclusion zones and communication protocols with fishers and mariners.

Additional resources, including frequently asked questions, can be found on Vermilion's website: www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities.

Feedback

If you have feedback specific to the proposed activities described under the proposed EPs, we would welcome your feedback at abu.consultation@vermilionenergy.com or (08) 9217 5858 by **30 November 2025.**

If you would like to opt out of consultation opportunities please contact us via email to confirm.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

Vermilion Oil and Gas Australia

3.47. Email to Shire of Carnarvon and Shire of East Pilbara on 22 October 2025

Dear Stakeholder

Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit a five yearly revision of the Wandoo Facility Environment Plan (EP).

The revised plan, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility.

Vermilion has operated the Wandoo Field (within Permit Area WA-14-L) since 2005 in Commonwealth waters of the Carnarvon Basin, approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

The revision addresses continued production operations and supporting activities over the next five years, reassesses environmental impacts and risks and outlines how these will continue to be managed. Even where no significant changes are identified, the review validates controls and invites feedback from relevant persons.

Activity Overview

Wandoo Facility Environment Plan	Vermilion plans to continue producing hydrocarbons at the Wandoo Production Facility. This EP is limited to hydrocarbon production, storage and export activities, including supporting operations and maintenance activities. The oil produced from Wandoo A is piped to the Wandoo B platform. After treatment, the oil is stored in the concrete gravity structure and then, when sufficient volumes are available, offloaded through flexible flowlines to a Catenary Anchor Leg Mooring Buoy (CALM Buoy) located 1.2 km north of the Wandoo B platform. A floating hose is used to transfer the oil from the CALM Buoy to export tankers situated at the mooring facility. Export tankers are used to offload the oil.

A consultation information sheet for the proposed activities is attached, providing additional background, including summaries of potential key impacts and risks, and associated management measures.

This is also available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities. Our website includes resources for further information including frequently asked questions about Wandoo Field Environment Plan Consultation, which can be accessed here.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under the EP.

The consultation period is open from today until **21 November 2025**. Following this, Vermilion intends to prepare and submit the EP to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4. Consultation Follow Up – November 2025

4.1. Email to Australian Border Force (ABF) (Maritime Border Command) on 13 November 2025

Dear ABF

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in

accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.2. Email to Australian Maritime Safety Authority (AMSA) – maritime safety, Australian Maritime Safety Authority (AMSA) – marine pollution, and Australian Hydrographic Office (AHO) on 13 November 2025

Dear AMSA and AHO

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.3. Email to Department of Agriculture, Forestry and Fisheries (DAFF) – Fisheries and Department of Agriculture, Forestry and Fisheries (DAFF) – Biosecurity (marine pests) (vessels, aircraft and personnel) on 13 November 2025

Dear DAFF

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.4. Email to Department of Defence (DoD) on 13 November 2025

Dear Department of Defence

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.5. Email to Department of Industry, Science and Resources (DISR) on 13 November 2025

Dear DISR

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.6. Email to Director of National Parks (DNP) on 13 November 2025

Dear Director of National Parks

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.7. Email to Department of Primary Industries and Regional Development (DPIRD) – Fisheries on 13 November 2025

Dear DPIRD

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets and information about exclusionary and cautionary zones and communication with fishers and mariners attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.8. Email to to Department of Mines, Petroleum and Exploration (DMPE) on 13 November 2025

Dear DMPE

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo

Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.9. Email to Department of Biodiversity, Conservation and Attractions (DBCA) on 13 November 2025

Dear DBCA

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling

unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.10. Email to Department of Transport and Major Infrastructure (DTMI) – marine pollution on 13 November 2025

Dear DTMI

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.11. Email to Pilbara Development Commission (PDC) on 13 November 2025

Dear Pilbara Development Commission

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.12. Email to Pilbara Ports Authority (PPA) on 13 November 2025

Dear Pilbara Ports

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.13. Email to Western Australian Fishing Industry Council (WAFIC) on 13 November 2025

Dear WAFIC

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.14. Email to 3D Energi Limited, Beagle No. 1 Pty Ltd / Longreach Capital Investment, BP Developments Australia, Finder No 16 Pty Ltd, INPEX Browse E&P Pty Ltd, Jadestone Energy (Australia) Pty Ltd, Kato Energy (WA) Pty Ltd, Kufpec (Perth) Pty Ltd, MEO International Pty Ltd, Mobil Australia Resources Company Pty Limited, Santos Offshore Pty Ltd, Shell Australia Pty Ltd and Western Gas (474 P) Pty Ltd on 13 November 2025

Dear Titleholder

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.15. Email to to Australian Energy Producers (AEP) on 13 November 2025

Dear AEP

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.16. Email to Curtin University (Centre for Marine Science and Technology), University of Western Australia (UWA), Commonwealth Scientific and Industrial Reserch Organsiation (CSIRO), Western Australian Marine Science Institution (WAMSI), Australian Institute of Marine Science (AIMS), and Australian Marine Sciences Association (WA Branch) on 13 November 2025

Dear Stakeholder

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.17. Email to City of Karratha, Town of Port Hedland, Shire of Ashburton, Shire of Exmouth, Onslow Chamber of Commerce and Industry, Western Australian Local Government Association (WALGA), Karratha and Districts Chamber of Commerce and Industry (KDCCI), Regional Development Australia (Pilbara) Karratha WA, WA Game Fishing Association (WAGFA), Recfishwest, Marine Tourism WA, Ashburton Anglers, Exmouth Game Fishing Club (EGFC), King Bay Game Fishing Club (KBFC), and Nickol Bay Sportsfishing Club (NBSC) on 13 November 2025

Dear Stakeholder

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
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These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.18. Email to Protect Ningaloo on 13 November 2025

Dear Protect Ningaloo

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.19. Email to The Conservation Council of WA (CCWA), Care for Hedland, and Western Australian Marine Conservation Society (AMCS) on 18 November 2025

Dear Stakeholder

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
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These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

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Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

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If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.20. Email to Australian Conservation Foundation (ACF), Greenpeace Australia Pacific (GAP), and Wilderness Society (WS) on 13 November 2025

Dear Stakeholder

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
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These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

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If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.21. Email to Department of Climate Change, Energy, the Environment and Water (DCCEEW) – Underwater Cultural Heritage (UCH) on 13 November 2025

Dear DCCEEW

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

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The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.22. Email to Western Australian Museum (WAM) on 13 November 2025

Dear WA Museum

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

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If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.23. Email to Australian Southern Bluefin Tuna Fishery Association (ASBITA), Commonwealth Fisheries Association (CFA), Pearl Producers Association (PPA), and Seafood Industry Australia (SIA) on 13 November 2025

Dear Commonwealth Fishing Industry Association and /or Member Representative Body

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

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Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

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Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.24. Email to Yamatji Marlpa Aboriginal Corporation (YMAC) on 18 November 2025

Dear YMAC

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

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If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.25. Email to Kimberley Land Council (KLC) on 18 November 2025

Dear KLC

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling

unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.26. Email to Department of Water and Environmental Regulation (DWER) on 25 November 2025

Dear DWER

We are writing to follow up on any feedback you may have regarding the consultation information sent on November 11, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open for DWER until 11 December 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.27. Email to Chevron Australia on 25 November 2025

Dear Titleholder

We are writing to follow up on any feedback you may have regarding the consultation information sent on November 13, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open for Chevron until 11 December 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be

provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.28. Email to Ningaloo Coast World Heritage Advisory Committee (NCWHAC) on 25 November 2025

Dear NCWHAC

We are writing to follow up on any feedback you may have regarding the consultation information sent on November 13, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit. **Further information can be found in the previous sent email included below, which also included consultation information sheets attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs.

The consultation period is open for NCWHAC until 11 December 2025.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.29. Email to Western Rock Lobster Council and West Coast Rock Lobster Managed Fishery on 13 November 2025

Dear Western Rock Lobster Fishery and Council

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the Wandoo Facility Environment Plan (EP).

The revised EP, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility. **Further information can be found in the previous sent email included below, which also included the commercial fishing information and consultation information sheet attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under the EP.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EP to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

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Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

4.30. Letter sent to Pilbara Kimberley Recreational Marine Users and Gascoyne Recreational Marine Users on 13 November 2025

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OIL & GAS
AUSTRALIA PTY LTD

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PERTH
WESTERN AUSTRALIA 6000

TEL: 08 9217 5858
ABN: 29 113 023 591

13 November 2025

Dear Licence Holder

Consultation on Wandoo Facility Environment Plan and Well Construction Environment Plan

This letter follows Vermilion Oil and Gas Australia Pty Ltd (Vermilion)'s previous correspondence.

We are writing to follow up on any feedback you may have regarding the proposed activities outlined in the consultation information sent to you on 27 October 2025.

Vermilion is planning to submit two Environment Plans (EPs) related to its continued operations and production from the Wandoo Field in production licence area WA-14-L.

Location

The Wandoo Field is situated approximately 80 kilometres northwest of the port Dampier and 110 kilometres northeast of Barrow Island. The proposed activities will occur in Commonwealth waters within the Carnarvon Basin, operating at a water depth in the range from 50-60 metres.

1. **Wandoo Facility Environment Plan** – this revised EP supports continued hydrocarbon production at the Wandoo Facility and will cover production, processing, storage, export, and associated operations and maintenance activities.

2. **Well Construction Environment Plan** – the revised EP supports future routine drilling activities and addresses the environmental management of well construction, including drilling, completions and associated support operations.

Feedback on Proposed Activities: We are consulting with relevant persons who may be affected by these activities. Consultation information sheets are available on our website at www.vermilionenergy.com/our-operations/australia/wandoo-consultation-activities.

Seeking Your Input: If you have feedback specific to the proposed activities described under the proposed EP, we would welcome your feedback at abu.consultation@vermilionenergy.com or (08) 9217 5858 by **30 November 2025.** Feedback can also be provided after the consultation period closes, throughout the life of an EP, as part of ongoing consultation.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

Vermilion Oil and Gas Australia

4.31. Email to Shire of Carnarvon and Shire of East Pilbara on 13 November 2025

Dear Stakeholder

We are writing to follow up on any feedback you may have regarding the consultation information sent on October 22, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revision of the Wandoo Facility Environment Plan.

The revised EP, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility. **Further information can be found in the previous sent email included below, which also included consultation information sheet attached.**

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under the EP.

The consultation period is open until 21 November 2025.

Following this, Vermilion intends to prepare and submit the EP to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EP which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Yours sincerely

5. Notification of intent to submit – December 2025

5.1. Email to ABF on 16 December 2025

Dear ABF

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

We've previously shared consultation information regarding these EPs with you on 22 October 2025 via email, including a consultation information sheet. We also followed up with you on 13 November 2025. See emails below.

Last Opportunity for Feedback

As part of the formal consultation process under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth), this is your **last opportunity to provide feedback** on these two proposed activities before the EPs are submitted for NOPSEMA assessment. We invite you to:

- Review the information previously provided (attached or access it again here:
- Please send any feedback by **24 December 2025** at abu.consultation@vermilionenergy.com or (08) 9217 5858.
- Feedback received by this date will be assessed and taken into account in finalising the EP, in accordance with the Environment Regulations.
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- Your feedback and our response will be included in our EPs in accordance with the Environment Regulations. If any part of your feedback is commercially or culturally sensitive, please advise us when responding so that we can request it be treated as confidential by NOPSEMA upon submission.

We value your input and thank you for your time and continued engagement.

Yours sincerely

5.2. Email to AMSA Marine Pollution on 16 December 2026

Dear AMSA - Marine Pollution

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

We've previously shared consultation information regarding these EPs with you on 22 October 2025 via email, including a consultation information sheet. We also followed up with you on 13 November 2025. See emails below.

Last Opportunity for Feedback

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We value your input and thank you for your time and continued engagement.

Yours sincerely

5.3. Email to Department of Agriculture, Forestry and Fisheries (DAFF) – Fisheries and Department of Agriculture, Forestry and Fisheries (DAFF) – Biosecurity (marine pests) (vessels, aircraft and personnel) on 16 December 2025

Dear DAFF

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

We've previously shared consultation information regarding these EPs with you on 22 October 2025 via email, including a consultation information sheet. We also followed up with you on 13 November 2025. See emails below.

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We value your input and thank you for your time and continued engagement.

Yours sincerely

5.4. Email to DCCEW on 16 December 2025

Dear DCCEEW

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

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We value your input and thank you for your time and continued engagement.

Yours sincerely

5.5. Email to DoD on 16 December 2025

Dear Department of Defence

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

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We value your input and thank you for your time and continued engagement.

Yours sincerely

5.6. Email to DISR on 16 December 2025

Dear DISR

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

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We value your input and thank you for your time and continued engagement.

Yours sincerely

5.7. Email to DMPE on 16 December 2025

Dear DMPE

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

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We value your input and thank you for your time and continued engagement.

Yours sincerely

5.8. Email to DPIRD on 16 December 2025

Dear DPIRD

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

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We value your input and thank you for your time and continued engagement.

Yours sincerely

5.9. Email to Pilbara Development Commission on 16 December 2025

Dear Pilbara Development Commission

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

We've previously shared consultation information regarding these EPs with you on 22 October 2025 via email, including a consultation information sheet. We also followed up with you on 13 November 2025. See emails below.

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We value your input and thank you for your time and continued engagement.

Yours sincerely

5.10. Email to Australian Southern Bluefin Tuna Fishery Association (ASBITA), Commonwealth Fisheries Association (CFA), Pearl Producers Association (PPA), and Seafood Industry Australia (SIA) on 16 December 2025

Dear Commonwealth Fishing Industry Association and /or Member Representative Body

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

We've previously shared consultation information regarding these EPs with you on 22 October 2025 via email, including a consultation information sheet. We also followed up with you on 13 November 2025. See emails below.

Last Opportunity for Feedback

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We value your input and thank you for your time and continued engagement.

Yours sincerely

5.11. Email to City of Karratha, Shire of Ashburton, Shire of Exmouth, Onslow Chamber of Commerce and Industry, Western Australian Local Government Association (WALGA), Regional Development Australia (Pilbara) Karratha WA, WA Game Fishing Association (WAGFA), Marine Tourism WA, Ashburton Anglers, Exmouth Game Fishing Club (EGFC), King Bay Game Fishing Club (KBFC), and Nickol Bay Sportsfishing Club (NBSC) on 16 December 2025

Dear Stakeholder

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

We've previously shared consultation information regarding these EPs with you on 22 October 2025 via email, including a consultation information sheet. We also followed up with you on 13 November 2025. See emails below.

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We value your input and thank you for your time and continued engagement.

Yours sincerely

5.12. Email to Karratha and Districts Chamber of Commerce and Industry (KDCCI) on 16 December 2025

Dear Stakeholder

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

We've previously shared consultation information regarding these EPs with you on 28 October 2025 via email, including a consultation information sheet. We also followed up with you on 13 November 2025. See emails below.

Last Opportunity for Feedback

As part of the formal consultation process under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth), this is your **last opportunity to provide feedback** on these two proposed activities before the EPs are submitted for NOPSEMA assessment. We invite you to:

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We value your input and thank you for your time and continued engagement.

Yours sincerely

5.13. Email to Town of Port Hedland on 16 December 2025

Dear Stakeholder

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

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We value your input and thank you for your time and continued engagement.

Yours sincerely

5.14. Email to Curtin University (Centre for Marine Science and Technology), University of Western Australia (UWA), Commonwealth Scientific and Industrial Reserch Organsiation (CSIRO), Western Australian Marine Science Institution (WAMSI), Australian Institute of Marine Science (AIMS), and Australian Marine Sciences Association (WA Branch) on 18 December 2025

Dear Stakeholder

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

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We value your input and thank you for your time and continued engagement.

Yours sincerely

5.15. Email to Australian Conservation Foundation (ACF), Greenpeace Australia Pacific (GAP), and Wilderness Society (WS) on 18 December 2025

Dear Stakeholder

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

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We value your input and thank you for your time and continued engagement.

Yours sincerely

5.16. Email to Protect Ningaloo on 18 December 2025

Dear Protect Ningaloo

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

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We value your input and thank you for your time and continued engagement.

Yours sincerely

5.17. Email to The Conservation Council of WA (CCWA), Care for Hedland, and Western Australian Marine Conservation Society (AMCS) on 18 December 2025

Dear Stakeholder

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

We've previously shared consultation information regarding these EPs with you on 22 October 2025 via email, including a consultation information sheet. We also followed up with you on 18 November 2025. See emails below.

Last Opportunity for Feedback

As part of the formal consultation process under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth), this is your **last opportunity to provide feedback** on these two proposed activities before the EPs are submitted for NOPSEMA assessment. We invite you to:

- Review the information previously provided (attached or access it again here:
- Please send any feedback by **24 December 2025** at abu.consultation@vermilionenergy.com or (08) 9217 5858.
- Feedback received by this date will be assessed and taken into account in finalising the EP, in accordance with the Environment Regulations.
- If you are unable to respond by this date but wish to provide input, please reply to this email and let us know.
- Feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered, and addressed where appropriate as part of ongoing consultation.
- Your feedback and our response will be included in our EPs in accordance with the Environment Regulations. If any part of your feedback is commercially or culturally sensitive, please advise us when responding so that we can request it be treated as confidential by NOPSEMA upon submission.

We value your input and thank you for your time and continued engagement.

Yours sincerely

5.18. Email to AEP on 18 December 2025

Dear AEP

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

We've previously shared consultation information regarding these EPs with you on 22 October 2025 via email, including a consultation information sheet. We also followed up with you on 13 November 2025. See emails below.

Last Opportunity for Feedback

As part of the formal consultation process under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth), this is your **last opportunity to provide feedback** on these two proposed activities before the EPs are submitted for NOPSEMA assessment. We invite you to:

- Review the information previously provided (attached or access it again here:
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- Your feedback and our response will be included in our EPs in accordance with the Environment Regulations. If any part of your feedback is commercially or culturally sensitive, please advise us when responding so that we can request it be treated as confidential by NOPSEMA upon submission.

We value your input and thank you for your time and continued engagement.

Yours sincerely

5.19. Email to Chevron Australia on 18 December 2025

Dear Titleholder

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

We've previously shared consultation information regarding these EPs with you on 22 October 2025 via email, including a consultation information sheet. We also followed up with you on 13 November 2025. See emails below.

Last Opportunity for Feedback

As part of the formal consultation process under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth), this is your **last opportunity to provide feedback** on these two proposed activities before the EPs are submitted for NOPSEMA assessment. We invite you to:

- Review the information previously provided (attached or access it again here:

- Please send any feedback by **24 December 2025** at abu.consultation@vermilionenergy.com or (08) 9217 5858.
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- Feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered, and addressed where appropriate as part of ongoing consultation.
- Your feedback and our response will be included in our EPs in accordance with the Environment Regulations. If any part of your feedback is commercially or culturally sensitive, please advise us when responding so that we can request it be treated as confidential by NOPSEMA upon submission.

We value your input and thank you for your time and continued engagement.

Yours sincerely

5.20. Email to 3D Energi Limited, Beagle No. 1 Pty Ltd / Longreach Capital Investment, BP Developments Australia, Finder No 16 Pty Ltd, INPEX Browse E&P Pty Ltd, Jadestone Energy (Australia) Pty Ltd, Kato Energy (WA) Pty Ltd, Kufpec (Perth) Pty Ltd, MEO International Pty Ltd, Mobil Australia Resources Company Pty Limited, Santos Offshore Pty Ltd, Shell Australia Pty Ltd and Western Gas (474 P) Pty Ltd on 18 December 2025

Dear Titleholder

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan and Well Construction Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EPs for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

We've previously shared consultation information regarding these EPs with you on 22 October 2025 via email, including a consultation information sheet. We also followed up with you on 13 November 2025. See emails below.

Last Opportunity for Feedback

As part of the formal consultation process under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth), this is your **last opportunity to provide feedback** on these two proposed activities before the EPs are submitted for NOPSEMA assessment. We invite you to:

- Review the information previously provided (attached or access it again here:
- Please send any feedback by **24 December 2025** at abu.consultation@vermilionenergy.com or (08) 9217 5858.

- Feedback received by this date will be assessed and taken into account in finalising the EP, in accordance with the Environment Regulations.
- If you are unable to respond by this date but wish to provide input, please reply to this email and let us know.
- Feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered, and addressed where appropriate as part of ongoing consultation.
- Your feedback and our response will be included in our EPs in accordance with the Environment Regulations. If any part of your feedback is commercially or culturally sensitive, please advise us when responding so that we can request it be treated as confidential by NOPSEMA upon submission.

We value your input and thank you for your time and continued engagement.

Yours sincerely

5.21. Email to Ngarluma Aboriginal Corporation (NAC) on 10 December 2025

Hi [redacted]

This is a follow up email regarding the consultation information sent to you on behalf of Ngarluma Aboriginal Corporation on 21 October, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Further information can be found in the previous sent email included below, which also included consultation information sheets attached.

I wanted to follow up on the phone call you had with Matt in November in which you confirmed Ngarluma may wish to be consulted for these two EPs.

Can you please advise the best format for consultation with Ngarluma for these EPs? Vermilion would be happy to arrange a second meeting with its representatives either in person or via MS Teams.

Acknowledging our previous and ongoing engagement, we would be happy to provide you with a summary of our understanding of your functions, interests and activities, to be documented in the EPs. Providing the option for NAC to review and build upon this with any feedback on the EPs.

Please let us know Ngarluma's preference for the consultation format and suitable dates for a meeting.

Building on our last meeting and noting Ngarluma's interests particularly in oil spill related matters, we wanted to advise that we can arrange for Vermilion's Oil Spill Response Coordinator to attend our next meeting to discuss this matter further and answer any questions.

I also thought to share a draft oil spill information sheet we have developed. We would be happy to further develop this with Ngarluma in our ongoing engagement.

Please be advised regarding consultation and feedback on the proposed activities:

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs. **The consultation period is open until 17 February 2025**.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

I look forward to hearing from you.

Kind regards,

Vermilion Oil & Gas Australia

E: abu.consultation@vermilionenergy.com

Level 5 | 30 The Esplanade | Perth WA 6000

5.22. Email to Murujuga Aboriginal Corporation (MAC) on 10 December 2025

Dear [redacted] and [redacted]

This is a follow up email regarding the consultation information sent to you both on behalf of Murujuga Aboriginal Corporation on 21 October, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan

- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Further information can be found in the previous sent email included below, which also included consultation information sheets attached.

Consultation with Murujuga Aboriginal Corporation

Noting your previous advice that a meeting is not considered necessary by MAC to discuss these matters, we just wanted to send a general follow up in case this has changed or if MAC wishes to provide any feedback on the EPs.

Alternatively, if MAC does not have an interest in the proposed activities or determines consultation is not required beyond receipt of the supplied information please confirm and let us know.

Please be advised regarding consultation and feedback on the proposed activities:

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs. **The consultation period is open until 17 February 2025**.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Thanks and Kind Regards,

Vermilion Oil & Gas Australia
E: abu.consultation@vermilionenergy.com
Level 5 | 30 The Esplanade | Perth WA 6000

5.23. Email to Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC) on 10 December 2025

Dear NTGAC engagement team,

This is a follow up email regarding the consultation information sent to you on behalf of Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC) and Yinggarda Aboriginal Corporation on 21 October, 2025.

As our previous email outlined, Vermilion Oil and Gas Australia Pty Ltd (Vermilion) is planning to submit five yearly revisions of the following Environment Plans (EPs):

- Wandoo Facility Environment Plan
- Well Construction Environment Plan.

These revised EPs, required under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023, will cover the next five years of continued operation of the Wandoo Production Facility and routine well construction activities, using a mobile offshore drilling unit.

Further information can be found in the previous sent email included below, which also included consultation information sheets attached.

Consultation with NTGAC

While we anticipate your feedback on the consultation protocol and Vermilion's sought amendments, we wanted to ask if and how NTGAC would like to be consulted for these EPs?

Vermilion would be happy to arrange a meeting with NTGAC's representatives if that is the preference, and so we wanted to ensure this can be arranged, hopefully before the consultation period closes.

Please advise NTGAC's preference for the consultation format and suitable dates for any meeting.

Feedback on the proposed activities

Vermilion is now consulting with relevant persons with functions, interests or activities that may be affected by the activities proposed under these EPs. **The consultation period is open until 17 February 2025**.

Following this, Vermilion intends to prepare and submit the EPs to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. Feedback can also be provided after the consultation period closes, throughout the life of an Environment Plan, as part of ongoing consultation.

If you have feedback specific to the proposed activities described under the proposed EP, please contact us via email at abu.consultation@vermilionenergy.com or by phone at (08) 9217 5858.

Your feedback and our response will be included in our EPs which will be submitted to the National Offshore Petroleum Safety and Environment Management Authority (NOPSEMA) for acceptance in accordance with the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth).

Please let us know if your feedback for this activity is sensitive and we will make this known to NOPSEMA upon submission of the EP in order for this information to remain confidential to NOPSEMA.

Thanks and Kind Regards,

Vermilion Oil & Gas Australia

E: abu.consultation@vermilionenergy.com

Level 5 | 30 The Esplanade | Perth WA 6000

5.24. Email to Shire of Carnarvon and Shire of East Pilbara on 18 December 2025

Dear Stakeholder

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EP for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

We've previously shared consultation information regarding this EP with you on 22 October 2025 via email, including a consultation information sheet. We also followed up with you on 13 November 2025. See emails below.

Last Opportunity for Feedback

As part of the formal consultation process under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth), this is your **last opportunity to provide feedback** on this proposed activity before the EP is submitted for NOPSEMA assessment. We invite you to:

- Review the information previously provided (attached or access it again here:
- Please send any feedback by **24 December 2025** at abu.consultation@vermilionenergy.com or (08) 9217 5858.
- Feedback received by this date will be assessed and taken into account in finalising the EP, in accordance with the Environment Regulations.
- If you are unable to respond by this date but wish to provide input, please reply to this email and let us know.
- Feedback received after 24 December 2025 will not be included in the submission to NOPSEMA but will still be reviewed, considered, and addressed where appropriate as part of ongoing consultation.
- Your feedback and our response will be included in our EP in accordance with the Environment Regulations. If any part of your feedback is commercially or culturally sensitive, please advise us when responding so that we can request it be treated as confidential by NOPSEMA upon submission.

We value your input and thank you for your time and continued engagement.

Yours sincerely

5.25. Email to Western Rock Lobster Council and West Coast Rock Lobster Managed Fishery on 16 December 2025

Dear Western Rock Lobster Fishery and Council

We are writing to inform you that the formal consultation period regarding the Wandoo Facility Environment Plan concluded on 21 November 2025.

Vermilion is now preparing the EP for submission to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

We've previously shared consultation information regarding this EP with you on 22 October 2025 via email, including a consultation information sheet. We also followed up with you on 13 November 2025. See emails below.

Last Opportunity for Feedback

As part of the formal consultation process under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (Cth), this is your **last opportunity to provide feedback** on this proposed activity before the EP is submitted for NOPSEMA assessment. We invite you to:

- Review the information previously provided (attached or access it again here:
- Please send any feedback by **24 December 2025** at abu.consultation@vermilionenergy.com or (08) 9217 5858.
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We value your input and thank you for your time and continued engagement.

Yours sincerely

Appendix G Greenhouse Gas (GHG) Assessment Technical Note

Vermilion Oil & Gas Australia Pty Ltd

Wandoo Facility Greenhouse Gas Assessment

Technical Note

ASSIGNMENT P100564-S02
DOCUMENT P-100564-S02-A-REPT-001

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REVISIONS & APPROVALS

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REV	DATE	DESCRIPTION	ISSUED	CHECKED	APPROVED	CLIENT
I01	23/4/2026	Issued for Use	FC	MH	AR	VOGA
R01	31/3/2026	Issued for Review	FC	MH	AR	VOGA

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1 INTRODUCTION

1.1 Background

Vermilion Oil & Gas Australia Pty Ltd (VOGA) is the licensed permit holder of production licence area WA-14-L, which contains the Wandoo Production Facility (Wandoo Facility). The Permit Area is located within Commonwealth waters in the Carnarvon Basin off the northwest coast of Western Australia (WA), approximately 80 km northwest of Dampier and 110 km northeast of Barrow Island.

As shown in Figure 1-1, Wandoo Facility consists of:

- Wandoo A (WNA), a normally unmanned monopod platform supported by a single column, which has the capacity of supporting a total of five production wells (dry trees). The platform has a helicopter landing facility.
- Wandoo B (WNB), the central oil production process and storage platform, is supported on a Concrete Gravity Substructure (CGS). This currently supports 17 production wells with one remaining spare conductor slot and one gas reinjection well, all with dry trees. The Wandoo B topside facilities include processing facilities, oil storage within the CGS, utilities, accommodation and a helipad. The configuration of the CGS provides storage for 63,200 m^3 of processed oil.
- Three infield flow lines including a production line, a gas lift line, and a test line connecting Wandoo A to Wandoo B. The test line is no longer used for hydrocarbon service due to integrity concerns on the Wandoo B riser section, as it is permanently isolated.
- The export pipeline system consists of two parallel flexible lines running between Wandoo B and the pipeline-end manifold and the Catenary Anchor Leg Mooring (CALM) Buoy system. A floating hose transfers the oil from the CALM Buoy to export tankers moored to the CALM Buoy.

Oil production from the WNB production platform commenced in March 1997 and total field production is currently in the order of 5,000 bbls/day. The end of field life is currently modelled to be approximately 2035-2038.

1.2 Purpose

VOGA has been operating in the Permit Area since 2005. A five-yearly revision of the Environment Plan (EP) is being prepared which applies to production operations and support functions related to the Wandoo Facility.

This technical note presents the greenhouse gas (GHG) emissions assessment results to support the EP. The GHG emissions assessment includes scope 1, scope 2, and scope 3 emissions associated with the Wandoo Facility.

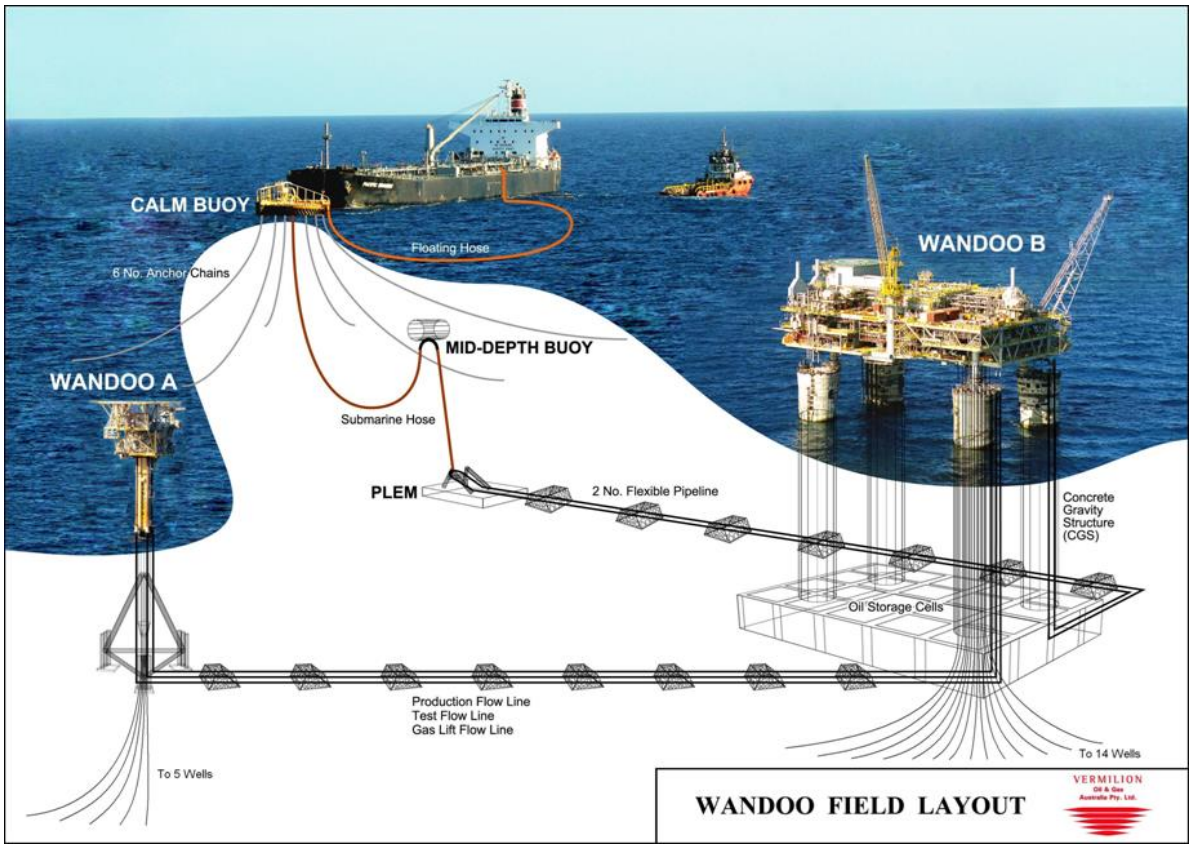


Figure 1-1: The Wandoo Facility

2 GHG ASSESSMENT

2.1 Boundary of Assessment

The boundary of assessment is outlined in Table 2-1. The GHG assessment is limited to the hydrocarbon well production, process, storage and export activities, and supporting operations and maintenance activities conducted within the Permit Area (WA-14-L).

The GHGs included in the emissions assessment are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulphur hexafluoride (SF_6), and specified kinds of hydrofluorocarbons and perfluorocarbons, as defined in the National Greenhouse and Energy Reporting (NGER) Scheme (CER, 2025). No emissions of SF6 and specified kinds of hydrofluorocarbons and perfluorocarbons are expected to be generated from the activities.

Activities covered under scope 1 emissions[1] include crude oil production (flare, fugitive leak, fugitive vent), produced water during production operations and fuel combustion. Fuels include unprocessed natural gas (UNG) and diesel oil. Lubricant oil and greases have been excluded as historical emissions data show emissions less than 0.01% of the total scope 1 emission.

There are no scope 2 emissions[2] involved as no purchased electricity is expected for the project.

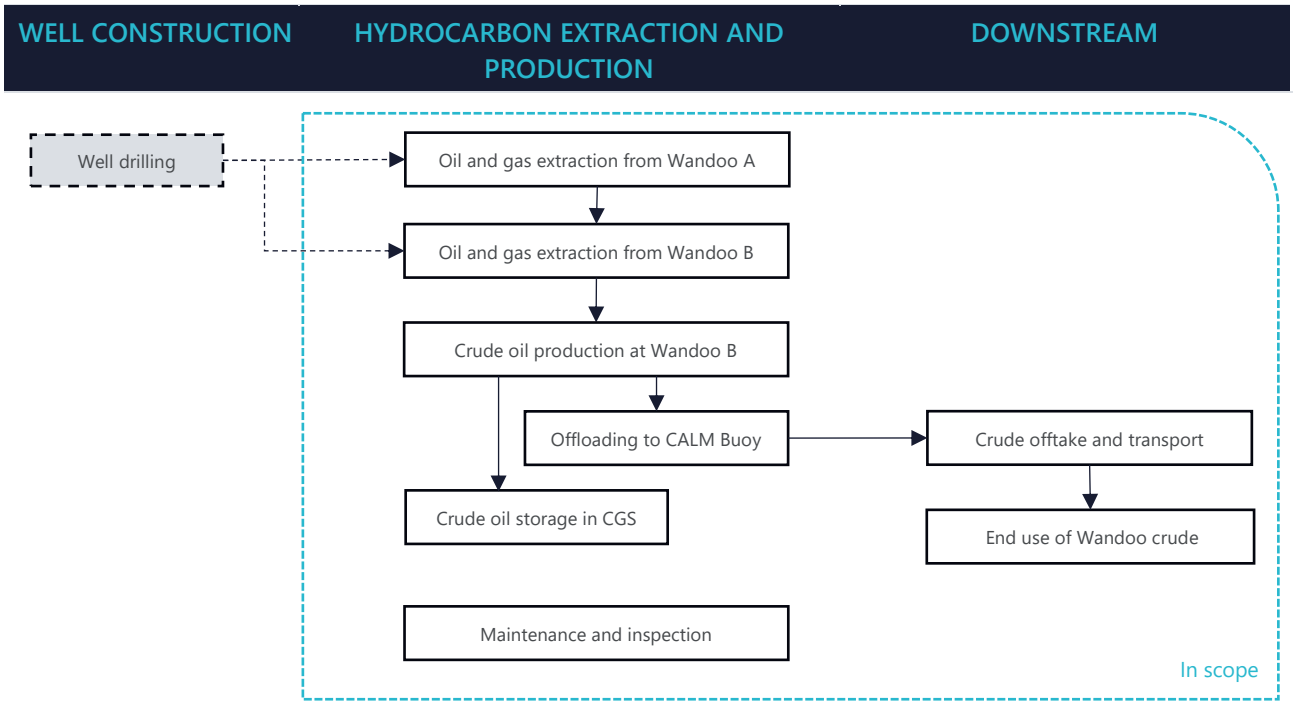
Activities contributing to scope 3 emissions[3] cover the supporting operations and maintenance activities during production operations (vessel operations and helicopter operations), transport and end use of product. Other scope 3 categories for example waste generated, purchased goods and services, capital goods, etc. have been excluded assuming immaterial emissions.

Activities excluded from the boundary of assessment are:

- Development or exploration drilling activities;
- Commissioning activities; and
- Decommissioning activities.

[1] *Scope 1 emissions: defined as the emissions produced from sources within the boundary of VOGA (CER, 2024).*
[2] *Scope 2 emissions: defined as the emissions that are released outside VOGA's boundary to produce the electricity required (CER, 2024).*
[3] *Scope 3 emissions: defined as the emissions other than scope 2 emissions that occur outside the boundary of VOGA as a result of Wandoo Facility's activities (CER, 2024).*

Table 2-1: Boundary of assessment



Activities under Scope 1 emissions		
-	• Fuel combustion – unprocessed natural gas • Fuel combustion - diesel • Crude oil production – flare • Crude oil production – fugitive vent • Crude oil production – fugitive leak • Produced water	-
Activities under Scope 2 emissions		
-	-	-
Activities under Scope 3 emissions		
-	• Vessel operations[4] • Helicopter operations[4]	• Crude oil transport • End use of crude oil

[4] *Vessel and helicopter operations also include the CALM Bouy Replacement Project*

2.2 Calculation Basis and Methods

The calculation basis and methods are summarised in Table 2-2. National Greenhouse Gas and Energy Reporting (NGER) Measurement Determination (MD) is used where applicable.

Table 2-2: GHG emissions estimation basis and methods

ACTIVITY / EMISSION SOURCE	GHG EMISSIONS ESTIMATION BASIS AND METHOD
Scope 1	
Fuel combustion - diesel	Representative emissions value was provided by VOGA on the following basis: • Volume of diesel oil used for stationary energy/miscellaneous equipment diesel was estimated based on forward forecasted fuel gas burn versus diesel burn split. • Emissions from diesel combustion were estimated using NGER MD Section 2.41 Method 1.
Fuel combustion - UNG	Representative emissions value was provided by VOGA on the following basis: • Volume of UNG used for electricity generation and for non-transport purposes was based on forward forecasted fuel gas burn versus diesel burn split. Fuel gas usage is limited by reservoir gas cap depletion management. • Emissions from UNG combustion were estimated using NGER MD Section 2.20 Method 1.
Produced water	Representative emissions value was provided by VOGA on the following basis: • Volume of produced formation water is based on the maximum allowable discharge rate of 36,000 kL/day. • Emissions from produced water were estimated using NGER MD Section 3.73NB Method 2.
Crude oil production – flare	Representative emissions value was provided by VOGA on the following basis: • The flared UNG amount was estimated based on annualised average including typical 30 days of planned annual turnarounds. • The energy content of flared gas was estimated from the CH_4 energy content and molar volume from the Wandoo Emissions Register spreadsheet. • Fugitive emissions from UNG flared were estimated using NGER MD Section 3.53 Method 1.
Crude oil production – fugitive vent	Representative emissions value was provided by VOGA on the following basis: • Emissions were estimated using VOGA's fugitive vent estimation approach considering fugitive vents from produced water flow into Induced Static Flotation Unit 1 (ISFU 1) on WNB and produced oil to Caissons.
Crude oil production – fugitive leak	• Emissions were estimated using NGER MD Section 3.49 Method 1, general leaks including from floating tank.

SCOPE 3	
End use of crude oil	• Emissions were estimated using NGER MD Section 2.41 Method 1. For conservatism, it was assumed that all product will be combusted.
Crude oil transport	• Crude oil offtakes occur 10 times per year, assumed 8 trips to Japan, 1 trip to Singapore, and 1 trip to Malaysia with Aramex tankers. • Emissions were estimated using the equation: Emission factor (t CO_2-e/m^3) x Activity data (m^3). • Emission factor of 'Diesel oil' taken from NGER MD, Division 4.1, Item 54 was used.
Vessel operations	• Emissions were estimated using the equation: Emission factor (t CO_2-e/m^3) x Activity data (m^3). • Emission factor of 'Diesel oil' taken from NGER MD, Division 4.1, Item 54. • Vessel fuel consumption data taken from Xodus database. • The following basis was used to determine the representative emissions values: Support activities for operations: o One infield vessel movement per week. o One accommodation vessel for 7 weeks. o One saturation diving vessel and one hyperbaric rescue vessel in a five-year event. o One bunkering vessel every 14 days. o All vessels are based in Dampier. Maintenance, inspection and project activities (project activities): o A total of 4 project activities across the validity period of the EP (including facility and subsea projects). o During each project activity, 4 vessels will be present per day up to 7 weeks, which include 2 tow tugs, a crew transfer vessel and a diving support vessel. o One jack-up mobile offshore drilling unit (MODU) will be required, towed by 3 vessels, assumed from Dampier initially and moved around within OA.
Helicopter operations	• Emissions were estimated using the equation: Emission factor (t CO_2-e/m^3) x Activity data (m^3). • Emission factor of 'kerosene for use as fuel in an aircraft' taken from NGER MD, Division 4.1, Item 56. • The following basis was used to determine the representative emissions values: o Four (4) helicopter movements at the Wandoo Facility per week, 2 hours return flights per trip. o Fuel consumption of 430 kg/h.

3 RESULTS

The total representative annual GHG emissions resulting from the activities are expected to be ~1,121 kt CO_2-e, consisting of ~92 ktpa CO_2-e of scope 1 emissions (8.2%) and ~1,029 ktpa CO_2-e of scope 3 emissions (91.8%).

The support operations (vessels and helicopter) are expected to generate approximately 53 ktpa CO_2-e, ~4.7% of the total GHG emissions. The vessel emissions have included a contingency factor of 15% to account for the potential delays from the schedule and weather.

Table 3-1: Summary of representative annual GHG emissions estimate over the 5-year period

ACTIVITIES	REPRESENTATIVE ANNUAL GHG EMISSIONS	
	tpa CO_2-e	%
Scope 1 emissions:	92,000	8.21%
Fuel combustion	61,500	5.49%
Diesel combustion	43,500	3.88%
UNG combustion	18,000	1.61%
Produced water	14,000	1.25%
Crude oil production – flare	10,000	0.89%
Crude oil production – fugitive vent	6,000	0.54%
Crude oil production – fugitive leak	500	0.04%
Scope 3 emissions:	1,028,600	91.79%
End use of crude oil	942,100	84.07%
Vessel operations	52,500	4.69%
Bunkering vessel	9,500	0.85%
MODU tow tugs during project activities	8,700	0.78%
Diving support vessel during project activities	6,200	0.55%
Accommodation vessel during operations	5,900	0.53%
Tow tugs during project activities	5,800	0.52%
Infield vessel during operations	5,200	0.46%
Hyperbaric rescue vessel during operations	3,200	0.29%
Crew transfer vessel during project activities	3,000	0.27%
Saturation diving vessel during operations	2,600	0.23%
MODU during project activities	2,400	0.21%
Crude oil transport	33,400	2.98%
Helicopter operations	600	0.05%
Representative annual total GHG emissions:	1,120,600	100.00%

4 REFERENCES

CER 2025, National Greenhouse and Energy Reporting Scheme, Australian Government Clean Energy Regulator. URL: https://cer.gov.au/schemes/national-greenhouse-and-energy-reporting-scheme [26 March 2026]