Santos

Ningaloo Vision

Cessation of Production and Floating Asset Removal Environment Plan

November 2024

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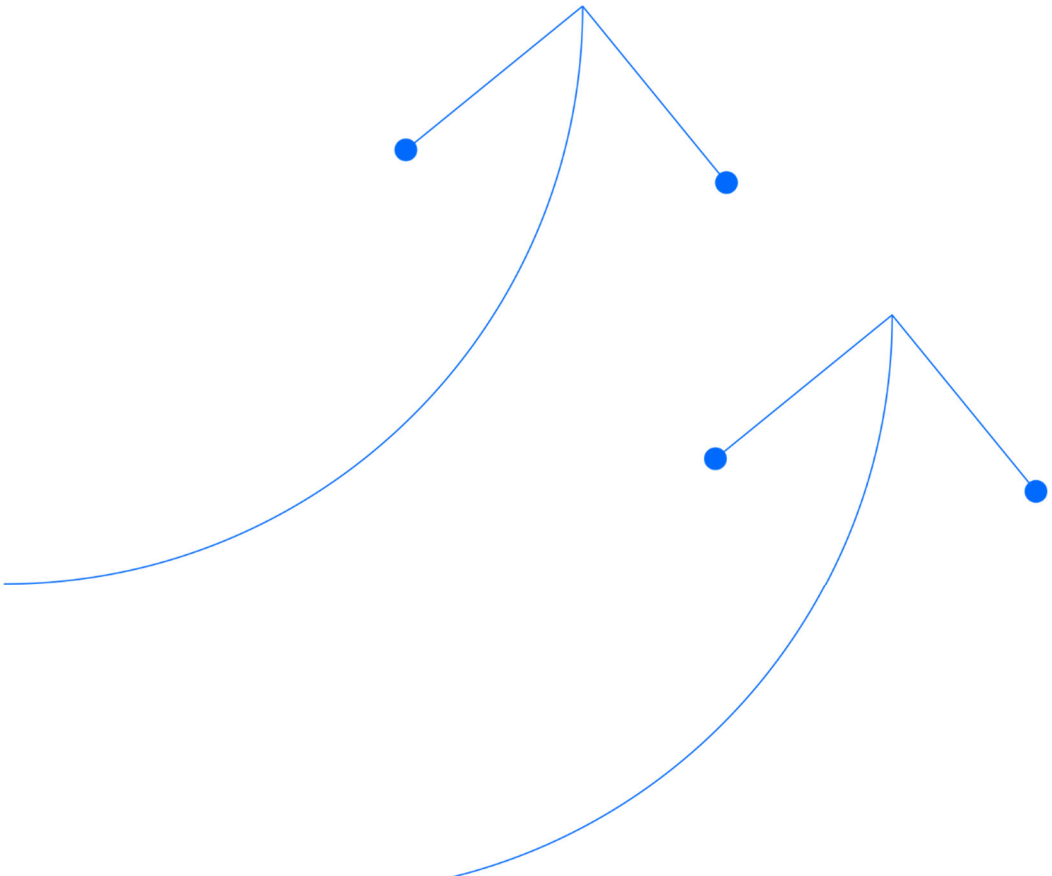

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Units of measurement

Unit	Description
°C	degrees centigrade
g/m²	grams per square metre
cP	centipoise
dB	decibels
dB(A)	decibels A-weighting
hrs	hours
Hz	hertz
kHz	kilohertz
km	kilometre (1000 metres)
km²	square kilometres
L	litre (1000 ml)
m	metre (100 cm)
m²	square metre
m³	cubic metre
mg/L	milligrams per litre
ml	millilitre
nm	nautical mile (1.856 km)
Pa	Pascal (unit of pressure)
ppb	parts per billion
ppm	parts per million
t	tonne (1000 kg)

Abbreviation and Acronyms

Abbreviation/Acronym	Definition
ACHIS	Aboriginal Cultural Heritage Inquiry System
ACN	Australian Company Number
AEP	Australian Energy Producers
AFMA	Australian Fisheries Management Authority
AFZ	Australian Fishing Zone
AHO	Australian Hydrographic Office
ALARP	As low as reasonably practicable
AMPs	Australian Marine Parks
AMOSC	Australian Marine Oil Spill Centre
AMSA	Australian Maritime Safety Authority
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ATBA	Area to be avoided
BIA	Biologically important area
CEWAFs	Chemically enhanced water-accommodated fractions
CFA	Commonwealth Fishing Association
CHARM	Chemical hazard and risk management
CH_4	Methane
CM	Control measure
CMP	Conservation management plan
CoPFAR	Cessation of Production and Floating Asset Removal
CoP	Cessation of production
CO_2	Carbon dioxide
CP	Cathodic protection
CMMS	Computerised maintenance management system
DAFF	Department of Agriculture, Fisheries and Forestry (Commonwealth)
DAH	Dissolved aromatic hydrocarbon
DAWE	Department of Agriculture, Water and Environment, now Department of Climate Change, Energy, the Environment and Water (DCCEEW) and Department of Agriculture, Fisheries and Forestry (DAFF)
DBCA	Department of Biodiversity, Conservation and Attractions (Western Australia)
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEWHA	Department of the Environment, Water, Heritage, and the Arts, now Department of Climate Change, Energy, the Environment and Water (DCCEEW)
DEMIRS	Department of Energy Mines, Industry Regulation and Safety
DISR	Department of Industry, Science and Resources
DNP	Director of National Parks
DOEE	Department of Environment and Energy, now Department of Climate Change, Energy, the Environment and Water (DCCEEW)
DoT	Western Australia Department of Transport
DP	Dynamic positioning
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage

Abbreviation/Acronym	Definition
DSEWPaC	the former Department of Sustainability, Environment, Water, Population and Communities, now Department of Climate Change, Energy, the Environment and Water (DCCEEW)
DTM	Disconnectable turret mooring
ESD	Ecologically sustainable development
EHFLs	Electrohydraulic flying leads
EHS	Environment, health, and safety
EMBA	Environment that may be affected
ENVID	Environmental hazard identification workshop
EOFL	End of field life
EP	Environment Plan
EPA	Environmental Protection Authority
EPSs	Environmental performance standards
EPO	Environment performance outcome
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ESSA	Environmental sensitive sea areas
FPSO	Floating production, storage, and offloading unit
GHG	Greenhouse gas
GPM	Gas production manifold
HAZID	Hazard identification
HAZMAT	Hazardous material
HEV	High environmental value
HEVA	High exposure value area
HOCNF	Harmonised offshore chemical notification format
HSE	Health, safety, and environment
IMMR	Inspection, monitoring, maintenance, and repair
IMCRA	Integrated Marine and Coastal Regionalisation of Australia
IMO	International Maritime Organization
IMT	Incident Management Team
IMS	Invasive marine species
IMSMP	Invasive Marine Species Management Plan
ISPP	International Sewage Pollution Prevention
IUCN	International Union for Conservation of Nature
JRCC	Joint Rescue Coordination Centre
KEF	Key Ecological Feature
LOWC	Loss of well control
MARPOL	International Convention for the Prevention of Pollution from Ships
MC	Measurement criteria
MDO	Marine Diesel Oil
MEG	Monoethylene glycol
MEVA	Moderate exposure value area
MNES	Matter of national environment significance
MoC	Management of change

Abbreviation/Acronym	Definition
MPNMP	Marine Park Network Management Plan
MODU	Mobile offshore drilling unit
MoU	Memorandum of Understanding
NEBA	Net environmental benefit analysis
NMFS	National Marine Fisheries Service
N_2O	Nitrous oxide
NOAA	National Oceanic and Atmospheric Administration
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NOx	Nitrogen oxides
NWS	North West Shelf
NV	Ningaloo Vision
OCNS	Offshore Chemical Notification Scheme
ODS	Ozone depleting substances
OECD	Organisation for Economic Co-operation and Development
OIW	Oil in water
OPGGS (E) R	Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023
OPGGS Act	Offshore Petroleum and Greenhouse Gas Storage Act 2006
OPEP	Oil Pollution Emergency Plan
OSCA	Oil spill control agents
OVID	Offshore Vessel Inspection Database
PAHs	Polycyclic aromatic hydrocarbons
P&A	Plug and abandonment
PLET	Pipeline end termination
PLONOR	Pose little or no risk (to the environment)
PPAs	Protection priority areas
PMS	Planned maintenance system
PMST	Protected matters search tool
PUDU	Production umbilical distribution units
PSZ	Petroleum safety zone
PTS	Permanent threshold shift
PVDF	Polyvinylidene difluoride
ROV	Remotely operated vehicle
SDS	Safety datasheet
SIMOPS	Simultaneous operations
SIMAP	Spill Impact Mapping and Analysis Program
SMPEP	Shipboard Marine Pollution Emergency Plan
SMS	Santos Management System
SOLAS	Safety of life at sea
SOX	Sulphur oxides
SOPEP	Shipboard Oil Pollution Emergency Plan
TSSC	Threatened species scientific committee

Abbreviation/Acronym	Definition
TTS	Temporary threshold shift
XTs	Xmas trees
WCD	Worst case discharge
UTA	Umbilical termination assembly
WA	Western Australia
WAF	Water accommodated fractions
WAFIC	Western Australian Fishing Industry Council
WDCS	Whale and Dolphin Conservation Society
WOMP	Well Operations Management Plan
4LPP	Four-layer polypropylene
3LPE	Three-layer polyethylene

1. Introduction

1.1 Environment Plan Summary

Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023 (OPGGS(E)R) Requirements
Section 35(7)
The summary: (a) must include the following material from the environment plan: (i) the location of the activity (ii) a description of the receiving environment (iii) a description of the activity (iv) details of environmental impacts and risks (v) a summary of the control measures for the activity (vi) a summary of the arrangements for ongoing monitoring of the titleholder's environmental performance (vii) a summary of the response arrangements in the oil pollution emergency plan (viii) details of consultation already undertaken, and plans for ongoing consultation (ix) details of the titleholder's nominated liaison person for the activity. (b) must be to the satisfaction of the Regulator.

This Ningaloo Vision Cessation of Production and Floating Asset Removal (CoPFAR) Environment Plan (EP) Summary has been prepared from material provided in the EP. The summary consists of the following as required by Section 35(7) of the OPGGS (E)R:

EP Summary Material Requirement	Relevant Section of the EP containing EP Summary Material
The location of the activity	Section 2.2
A description of the receiving environment	Section 3 and Appendix C
A description of the activity	Section 2
Details of the environmental impacts and risks	Section 6 and Section 7
The control measures for the activity	Section 6 and Section 7
The arrangements for ongoing monitoring of the titleholder's environmental performance	Section 8
Response arrangements in the oil pollution emergency plan	Section 6.8, Section 7.5, Section 7.6 and Section 7.7 See Ningaloo Vision Cessation of Production and Floating Asset Removal Oil Pollution Emergency Plan (7750-650-EIS-0008)
Consultation already undertaken and plans for ongoing consultation	Section 4 and Section 8
Details of the titleholders nominated liaison person for the activity	Section 1.6.2

1.2 Background

Santos WA PVG Pty Ltd (Santos), on behalf of the Coniston-Van Gogh Production Joint Venture titleholders (Santos WA PVG Pty Ltd [52.501% ownership] and INPEX Alpha Ltd [47.499% ownership]) operates the Van Gogh, Coniston and Novara fields located in WA-35-L which recovers oil in production licence area WA-35-L using the Ningaloo Vision floating production, storage and offloading (FPSO) vessel. Historically, oil has been recovered from the Van Gogh field using the Ningaloo Vision FPSO since 2010.

Operation of the facility is performed under the in-force Ningaloo Vision Operations Environment Plan WA-35-L (Van Gogh/Coniston/Novara Fields) (TV-00-RI-00003.01) (Operations EP), accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) in February 2021. Activities described in the Operations EP include onboard processing of production fluids (and associated discharges), ongoing vessel- based inspection and intervention activities, as well as periodic disconnection of the FPSO, typically in response to cyclones or other operational (e.g., maintenance) requirements.

Production rates are declining and the FPSO is due for hull re-certification in Q1 2025. EOFL is currently estimated to be first half of 2025. As a result, Santos has commenced decommissioning planning activities for the Ningaloo Vision FPSO and infrastructure on title.

1.3 Scope of this Environment Plan

Santos is planning for decommissioning of the Ningaloo Vision FPSO and Van Gogh and Coniston and Novara subsea assets. This CoPFAR EP covers the cessation of production phase of the Ningaloo Vision facilities, the removal of floating assets and a damaged section of Coniston Novara production flowline B.

Production will have ceased, suspension of operations activities will have been completed, and the last hydrocarbon cargo and slops will have been removed with an offtake under the Operations EP. This EP will commence at disconnection of the FPSO from the Disconnectable Turret Mooring (DTM).

The petroleum activities covered in this EP include:

- The disconnection and permanent sail away of the FPSO;
- the presence of all infrastructure on title and in the water column, up until subsea infrastructure is decommissioned (subject to a future decommissioning EP);
- floating asset removal (DTM, risers and wet parking or removal of the DTM mooring lines). If deemed safe and practicable to do so, the unburied section of the DTM mooring lines may be removed as part of the FAR activities covered by this EP;
- implementation of inspection, monitoring, maintenance, repair (IMMR) activities until all wells are plugged and abandoned (subject to future and separate P&A EP) and subsea infrastructure is decommissioned (subject to a future decommissioning EP);
- flushing of both production flowlines A and B between DC3 and DC4, and DC2 and DC3; and
- removal of a 910 m damaged section of the Coniston Novara production flowline B between DC2 and DC3.

1.4 Purpose of this Environment Plan

The purpose of this CoPFAR EP is to meet the requirements of OPGGS(E)R for acceptance by NOPSEMA, and is Step 1 in Santos' Ningaloo Vision decommissioning approvals pathway by providing a:

- description of the planning processes and timetables of activities to support current and future activities, including a description of Santos' future plans for the plug and abandonment of wells and decommissioning of remaining subsea equipment (which will be the subject of a future plug and abandonment EP and a revision to this EP to capture end state decommissioning) (**Section 1.5**);
- description of all property brought onto title, including its current status and condition (**Section 2**);
- description of the activities associated with the cessation of production phase of the Ningaloo Vision facilities up until the field decommissioning phase (**Section 2**);
- description of removal of infrastructure activities and planned execution timings for:
  - FPSO disconnection and permanent sail way (**Section 2**)
  - the DTM, risers, the 910 m damaged section of the Coniston Novara production flowline B, and disconnection of the mooring lines and execution timing (**Section 2**)
- description of the additional flushing of both production flowlines A and B between DC3 and DC4 before the removal of the 910 m damaged section of the Coniston Novara production flowline B (**Section 2**);
- description of how Santos will maintain all property on the title, as required by s572 (2) of the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGS Act) such that end states are not precluded (Section 2);
- description of the existing environment (**Section 3**) that may be affected by the activity;
- description of stakeholder consultation relevant to the EP Activities (**Section 4**);
- an outline of the Risk and Impact Assessment process applied in this EP (**Section 5**), followed by a demonstration of how impacts and risks of planned and unplanned activities are ALARP and Acceptable (**Sections 6** and **7**); and

- an implementation strategy (**Section 8**) that will be used to measure and report on environmental performance to ensure impacts and risks during planned and unplanned events are reduced to as low as reasonably practicable (ALARP) and acceptable levels.

1.5 Future Decommissioning Project Planning Activities

1.5.1 Overview

As outlined in **Section 1.3**, Santos is planning for decommissioning of the Ningaloo Vision FPSO and Van Gogh and Coniston and Novara subsea assets.

Decommissioning to an end state on title (other than FPSO removal described in **Section 2.9**, floating asset removal described in **Section 2.10**, and partial removal of the Coniston Novara Production Flow Line B described in **Section 2.11**) is not an activity performed within this EP. However, Santos planning for decommissioning is described in the following sections to provide context for activities:

- **Section 1.5.2** provides a summary of the applicable regulatory context to CoP and future decommissioning activities; and

- Santos' decommissioning planning activities in accordance with Section 572 of the OPGGS Act is outlined in **Section 1.5.3.**

1.5.2 Regulatory Context

The NOPSEMA planning for proactive decommissioning document (N-00500-IP2002), states that decommissioning is taken to mean the process of removing or otherwise satisfactorily dealing with offshore petroleum property (including wells) in a safe and environmentally responsible manner when it is neither used nor intended to be used.

Decommissioning in Commonwealth waters is governed by a series of legislation, policies and standards. The OPGGS Act is the primary legislation governing offshore decommissioning in Commonwealth waters. NOPSEMA lists multiple important documents for decommissioning, including but not limited to the following:

- NOPSEMA Policy: Section 572 Maintenance and removal of property (Document No: N-00500-PL1903 A720369).
- NOPSEMA policy Section 270 Consent to surrender title - NOPSEMA advice (Document No: N-00500-PL1959 A800981).
- NOPSEMA Decommissioning Compliance Strategy 2024-2029

NOPSEMA Policy - Section 572 maintenance and removal of property

The NOPSEMA Section 572 Maintenance and removal of property policy (N-00500-PL1903 A720369) sets out the principles that NOPSEMA will apply in the administration of Section 572 of the OPGGS Act which requires titleholders to:

- maintain all structures, equipment and other property in a title area in good condition and repair
- remove all structures, equipment and other property that is neither used nor to be used in connection with operations authorized by the title
- or make arrangements that are satisfactory to NOPSEMA in relation to those structures, equipment and other property.

Table 1-1: Duties and requirements under section 572

Duties and requirements under section 572		EP Reference
Maintenance of property etc. (section 572(2))	A titleholder must maintain in good condition and repair all structures that are, and all equipment and other property that is: a. in the title area; and b. used in connection with the operations authorised by the permit, lease, licence or authority.	Refer to Section 2.8 which describes general field management activities for IMMR

Duties and requirements under section 572		EP Reference
Removal of property etc. (section 572(3))	A titleholder must remove from the title area all structures that are, and all equipment and other property that is, neither used nor to be used in connection with the operations: a. in which the titleholder is or will be engaged; and b. that are authorised by the permit, lease, licence or authority.	Refer to **Sections 2.9** to **2.11**.
Exception to the requirement (section 572(6))	Section 572(6) provides that maintenance and removal requirements, "do not apply in relation to any structure, equipment or other property that was not brought into the title area by or with the authority of the titleholder". Where a title has been sold or transferred (change in control), the requirement to maintain and remove property etc. remains with the titleholder, whether it is operational or not. Where property etc. remains within a title and the title has ceased to be in force (i.e. for a period of time an area has reverted to vacant acreage), the current titleholder may not be responsible for any property etc. in the area of the title resulting from historical activities of the former titleholder if that property etc. is not being used. It should be noted, where a title ceases to be in force, in whole or in part, NOPSEMA may still direct the titleholder, former titleholder or certain other persons, under section 587 of the OPGGS Act to remove or make arrangements with respect to property etc.	N/A
Obligations of maintenance and removal of property etc. are subject to other provisions (section 572(7))	Section 572(7) of the OPGGS Act allows for titleholders to make other arrangements that are satisfactory to NOPSEMA with respect to property etc. for the purposes of section 270 of the OPGGS Act via an accepted permissioning document. Other arrangements in the context of this regulatory policy include where a titleholder intends to do something that is different from the requirements of section 572(2) and (3). Maintenance and removal of property etc. requirements are subject to other provisions of the OPGGS Act, the regulations, directions given by NOPSEMA or the responsible Commonwealth Minister, and any other law. The maintenance and removal requirements do not substitute for, or override other provisions of, or arrangements made under, the OPGGS Act or regulations. If a titleholder intends to make other arrangements in relation to property etc. under section 572(7), the proposed approach should be included in permissioning documents and accepted by NOPSEMA prior to the property etc. being brought into the title area. Any changes in the titleholders' approach should be addressed in subsequent revisions of permissioning documents.	Section 270 matters will be the subject of a future decommissioning EP.

NOPSEMA Policy - Section 270 consent to surrender title

The NOPSEMA policy Section 270 Consent to surrender title - NOPSEMA advice (Document No: N-00500-PL1959 A800981) states the following key points:

- Section 270 of the OPGGS Act provides that the Joint Authority (JA) may consent to the surrender of petroleum exploration permits, production licences, retention leases, infrastructure licences and pipeline licences, if it is satisfied there are sufficient grounds to warrant giving consent.
- NOPSEMA will be requested to provide advice to the JA in relation to certain criteria to inform the JA's decision-making.
- NOPSEMA's advice will be based upon performance against conditions and obligations set out in permissioning documents

Santos acknowledges the requirement of Section 270 but notes that Section 270 matters are not addressed within this EP and are therefore not discussed further. Section 270 matters will be the subject of a future decommissioning EP.

NOPSEMA Decommissioning Compliance Strategy 2024-2029

NOPSEMA's vision is that decommissioning of offshore petroleum wells, structures and property is completed in a timely, safe and environmentally responsible manner. Santos Decommissioning Plan for Ningaloo vision was submitted to NOPSEMA in Q1 2023. Santos propose to remove floating assets under the scope of this EP. Santos proposed schedule for future decommissioning activities is outlined in **Section 1.5.3.**

Santos considers that the timing proposed is a pragmatic and reasonable approach, is aligned with NOPSEMA's overall vision and purpose to have a protected offshore workforce and environment and to assure the protection of lives and the environment.

1.5.3 Santos Decommissioning Plan

Recently Santos has completed significant work on its long term decommissioning plan across Commonwealth and State waters. The decommissioning plan ensures we are carrying out activities at an appropriate time when taking into consideration risk, environmental and safety benefits. This stable long term plan of activity allows for effective resourcing, skills development and financing, allowing for learnings to be applied to ensure the safe execution of all campaigns.

Santos acknowledges NOPSEMA's Decommissioning Compliance Plan and Strategy which aims to ensure titleholders have appropriate plans for decommissioning and are completing activities in a timely manner. Santos also notes that the strategy acknowledges that NOPSEMAs "decommissioning targets cannot cover every case or variation – and that they may be too short or too long in some cases" (NOPSEMA, 2024). Santos' proposed schedule is committed to ensuring that all of our facilities are in safe condition and do not pose a threat to people, the environment or property, and is aligned with NOPSEMA's vision of decommissioning being completed in a timely, safe, and environmentally responsible manner.

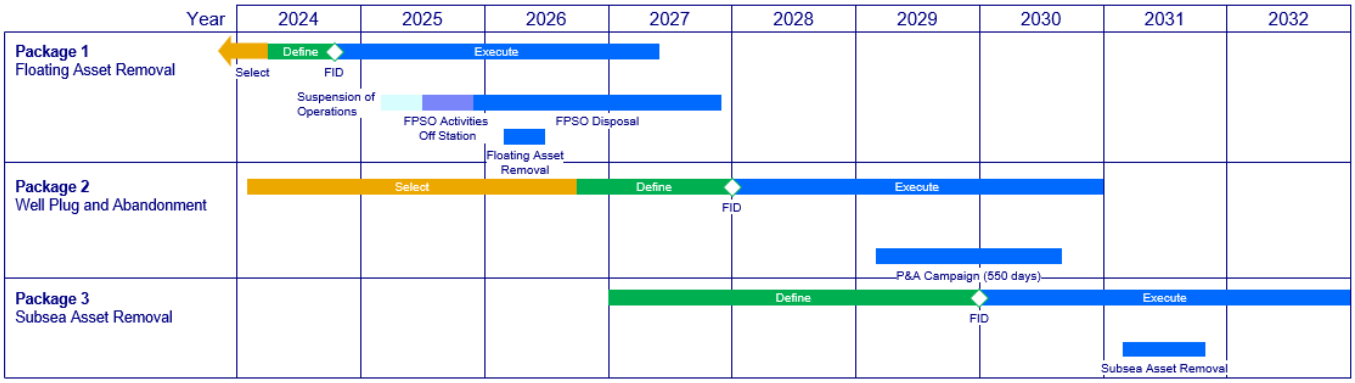
When planning for a decommissioning project, Santos splits the planning for each execution area into three main packages. Noting they may be split into further sub-packages for contracting requirements:

1. Package 1: Floating Asset Removal – in this case includes FPSO removal (This EP)
2. Package 2: Well Plug and Abandonment (Future EP)
3. Package 3: Subsea Asset Removal (Future EP)

Santos has also taken the following into account when planning for successful decommissioning in accordance with the Regulations.

- The ability to obtain all regulatory acceptances before taking financial commitments (i.e. Financial Investment Decision (FID) to major contractors to execute the works.
- The integrity of the infrastructure on title will be maintained appropriately to ALARP and acceptable levels.
- The controls used during long term suspension of wells up until plug and abandonment and end state decommissioning are listed within the WOMP, Safety Case and this EP and how all three permissioning documents need to be accepted by NOPSEMA
- The ability to secure a rig post regulatory acceptance to undertake a future large scale plug and abandonment scope, along with maintaining Santos' internal team currently executing similar works at another offshore asset to apply best practice through Santos' continuous improvement process.
- Being able to apply direct learnings from the MEFF P&A campaign currently underway, being built into the concept select process for NV to look at safety and operational efficiencies
- The ability to try and apply synergies between decommissioning activities where practicable, to undertake activities in a safe and more efficient manner (e.g. Potential synergies in 2026 for the NV CoPFAR DTM activities with Mutineer Exeter (MEFF) seabed asset decommissioning activities).

The below schedule summarises the forward plan for the Ningaloo Vision and associated assets decommissioning:



The reasons that support Santos' planned approach to decommissioning schedule above are outlined below. The supporting information demonstrates that Santos has appropriate plans for decommissioning and are completing activities in a practicable and timely manner.

Package 2

Initiation phase

- Santos' subsurface team developing Subsurface Basis of Abandonment (SS BOA) for P&A of the Van Gogh Coniston Novara (VGCN) wells, this will define what formations need to be isolated with two barriers, one barrier, and will define which formations qualify as caprock. On track for completion in 2024.
- Engineering study under way to develop preliminary P&A concepts for VGCN wells and develop an initial time and cost estimate to P&A all the wells in the field. On track for completion in 2024.

Concept stage of Select Phase (approx. Q1 2025 through H1 of 2026)

- Complete engineering study to determine feasibility of executing a Light Weight Intervention Vessel (LWIV) pre-rig well intervention campaign to prepare VGCN wells for Mobile Offshore Drilling Unit (MODU) based P&A. Study will identify scopes that can be executed using LWIV prior to MODU arrival and determine cost benefit of removing these scopes from the MODU.
- Complete engineering study to determine feasibility of executing P&A campaign using a Dynamic Positioning (DP) MODU instead of a moored MODU.
- Santos Drilling and Completions (D&C) engineering team to select P&A concept and complete conceptual P&A design for each well. Conceptual P&A design to incorporate lessons learned from MEFF P&A campaign due for completion in late Q2 2025.
- Complete engineering project to develop agnostic tooling to allow handling of all subsea trees in the field by a single service provider (Cameron and BHGE XTs)
- Refine time and cost estimate inclusive of pre-rig well intervention campaign (if feasible) and MODU based P&A

Define phase (H2 2025 through FID Q4 2027/Q1 2028)

- Complete detailed engineering including LWIV pre-rig well intervention design (if feasible), detailed well P&A design, well test design (bleed-off package), source control plan.
- Procure long leads, contract 3rd party services, commence MODU and support vessels contracting process
- Complete AFE time and cost estimate
- Develop and obtain acceptance of EP and OPEP for LWIV pre-rig campaign (if feasible)
- Develop and obtain acceptance of EP and OPEP for MODU based P&A campaign
- Take project FID

Implementation stage of Execute Phase (2028)

- Award MODU and support vessels contracts
- Develop and obtain acceptance of WOMPs (LWIV pre-rig and MODU P&A)
- Develop and obtain acceptance of Vessel Safety Case Revisions (LWIV pre-rig and MODU P&A)
- Execute LWIV pre-rig well intervention campaign
- Prepare MODU for P&A operations (rig modifications, rig acceptance inspections, site specific documents, etc)
- Finalise P&A programs utilising information obtained during LWIV pre-rig campaign (e.g. cement bond logs)

Operation stage of Execute Phase (2029/2030)

- Execute the 25 well P&A Campaign

Package 3

The SAR scope of work will follow on from the P&A scope. The key drivers for SAR timing will include scope definition based on the outcome of the P&A campaign (i.e. trees that were unable to be removed by the MODU during P&A campaign), and the remaining scope at that time. Additionally, SAR will require a separate EP which may be informed by the outcome of the P&A scope and hence cannot be finalised until sometime after the P&A work is substantially complete.

Operationally it is advantageous to separate the P&A and SAR offshore campaigns avoiding SIMOPS for safer decommissioning. Avoiding SIMOPS requires a buffer between to the two scopes, as the duration of the P&A campaign (500 days) may vary substantially due to unforeseen circumstances.

Sequence of events will broadly be made up of;

- Define taking place simultaneously with the P and A
- Complete EP and submit to NOPSEMA.
- Complete FID assurance in preparation for EP, and other permissioning documents being accepted
- Obtain EP approval and then FID
- Award SAR contracts
- Complete SAR engineering and commence work on site.

This process is expected to be around 18 to 24 months after P and A complete.

Planning for all execution activities starts well in advance of any execution activities. This allows sufficient time for EP submission and approvals, and awarding of key contracts post EP approval and package Final Investment Decisions (FID).

1.5.3.1 Package 1: Floating Asset Removal

Removal of floating assets is covered in this EP, refer to **Section 1.3** and **Section 1.4** for details.

1.5.3.2 Package 2: Well Plug and Abandonment

Submit a plug and abandonment EP which provides for well plugging and abandonment activities. The matters to be addressed in the P&A EP are:

- description of all property brought onto title, including its current status and condition
- description of all the activities associated with the plug and abandonment of all wells on title
- detailed plans of P & A activities and the execution timings.

1.5.3.3 Package 3: Subsea Asset Removal

Santos plans to submit a future Subsea Asset Removal EP which provides for the end state decommissioning of the assets consistent with section 572 of the Act. This Subsea Asset Removal EP will be a revision to the COP EP to

reflect floating asset removal activities and the inclusion of additional matters specific to subsea decommissioning outlined below:

- detailed plans of the proposed subsea decommissioning activities. In particular, the fate of all property on the title, proposed decommissioning methodology, scope of work and execution strategy
- an evaluation of the feasibility of all options, including partial and complete property removal to inform any leave in situ proposal
- an evaluation of environmental impacts and risks of all feasible options, including complete property removal, to enable NOPSEMA to have regard to the Australian Government Decommissioning Guideline policy principle that deviations will provide an equal or better environmental outcome when compared to complete property removal. The evaluation of all the environmental impacts and risks of each option must include consideration of control measures necessary to manage the impacts and risks
- evaluation of all environmental impacts and risks within Australia's environment including, where relevant, indirect consequences that may arise from the petroleum activity of removing property from a title area
- where deviation/s to removal of property or relocation of property is proposed, Santos will address arrangements for monitoring and management
- an evaluation of all impacts and risks from the proposed decommissioning end state activities to demonstrate that the end state option provides a net environmental benefit and impacts and risks are managed to acceptable levels and ALARP

1.5.4 Future Environment Plans

Prior to the execution of decommissioning activities, Santos will need to have an accepted plug and abandonment EP to plug and abandon all wells on title. Following that, Santos will need an EP to describe the proposed end state, execution activities and section 270 requirements for decommissioning on title.

A plug and abandonment EP will be submitted to NOPSEMA in H2 2026 which addresses the following:

- Description of all property brought onto title including its current status and condition
- A description of all activities associated with plugging and abandonment of all wells on title
- Details plans of P&A activities and execution timings

A decommissioning EP will be submitted to NOPSEMA in H1 2028, which addresses the following:

- Detailed plans of the proposed subsea decommissioning activities. In particular, the fate of all property on the title, proposed decommissioning methodology, scope of work and execution strategy
- An evaluation of the feasibility of all options, including partial and complete property removal
- An evaluation of environmental impacts and risks of all feasible options, including complete property removal, to enable NOPSEMA to have regard to the Australian Government Decommissioning Guideline policy principle that deviations will be ALARP and acceptable compared to full removal.
- The evaluation of all the environmental impacts and risks of each option must include consideration of control measures necessary to manage the impacts and risks
- Evaluation of all environmental impacts and risks within Australia's environment including, where relevant, indirect consequences that may arise from the petroleum activity of removing property from a title area
- Where deviation/s to removal of property or relocation of property is proposed, Santos will address arrangements for monitoring and management

1.5.5 Maintaining Property to Enable Decommissioning

As per the NOPSEMA Policy N-00500-PL1903 A720369 (Section 572 Maintenance and removal of property), when planning for any alternative arrangement to removal of property etc. a titleholder must continue to maintain property etc. in good condition and repair so that it can be removed, until alternative arrangements are accepted by NOPSEMA.

During both the Operation and Preservation phases, Santos will ensure through IMMR and integrity management activities (as described in **Section 2**) that all property is maintained in a state that ensures it can be removed safely at the end of its life, or an alternate end state agreed.

A Well Operations Management Plan (WOMP) will be implemented throughout the preservation phase. The WOMP was submitted to NOPSEMA in September 2024 and at the time of writing this revision of the EP, was still under assessment. The WOMP describes how the wells are managed during the Cessation of Production phase (e.g. long term suspension), including inspection, monitoring, maintenance and repair activities. It also covers emergency situations. These measures are intended to ensure integrity of the wells and ensure that risks to personnel and the environment are as low as reasonably practicable (ALARP).

1.5.6 Studies

Santos proposes to remove infrastructure on WA-35-L in line with section 572 of the OPGGS act subject to a technical feasibility assessment. Santos proposes the studies in **Table 1.2** to support decommissioning.

Table 1-2: Studies proposed to support decommissioning

Decommissioning option	Proposed Study	Year/s	Scope / Purpose
Removal and leave in situ	Technical feasibility assessment	2026 - 2028	Assessment of technical feasibility of infrastructure removal
	Waste management study	2026 - 2028	Identify options for repurposing, recycling and disposal of materials
	Environmental sampling if required	2026 - 2028	Environmental sampling to inform impact and risk evaluation for future activities
Leave situ only	Comparative assessment of decommissioning options	2026 - 2028	Comparison of technically feasible decommissioning options against environmental and social assessment criteria
	Degradation assessment	2026 - 2028	Material degradation assessment (concrete, plastic, steel etc.) for leave in situ option
	Snag risk assessment	2026 - 2028	Assessment of snag risk associated with leaving infrastructure in situ
	Biodiversity & habitats assessment	2026 - 2028	Assessment of biodiversity associated with infrastructure
Notes: Dates in this table are estimates only			

1.6 Titleholder

1.6.1 Details of the Titleholder

OPGGS(E)R Requirements
Section23. Details of titleholder and nominated liaison
23(1) The environment plan must include the following details for the titleholder: (a) name; (b) business address; (c) telephone number (if any); (d) fax number (if any); (e) email address (if any); (f) if the titleholder is a body corporate that has an ACN (within the meaning of the Corporations Act 2001)—ACN. 23(2) The environment plan must also include the following details for the titleholder's nominated liaison person: (a) name; (b) business address;

OPGGS(E)R Requirements
(c) telephone number (if any); (d) fax number (if any); (e) email address (if any).

Santos WA PVG Pty Ltd is the nominated titleholder for the petroleum activity covered under this EP within WA-35-L.

In accordance with Section23(1) of the OPGGS(E)R, the titleholder details are as follows:

Name:	Santos WA PVG Pty Ltd
Business address:	100 St Georges Terrace, Perth, WA 6000
Telephone number:	(08) 6218 7100
Email address:	offshore.environment.admin@santos.com
ACN:	129 604 860

1.6.2 Details for Nominated Liaison Person

Details for the Santos Nominated Liaison Person for the activity are as follows:

Name:	Dawn MacInnes
Position:	Environment Manager WANATL
Address:	100 St Georges Terrace, Perth, 6000
Telephone number:	(08) 6218 7100
Email address:	offshore.environment.admin@santos.com

1.6.3 Notification Procedure in the Event of Changed Details

If there is a change in the titleholder, the titleholder's nominated liaison person, or a change in the contact details for the titleholder or liaison person, Santos will notify NOPSEMA in writing and provide the updated details.

1.7 Environmental Management Framework

OPGGS(E)R) Requirements
Section24(a). Other information in the environment plan
The environment plan must contain the following: (a) A statement of the titleholder's corporate environmental policy

1.7.1 Environmental health and safety policy

The activities will be conducted in accordance with the Santos Environment Health and Safety Policy **(Appendix A)** and relevant legislative requirements presented within **Appendix B** inclusive of the relevant EP sections where the legislation may prescribe or control how an activity is undertaken.

Sections 6 and 7 reflect the Santos Environment Health and Safety Policy, detailing and evaluating impacts and risks from planned and unplanned events, providing control measures with set performance outcomes, standards, and measurement criteria to ensuring environmental performance is achieved.

1.8 Legislative Framework

OPGGS(E)R) Requirements
Section 21. Environmental assessment
Description of the activity 21(4) The environment plan must: a) describe the requirements, including legislative requirements, that apply to the activity and are relevant to the environmental management of the activity; and b) demonstrate how those requirements will be met.

1.8.1 International Legislation

Australia is signatory to numerous international conventions and agreements that obligate the Commonwealth government to prevent pollution and protect specified habitats, flora, and fauna. Those which are relevant to the CoPFAR activities are detailed in **Appendix B.**

1.8.2 Commonwealth and State Legislation

All CoPFAR activities will comply with legislative requirements established under relevant State and Commonwealth legislation. These are further detailed in **Appendix B**.

1.8.2.1 Offshore Petroleum and Greenhouse Gas Storage Act 2006

The *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (OPGGS Act) is the principal legislation managing petroleum activities in Australian Commonwealth waters.

The OPGGS Act and supporting regulations address all licensing, health, safety environmental and royalty issues for offshore petroleum and gas exploration and production operations in Commonwealth waters.

Specifically, the OPGGS(E)R prescribe the requirements for management of environmental impacts associated with petroleum activities and require proponents to submit an EP to the Regulatory Authority for approval prior to the commencement of activities. As part of these documents, the proponent is required to assess the risks associated with the activities and demonstrate that the proposed mitigation measures reduce these risks to ALARP and acceptable levels.

Obligations in relation to the maintenance and removal of equipment and property brought onto title are provided under subsection 572(3) of the OPGGS Act.

Under subsection 572(3) of the OPGGS Act, a titleholder must remove from the title area all structures that are, and all equipment and other property that is neither used nor to be used in connection with the operations. Under subsection 572(7), property removal requirements are subject to any other provision of the OPGGS Act, the regulations, directions given by NOPSEMA or the responsible Commonwealth Minister, and any other law. Section 572(3) requires the removal of property when it is no longer used, unless NOPSEMA has accepted alternative arrangements where justification is appropriate and with regard to the Guideline: Offshore Petroleum Decommissioning (Department of Industry, Science and Resources, 2022).

Under subsection 270(3) of the OPGGS Act, before title surrender, all property brought into the surrender area must be removed to the satisfaction of NOPSEMA, or arrangements that are satisfactory to NOPSEMA must be made relating to the property.

Field management covered under this CoPFAR EP evaluates the infrastructure integrity and applies applicable measures, based on risk, to ensure well and subsea infrastructure may be maintained for future removal in accordance with Section 572(3) of the OPGGS Act.

Appendix B includes the pertinent sections of the OPGGS(E)R 2023 and details the sections of the EP which ensure compliance with the requirements.

1.8.2.2 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The Van Gogh Development was referred under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) to the Commonwealth Department of Environment, Water, Heritage, and the Arts (DEWHA; now Department of Climate Change, Energy, the Environment and Water (DCEEW) on 3 January 2007 (Ref. EPBC 2007/3213). The DEWHA determined that the development was a “controlled action” requiring approval under Part 3, Division 1 of the EPBC Act. The Van Gogh Development referral covered the installation of subsea equipment to control and direct reservoir production fluids to a floating production, storage, and offloading (FPSO) vessel, to recover, process and export oil from the Van Gogh field.

The Coniston Novara Development was referred under the EPBC Act to DEWHA on 13 June 2011 (Ref. EPBC 2011/5995). The DEWHA determined that the development was a “controlled action” requiring approval under Part 3, Division 1 of the EPBC Act. The Coniston Novara Development referral covered the development of a subsea oil field comprising of seven production wells tied back to the existing Ningaloo Vision FPSO.

Conditions of EPBC Referrals 2007/3213 and 2011/5995 relevant to decommissioning activities are provided in Table 1-3.

Table 1-3: Relevant EPBC Referral Condition to the Activity

EPBC Referral Condition	Relevancy to this Activity
Van Gogh Ref. EPBC 2007/3213	
Condition 3. The person taking the action must submit a decommissioning plan (or plans) for approval by the Minister one year prior to decommissioning of the floating production, storage and offtake vessel, and three months prior to decommissioning any subsea wells, flowlines, or any associated infrastructure. The plan (or plans) must consider the complete removal of all structures and components above the sea floor. The approved plan must be implemented.	Santos submitted a Decommissioning Plan to NOPSEMA in Q1 2023 with information about the plans for decommissioning of the infrastructure on title covering the Van Gogh development. The floating asset and damaged section of production flowline B removal activities covered in this EP are planned to commence is within 12 months of FPSO sail away (i.e. currently planned for H1 2026) dependant on weather and vessel availability. Decommissioning of remaining infrastructure will be subject to a future decommissioning EP.
Coniston Novara Ref. EPBC 2011/5995	
Condition 14. The person taking the action must submit a Decommissioning Plan to the Minister for approval at least twelve months prior to commencement of the decommissioning phase. Appropriate consideration must be given to matters of national environmental significance as defined by the EPBC Act and the net environmental benefit analysis of pursuing the proposed plan. Note: If a legal requirement held by the person taking the action requires submission of a plan that meets the above requirements, that plan may be submitted for the purpose of this condition.	The floating asset and damaged section of production flowline B removal activities covered in this EP are planned to commence within 12 months of FPSO sailaway (e.g. H12026) dependant on weather and vessel availability. Decommissioning of remaining infrastructure will be subject to a future decommissioning EP.

1.8.2.3 Hazardous Waste (Regulation of Exports and Imports) Act 1989

The Hazardous Waste (Regulation of Exports and Imports) Act 1989 regulates the export, import and transit of hazardous waste to ensure that hazardous waste is dealt with appropriately so that human beings and the environment, both within and outside Australia, are protected from the harmful effects of the waste. The relevance of this Act is summarised within **Appendix B**. In instances where infrastructure is proposed to be exported and needs a permit under the Hazardous Waste Act, the Department of Climate Change, Energy, the Environment and Water (DCEEW) issue these. Santos has engaged with DCCEEW regarding the requirements of the Hazardous Waste (Regulation of Exports and Imports) Act 1989 (the Act) and will comply with requirements as applicable, under the Act to the extent applicable.

2. Activity Description

OPGGS(E)R 2023 Requirements
Section 21. Environmental assessment.
Description of the Activity: 21 (1) The environment plan must contain a comprehensive description of the Activity including the following: a) the location or locations of the Activity b) general details of the construction and layout of any facility c) an outline of the operational details of the Activity (for example, seismic surveys, exploration drilling or production) and proposed timetables d) any additional information relevant to consideration of environmental impacts and risks of the Activity. Note: An environment plan will not be capable of being accepted by the Regulator if an Activity or part of the Activity, other than arrangements for environmental monitoring or for responding to an emergency, will be undertaken in any part of a declared World Heritage property – see Section 34.

2.1 Activity overview

The petroleum activities covered in this EP include:

- The disconnection and permanent sail away of the FPSO
- the presence of all infrastructure on title and in the water column, up until subsea infrastructure is decommissioned (subject to a future decommissioning EP)
- implementation of inspection, monitoring, maintenance, repair (IMMR) activities until all wells are plugged and abandoned (subject to future and separate P&A EP) and subsea infrastructure is decommissioned (subject to a future decommissioning EP)
- flushing of both production flowlines A and B between DC3 and DC4, and DC2 and DC3.
- floating asset removal (DTM, risers and wet parking of the DTM mooring lines). If deemed safe and practicable to do so, the unburied section of the DTM mooring lines may be removed as part of the FAR activities covered by this EP
- removal of a 910 m damaged section of Coniston Novara production flowline B between DC2 and DC3

The subsea production system (with the exception of production flowlines A and B between DC3 and DC4, and DC2 and DC3) will have been flushed of hydrocarbons with treated seawater and left in a preservation state under the Operations EP. Flushing returns will have been processed through the FPSO and disposed of down hole in the water injection well or into the FPSO cargo and slops system and taken away via offtake tanker. The reservoirs will also have been isolated from the subsea production system at the XTs (barrier testing of the XTs will have been completed and verified as per the WOMP (DR-91-ZG-10048)) in preparation for the commencement of this EP.

As mentioned in **Section 1.3**, this EP commences with FPSO disconnection from the DTM.

After FPSO disconnection and sail away the risers will remain connected to the DTM within the petroleum safety zone (PSZ) and are planned to be removed under this EP. A 910 m damaged section of Coniston Novara production flowline B between DC2 and DC3 will also be removed under this EP. All remaining flexible flowlines will remain in place on the seabed, connected to manifolds and will be subject to a future decommissioning EP, as will all other subsea infrastructure. A full summary of the infrastructure on title, and the status and condition, is provided in **Table 2-1, Table 2-2** and **Table 2-3.**

The risers and DTM will be recovered and removed from the operational area as part of the floating asset removal activities. The DTM will be recovered to a vessel/barge or towed out of the operational area to a designated port. The DTM mooring lines and anchors will remain in the operational area and be subject to later decommissioning activity and EP; however, if deemed safe and practicable to do so, the unburied section of these may be removed as part of the activities covered by this EP.

2.2 Location

The Van Gogh, Coniston and Novara fields and associated infrastructure and equipment are located within Production Licence WA-35-L in Commonwealth waters, approximately 45 km north-northwest off the Cape Range Peninsula in Western Australia. The FPSO and DTM are located approximately 58 km north-northwest of the

Exmouth township **(Figure 2-1**). Water depths range from 340 m in the east of the production licence to 400 m in the west, with the DTM located in a water depth of approximately 341 m.

2.3 Operational Area

This EP covers Ningaloo Vision CoPFAR activities within an operational area on production licence WA-35-L (refer **Figure 2-1**) defined as:

- a 500 m radius petroleum safety zone (PSZ) that extends around the DTM
- a 500 m radius around the DTM anchor spread
- 500 m around and either side of all other subsea infrastructure.

The nominal proximity of the operational area to other key coastal or mainland features is:

- Muiron Islands– 38 km southeast
- North West Cape – 42 km south
- Exmouth – 58 km south
- Barrow Island – 137 km northeast.

The nearest petroleum activities are two Woodside operated FPSOs:

- Ngujima-Yin FPSO – Enfield Development in WA-28-L, approximately 4 km south of the operational area currently in the decommissioning phase
- Pyrenees Venture FPSO - Pyrenees Development in WA-42-L, approximately 13 km southeast of the operational area.

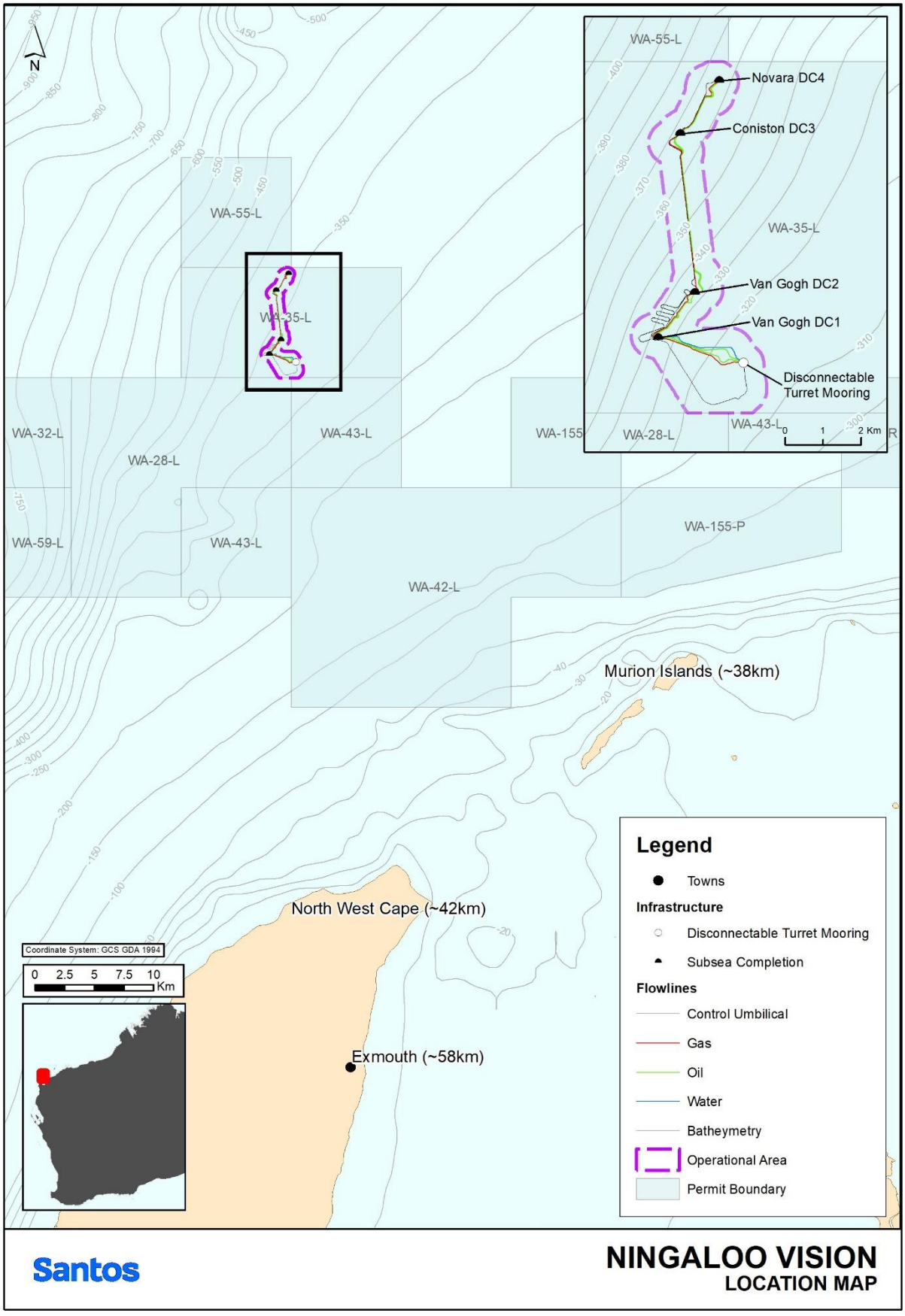


Figure 2-1: Location of Ningaloo Vision and Associated Infrastructure

2.4 Facilities Description

The NV operations infrastructure is depicted in the schematic of **Figure 2-2**.

After FPSO departure from the operational area the DTM system will be left in place approximately 20 to 30 m below sea level and remaining connected to its mooring system of mooring lines and anchors. The DTM will have a surface marker buoy attached to identify its location.

Figure 2-2 shows what infrastructure is left on title (and subject to a future decommissioning EP) after removal of the FPSO, the DTM and its risers, and the damaged portion of Coniston Novara Production Flowline B.

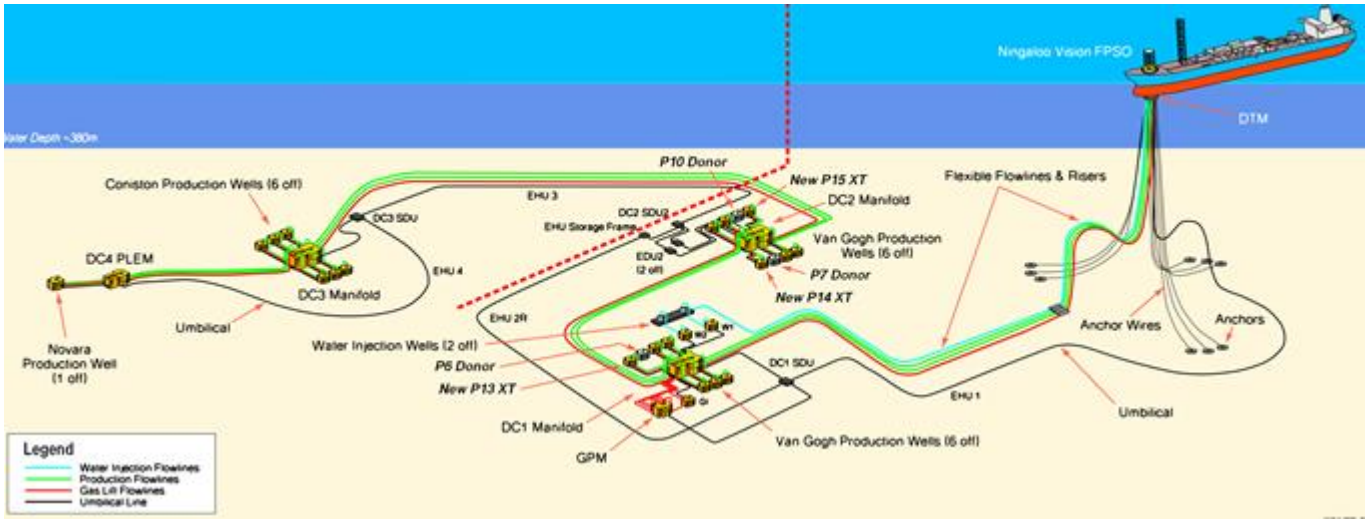


Figure 2-2: Schematic of the Ningaloo Vision Operations Subsea Infrastructure before any asset removal

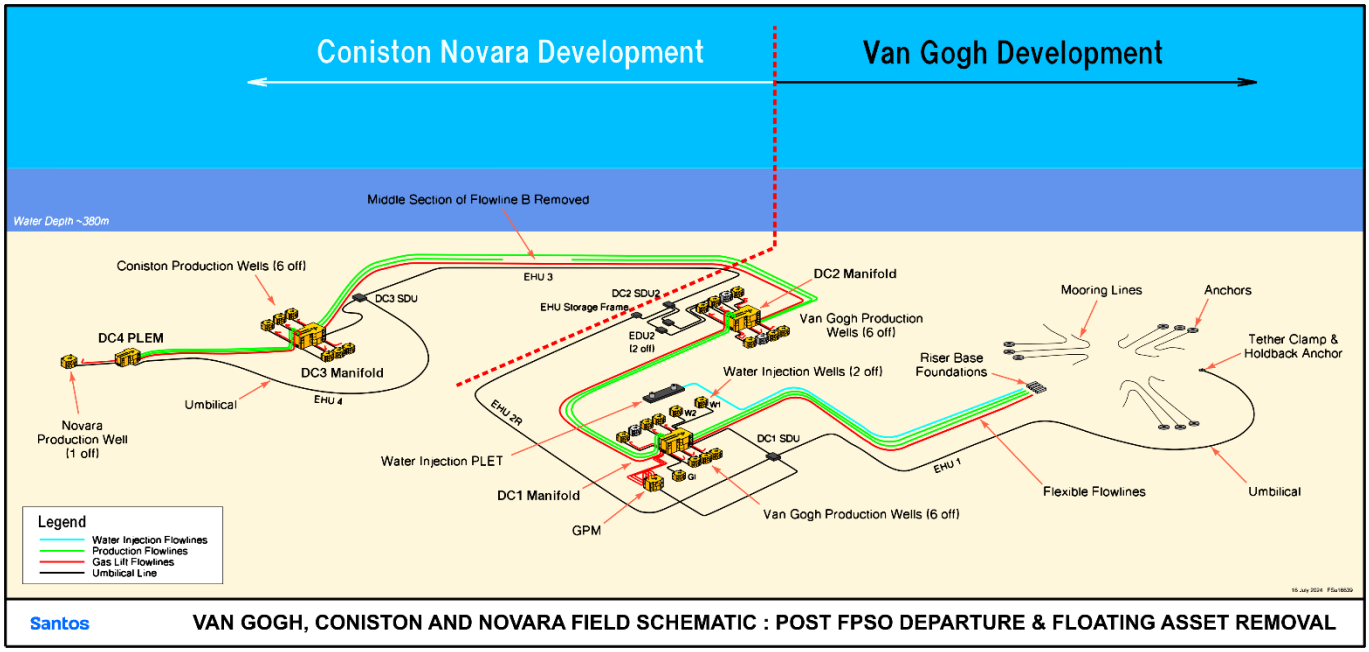


Figure 2-3: Schematic of the Ningaloo Vision Operations Subsea Infrastructure post FAR and partial removal of Production Line B

Table 2-1 shows an inventories list which includes the quantities, condition, status and constituents of subsea infrastructure that remains in place post FPSO sail away until either removal under this EP, or subject to the future decommissioning EP **Table 2-2** summarises production/injection well location and status on title, **Table 2-4** the historical plug and abandoned wells locations, and **Table 2-5** the DTM and anchor locations.

Table 2-1: Summary of the status and condition of infrastructure on title

ID	Asset	Qty.	Overall Dimensions	Weight	Current Condition	Status after FPSO Departure	Composition Mass %	Component Details
1.	Ningaloo Vision FPSO	1	244m x 42m x 23.5m	~32,000t lightship	Seaworthy and in Class, connected to DTM.	FPSO towed to Deconstruction and Recycling facility	Various, mostly steel	FPSO is single piece construction
2.	DTM Bouy	1	18m x Ø12m	460t	DTM held in position by nine mooring lines. The DTM consists of radially symmetrical compartments distributed symmetrically along its vertical axis. In all, there are 5 different sets of compartments and a total of 34 tanks (Section 2.10.2). A known issue exists with tank to tank communication between tanks C2 / D2 and E4 / D7 (only detectable with Helium). The tank internal corrosion threat has been appropriately managed through dosing to avoid internal corrosion for the period between FPSO removal and DTM removal. Additionally, the tanks are filled with nitrogen and pressurised to 2 bara	After FPSO disconnection, the DTM will be submerged approximately 20 to 30 m below mean sea level. It will have a surface marker buoy attached that will continuously monitor buoy depth. The DTM line that allows the FPSO to retrieve the DTM for re-connection will be removed after the FPSO disconnects and sails away.	98% steel with 7t of plastic fenders and 2t of paint and anodes	Bouy is single piece construction
3.	DTM Buoy mooring system - 9x lines in a 3 x 3 sector pattern with each line consisting of an embedded drag anchor, chain, wire and shackles.	9	1,360m long each	195t each 1,754t Total	Mooring lines are in good condition and have recently been inspected. Anchor and portion of ground chain is buried in seabed.	Will remain connected to the DTM once the FPSO departs.	99.7% steel with 5.5t of plastic sheathing on the mooring wires. Shackle pin connections contain Orkot bushing with total mass of	Single Leg makeup; 1x 30m long 76mm studless fair lead chain 1x LTM socket shackle (222kg) 1x 392m long 68mm Spiral Strand Wire (Sheathed) 1x LTM socket shackle (222kg) 1x 50m long 76mm studless chain 1x H-type Shackle (274kg) 1x 205m long 137mm studless chain

ID	Asset	Qty.	Overall Dimensions	Weight	Current Condition	Status after FPSO Departure	Composition Mass %	Component Details
							approximately 55kg	1x H-type Shackle (274kg) 1x 695m long 76mm studless ground chain 1x H-type Shackle (142kg) 1x 5m long 76mm studless ground chain 1x 120mm bow shackle (214kg) 1x 16.7te Stevshark MK5 Anchor
4.	10” Production A flexible riser (DTM to RB)	1	493m x Ø350.5mm	Riser 90t Buoys & Clamps 42t	Production risers are in good condition and will be flushed before FPSO disconnection. Upper bend stiffener has secondary restraint rigging installed to reduce movement in the connector under the DTM.	Will remain connected to the DTM once the FPSO departs.	Riser: 87.5% Steel duplex 11.5% Nylon/PA12 <1% Other Buoys & clamps: 81% Syntactic Foam, Polymer 9.6% Steel 5.7% Polyurethane 3.7% Epoxy <0.1% Other	Single Riser Makeup: 1x Flexible Riser c/w end fittings 1x BSLM Centraliser 1x BSLM Male Interface 1x Topside Bend Stiffener 1x Subsea Bend Stiffener 31x Buoyancy Modules c/w inner clamp
5.	10” Production B flexible riser (DTM to RB)	1	493m x Ø350.5mm	Riser 90t Buoys & Clamps 42t	Production risers are in good condition and will be flushed before FPSO disconnection.			
6.	10" Gas lift flexible riser (DTM to RB)	1	495m x Ø350.5mm	Riser 90t Buoys & Clamps 42t	Risers is in good condition and will be flushed before FPSO disconnection.			
7.	10" water injection riser (DTM to RB)	1	469m x Ø350.5mm	Riser 85t Buoys & Clamps 42t	Risers is in good condition and will be flushed before FPSO disconnection.			
8.	Production A Riser Base (mudmat, insert & ballast)	1	8.1m x 6.1m x 3.8m	146t	Good, protected by paint & CP system.	Riser base in place connected to seabed flowline and riser. The riser base insert will be removed under this EP during	77% Concrete 22% Steel <1% anodes and paint	Each Riser Base Consists of: 1x mudmat foundation c/w ballast 1x Insert c/w ballast
9.	Production B Riser Base (mudmat, insert & ballast)	1	8.1m x 6.1m x 3.8m	143t	Good, protected by paint & CP system.			

ID	Asset	Qty.	Overall Dimensions	Weight	Current Condition	Status after FPSO Departure	Composition Mass %	Component Details
10.	Gas Lift Riser Base (mudmat, insert & ballast)	1	8.1m x 6.1m x 3.8m	140t	Good, protected by paint & CP system.	riser removal. Riser base mudmat foundation to remain wetparked until future decommissioning.		
11.	Water Injection Riser Base (mudmat, insert & ballast)	1	8.1m x 6.1m x 3.8m	159t	Good, protected by paint & CP system.			
12.	12" Production A flexible flowline (RB to DC1)	1	2146m	360t	Good condition, protected by CP system	remain wet parked for future removal	Typical Flexible Composition; 68.9% Steel 17.9% Duplex/SS 5.6% HDPE 7.6% Plastic	Typical; 2x End termination Flexible unbonded pipe 2x Bracelet Anode sets 2x 120deg Steel gooseneck, c/w Grayloc and CVC hub connector
13.	10" Production A flexible flowline (DC1 to DC2)	1	1750m	225t	Good condition, protected by CP system	remain wet parked for future removal		
14.	12" Production A flexible flowline (DC2 to DC3)	1	4550m	775t	Out of Service. Made up of 5x 910m sections, with last section at DC3 end damaged (Ovalized) though assessed as suitable for flushing operations. This flowline be flushed under the Operations EP, but is also utilised for additional flushing under this EP in relation to the flushing of Production Flowline B.	All 5x sections to remain wet parked for future removal with the 2x midline locations parted to allow for flushing operations completed under this EP during FAR to be plugged on completion of the flushing works. This work will be performed after the production systems have been isolated from the XTs.		
15.	10" Production A flexible flowline (DC3 to DC4)	1	1842m	235t	Good condition, protected by CP system	remain wet parked for future removal		
16.	12" Production B flexible flowline (RB to DC1)	1	2090m	360t	Good condition, protected by CP system	remain wet parked for future removal		
17.	10" Production B flexible flowline (DC1 to DC2)	1	1750m	225t	Good condition, protected by CP system	remain wet parked for future removal		
18.	12" Production B flexible flowline (DC2 to DC3)	1	4550m	775t	Out of Service. Made up of 5x 910m sections, with the middle section	1x damaged 910m section to be removed under this		

ID	Asset	Qty.	Overall Dimensions	Weight	Current Condition	Status after FPSO Departure	Composition Mass %	Component Details
					damaged beyond survivability (flat) and not able to be flushed. The 1x 910m damaged section of flowline will be removed under this EP. The remaining 4 x 910m sections of production flowline B will be flushed under this EP.	EP. Remaining 4x 910m undamaged sections to remain wet parked with the end fittings in way of the removed section plugged at the completion of the flushing operations performed under this EP during FAR.		
19.	10" Production B flexible flowline (DC3 to DC4)	1	1842m	235t	Good condition, protected by CP system	remain wet parked for future removal		
20.	8" gas injection flexible flowline (RB to DC1)	1	2074m	235t	Good condition, protected by CP system	Remain wet parked for future removal		
21.	6" gas injection flexible flowline (DC1 to DC2)	1	1800m	125t	Good condition, protected by CP system	remain wet parked for future removal		
22.	6" gas injection flexible flowline (DC2 to DC3)	1	4600m	315t	Good condition, protected by CP system	remain wet parked for future removal		
23.	4" gas injection flexible flowline (DC3 to DC4)	1	1800m	87t	Good condition, protected by CP system	remain wet parked for future removal		
24.	10" water injection flexible flowline (RB to WI PLET)	1	2156m	275t	Good condition, protected by CP system	remain wet parked for future removal		
25.	EHU #01 (DTM to DC1)	1	3,334m x Ø176mm (836m dynamic section)	180t	Good condition, protected by CP system	Demulsifier, Scale inhibitor lines, and hydraulic lines will not be flushed. Methanol line will be flushed. Umbilical riser remains uncapped. Dynamic Riser will be removed under this EP as part of FAR.	Typical Umbilical Composition; 64% Steel 20.4% Hydraulic hose 12.5% Plastic 2.4% Copper 0.7% Lead	1x BSLM Male Shroud 1x BSLM Male Interface 1x Topside Bend Stiffener 20x Buoyancy Modules c/w inner clamp 1x Tether clamp 1x Bend Restrictor
26.	EHU #02 (DC1 to DC2)	1	1851m	77.9t	Good condition	remain wet parked for future removal		Electro-hydraulic umbilical length with Cobra head termination at each end or UTA.

ID	Asset	Qty.	Overall Dimensions	Weight	Current Condition	Status after FPSO Departure	Composition Mass %	Component Details
27.	EHU #04 (DC2 to DC3)	1	4497m	101t	Good condition	remain wet parked for future removal		Electro-hydraulic umbilical length with Cobra head termination at each end or UTA.
28.	EHU #03 (DC3 to DC4)	1	1950m	434t	Good condition	remain wet parked for future removal		Electro-hydraulic umbilical length with Cobra head termination at each end or UTA.
29.	EDU-R	1	4716m	106t	Good condition	remain wet parked for future removal		Electro-hydraulic umbilical length with Cobra head termination at each end or UTA.
30.	Umbilical termination assemblies (EDU / SDU) DC1: SDU, EDU-R & EDU-RB DC2: SDU, SDU2, EDU2-RA & EDU2-RB DC3: SDU & EDU3-RA	9	4.7m x 4.7m x3.6m (2 off SDU) 5.2m x 4.7m x 3.6m (2 off SDU) 3.2m x 3.2m x 2.9m (5 off EDU)	6.9t SDU x 2 9.3t DC2 SDU2 9.2t DC3 SDU 4.1t EDU x 5 52.8t Total	Good condition, protected by CP system	remain wet parked for future removal	Painted steel frame protected by anodes	Painted steel frame with anodes and short wiring harness
31.	Umbilical Storage Frame (at DC1 & DC2)	2	3.2m x 3.2m x 2.9m	4.1t each 8.2t Total	Good condition, protected by CP system	remain wet parked for future removal	Painted steel frame protected by anodes	Painted steel frame with anodes and 2x MQC mount plates
32.	Umbilical Holdback Anchor	1	4.3m x 4.3m x 1.8m	30t	Good condition, protected by CP system	remain wet parked for future removal	Painted steel frame (5.4t) ballasted with steel shot capped with a concrete fill	Rigging tether system connecting it to the Umbilical tether clamp attached to the EHU1 umbilical
33.	Van Gogh DC1 Production Manifold	1	16.8m x 9.4m x 4.6m	177t	Good condition, protected by paint & CP system	remain wet parked for future removal	Typical Structure Composition; >90% Steel/Duplex <10% Paint/anodes	Typical Manifold; Twin production headers Gas lift header Test header Branch pipework Various branch and isolation valves
34.	Van Gogh DC2 Production Manifold	1	16.8m x 9.4m x 4.6m	160t	Good condition, protected by paint & CP system	remain wet parked for future removal		
35.	Coniston DC3 Production Manifold	1	13.9m x 9.4m x 5.4m	165t	Good condition, protected by paint & CP system	remain wet parked for future removal		

ID	Asset	Qty.	Overall Dimensions	Weight	Current Condition	Status after FPSO Departure	Composition Mass %	Component Details
36.	Navara DC4 Pipeline End Manifold (PLEM)	1	7.8m x 7.1m x 4.3m	39t	Good condition, protected by paint & CP system	remain wet parked for future removal	/synthetic seals/copper /plastic	SCMs and associated wiring and tubing Primary and secondary steel on a mudmat foundation
37.	Gas Production Manifold (GPM)	1	6.2m x 5.5m x 4.1m	37t	Good condition, protected by paint & CP system	remain wet parked for future removal		
38.	Water Injection Pipeline End Termination (PLET)	1	11.9m x 6.4m x 2.8m	27t	Good condition, protected by CP system	remain wet parked for future removal		Single water pipe with dual connectors. Branch pipework Various branch and isolation valves Primary and secondary steel on a mudmat foundation
39.	XT - Vetco Gray / Baker Hughes	10	4.2m x 3.6m x 3.3m	30.2t each 302t Total	Good condition, protected by paint & CP system	remain wet parked for future removal	Mostly steel with paint coating and anodes. Willl contain plastic seals/bushing	Dumb tree with Production, Annulus and crossover pipework. Well head latch Control valves control lines and tubing.
40.	XT - Cameron / OneSubsea	15	4.6m x 4.2m x 3.1m	28.4t each 426t Total	Good condition, protected by paint & CP system	remain wet parked for future removal		
41.	6" Rigid Production Spools (DC1)	12	16m to 24m long (horizontal length)	5t each 60t Total	Good condition, protected by coating system and fabricated from CRA.	Remain connected to XT and production system. Will be removed under this EP during FAR	93.6% (106t) of duplex and steel 5.2% (6t) of PE strakes 1.2% (<2t) 3LPP coating	Typical spool; 2 x 6" end connectors (CVC and VCCS) 6.25" Duplex pipe Paint coating PE VIV suppression stakes attached with Inconel bandit straps
42.	6" Rigid Production Spools (DC2)	6	18m to 32m long (horizontal length)	5t each 30t Total	Good condition, protected by coating system and fabricated from CRA.			
43.	6" Rigid Production Spools (DC3)	6	19m to 24m long (horizontal length)	5t each 30t Total	Good condition, protected by coating system and fabricated from CRA.			
44.	6" Rigid Production Spools (DC4)	1	22m long (horizontal length)	5t	Good condition, protected by coating system and fabricated from CRA.			
45.	Rigid Spool Added Mass Dampeners (at DC2)	5	2.6m x 2.7m x 2.1m	1.8t each 9t Total	Good condition, steel components protected by CP system	Remain connected to spool. Will be removed under this EP during FAR	90% HDPE 8% steel <2% other	HPDE canisters held together with steel frame and connected via a ROV operated clamp. Steel components protected by anodes.
46.	Flexible gas lift jumpers (1.5” & 2” ID)	18	12x 60m long 6x 56m long	0.7t each 13t Total	Good condition, protected by CP system	remain wet parked for future removal	80.1% Steel 17.3% Nylon/PE <3% other	2 x UH550 end connectors Bonded hose 2 x Synthetic bend stiffeners

ID	Asset	Qty.	Overall Dimensions	Weight	Current Condition	Status after FPSO Departure	Composition Mass %	Component Details
47.	Electrical flying leads (EFLs)	22	various 50 to 100m long	0.1t each <2.5t Total	Good condition, protected by CP system	remain wet parked for future removal	Composition of Steel, copper and plastic	2 x Electrical end connector Hose sheathing 8/12 Copper cores
48.	Electro-Hydraulic flying leads (EHFLs)	31	Various 50 to 80m long	<1t each <30t Total	All Good condition	remain wet parked for future removal	Composition of steel, copper, hydraulic hose, anodes, Transaqua and plastic	2 x Cobra head connector 2 x electrical end connector Hose sheathing 8/12 Copper cores 8 to 14 hydraulic hoses internal strength wire 2 x Synthetic Bend stiffeners
49.	Novara Subsea Guidebase post dropped on title at DC4, during Novara-4H drilling on WA-35-L under the Coniston Novara Phase II Drilling Environment Plan (EA-00-RI-268/1), Revision 2, dated 06/09/2013 (CN EP).	1	Unknown	Unknown	Unknown	Inactive	Steel	N/A

Table 2-2: Summary production and injection wells on title

Drill Centre	Well Name	Well type	Water Depth (m)	Coordinates (Datum/Projection: GDA 94 Zone 50)		Well Status (Status when FPSO has departed the operational area and in accordance with the accepted WOMP)
				Latitude(South)	Longitude (East)	
DC1	Theo-3H	Oil Production Well	367	21° 23’ 52.092”	114° 04’ 05.320”	Shut-in with controls disconnected
	VGA-2H	Oil Production Well	367	21° 23’ 52.070”	114° 04’ 04.581”	Shut-in with controls disconnected
	VGA-3H	Oil Production Well	367	21° 23’ 52.080”	114° 04’ 04.946”	Shut-in with controls disconnected
	VGA-4H GI	Gas Injection/Production	367	21° 23’ 52.186”	114° 04’ 04.147”	Shut-in with controls disconnected
	VGA-5H	Oil Production Well	367.5	21° 23’ 50.480”	114° 04’ 05.398”	Shut-in with controls disconnected
	VGA-6H	Oil Production Well	367	21° 23’ 50.460”	114° 04’ 04.648”	Shut-in with controls disconnected, production spool removed
	VGA-7H	Oil Production Well	367	21° 23’ 50.468”	114° 04’ 05.040”	Shut-in with controls disconnected
	VGA-12 WI1	Water Injection Well	367	21° 23’ 50.754”	114° 04’ 05.717”	Shut-in with controls disconnected
	VGA-13 WI2	Water Injection Well	367	21° 23’ 50.874”	114° 04’ 06.122”	Shut-in with controls disconnected
	VGA-18H	Oil Production Well	367	21° 23’ 50.59”	114° 04’ 04.27”	Shut-in with controls disconnected
DC2	VGB-8H	Oil Production Well	362	21° 23’ 13.541”	114° 04’ 35.559”	Shut-in with controls disconnected, production spool removed
	VGB-9H	Oil Production Well	362	21° 23’ 13.509”	114° 04’ 35.884”	Shut-in with controls disconnected
	VGB-10H	Oil Production Well	362	21° 23’ 13.539”	114° 04’ 36.236”	Shut-in with controls disconnected
	VGB-11H	Oil Production Well	362	21° 23’ 11.929”	114° 04’ 36.289”	Shut-in with controls disconnected, production spool removed
	VGB-14H	Oil Production Well	362	21° 23’ 11.87”	114° 04’ 35.53”E	Shut-in with controls disconnected
	VGB-15H	Oil Production Well	362	21° 23’ 11.88”	114° 04’ 35.88”	Shut-in with controls disconnected
	VGB-16H	Oil Production Well	362	21° 23’ 13.53”	114° 04’ 34.96”E	Shut-in with controls disconnected
	VGB-17H	Oil Production Well	362	21° 23’ 11.76”	114° 04’ 36.68”	Shut-in with controls disconnected
DC3	CON-10H	Oil Production Well	377.75	21° 20’ 58.214”	114° 04’ 23.820”	Shut-in with controls disconnected
	CON-11H	Oil Production Well	379.95	21° 20’ 56.952”	114° 04’ 22.637”	Shut-in with controls disconnected
	CON-12H	Oil Production Well	378.15	21° 20’ 57.936”	114° 04’ 24.166”	Shut-in with controls disconnected
	CON-13H	Oil Production Well	379.15	21° 20’ 56.651”	114° 04’ 23.035”	Shut-in with controls disconnected
	CON-14H	Oil Production Well	377.75	21° 20’ 56.338”	114° 04’ 23.426”	Shut-in with controls disconnected
	CON-15H	Oil Production Well	378.15	21° 20’ 57.622”	114° 04’ 24.600”	Shut-in with controls disconnected
DC4	NOV-4H	Oil Production Well	373.24	21° 20’ 11.78”	114° 04’ 56.60”	Shut-in with controls disconnected

Table 2-3: Summary of historically plugged and abandoned wells on title

Well Name	Well type	Coordinates (Datum/Projection: GDA 94 Zone 50)		Well Status
		Latitude (South)	Longitude (East)	
Crusader 1	Exploration	21° 39’ 70.764”	114° 02’ 25.908”	Abandoned
Coniston 2	Appraisal	21° 34’ 38.369”	114° 08’ 35.89”	Abandoned
Coniston 2 CH1	Appraisal	21° 39’ 70.764”	114° 02’ 25.908”	Abandoned
Coniston 2H	Appraisal	21° 34’ 38.369”	114° 08’ 35.89”	Abandoned
Coniston 2H ST1	Appraisal	21° 39’ 70.764”	114° 02’ 25.908”	Abandoned
Novara 3H	Development	21° 34’ 65.53”	114° 08’ 35.89”	Abandoned
Novara 3 ST1	Development	21° 34’ 65.53”	114° 08’ 35.89”	Abandoned
Novara 3	Development	21° 34’ 65.53”	114° 08’ 35.89”	Abandoned

Table 2-4: Geographical location of DTM, anchors and historically dropped guidebase post

Equipment	Latitude	Longitude
Disconnectable Turret Mooring (DTM)	21° 24’ 12.39”	114° 05’ 17.18”
Anchor 1	21° 23’ 33.34”	114° 05’ 04.67”
Anchor 2	21° 23’ 32.43”	114° 05’ 08.43”
Anchor 3	21° 23’ 31.94”	114° 05’ 12.08”
Anchor 4	21° 24’ 21.61”	114° 05’ 59.68”
Anchor 5	21° 24’ 25.03”	114° 05’ 58.57”
Anchor 6	21° 24’ 28.39”	114° 05’ 57.26”
Anchor 7	21° 24’ 42.03”	114° 04’ 47.79”
Anchor 8	21° 24’ 39.45”	114° 04’ 45.24”
Anchor 9	21° 24’ 36.72”	114° 04’ 42.83”
Dropped subsea guidebase post	21˚ 20’ 12.33”	114˚ 04’ 55.95”

2.5 Activity Duration and Timing

Activity duration and timings are outlined in **Activities could** be undertaken at any time of the year. Activities would be continuous over a 24-hour period and could be conducted over multiple and concurrent campaigns during these time frames. Timing and duration of these activities is subject to change due to project schedule requirements, vessel availability, unforeseen circumstances and weather. This EP has risk assessed decommissioning activities throughout the year (all seasons) to provide operational flexibility.

Table 2-5**.**

Activities could be undertaken at any time of the year. Activities would be continuous over a 24-hour period and could be conducted over multiple and concurrent campaigns during these time frames. Timing and duration of these activities is subject to change due to project schedule requirements, vessel availability, unforeseen circumstances and weather. This EP has risk assessed decommissioning activities throughout the year (all seasons) to provide operational flexibility.

Table 2-5: Activity durations and timings

Activity	Timing	Duration
FPSO disconnection and sailaway	The FPSO is expected to disconnect and sail away from the operational area H1 2025 (at time of writing this EP)	This activity is expected to take 48 hours but may take up to five days depending on weather conditions.
Floating Asset Removal and damaged flowline removal	Planned timing for floating asset and damaged flowline removal dependant on weather and vessel availability, is within 12 months of sail away (i.e. currently planned for H1 2026)	It is envisaged the total duration of the floating asset and damaged flowline removal activities covered by this EP will be approximately 48 days in the operational area. However, with potential for unfavourable weather and operational delays this could extend the project duration to a period of 90 days in the operational area. DTM recovery and potential towing is described in **Sections 2.10.2** and **0**. If towing of the DTM is selected as the preferred method, towing the DTM to Dampier (as an example port destination) may take two to five days depending on weather.

IMMR	Activities could be undertaken at any time of the year. IMMR activities may occur (outside of the existing PSZ surrounding the DTM and the 500 m radius around the DTM anchor spread) simultaneously with floating asset and damage flowline removal activities.	IMMR campaigns are expected to take around 30 days. Activities would be continuous over a 24-hour period and multiple IMMR campaigns may be conducted during these time frames.

2.6 Vessels

Floating asset and damaged Coniston Novara Production Flowline B removal activities will be carried out by at least one primary vessel and may be supported by at least one support vessel. Typically, there will be two vessels in the operational area with a maximum of four at any one time. Primary vessels will typically be a dynamic positioning (DP) Class 2 or 3 vessel with heavy lift on-board crane and minimum two work class ROVs. The primary vessel/s is expected to depart and then re-enter the operational area on several occasions. The support vessel(s) will provide operational, logistical, safety and equipment management support such that it may not be in the operational area throughout the entire duration of the activity, and may come and go as required in its logistical and support capacity to provision the primary vessel/s. The exact vessels are yet to be confirmed.

The activity may be supported by one or a combination of:

- tugs including anchor handling tugs
- barges
- crew transfer vessel
- heavy lift vessel
- tow vessel
- dive support vessel and rescue vessel.

Inspection and maintenance activities are expected to be conducted with one vessel with minimum one ROV. It is possible that some IMMR activities could be carried out by an unmanned autonomous underwater vehicle (AUV).

Positioning beacons may also be placed on vessel equipment (e.g., cranes), ROV, structures, or the seabed while undertaking the activities.

2.7 Helicopter support

Helicopters may be used to transfer crew and equipment to and from vessels and assist in emergency as required. Support vessels may also be required for materials, equipment, provisions, personnel, and waste transfers.

2.8 General Field Management Activities

As required by s572 (2) of the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGS Act) Santos will maintain infrastructure such that future decommissioning end states are not precluded. A risk-based inspection (RBI) assessment will be completed to determine the requirements and optimum intervals for undertaking IMMR activities with the maximum interval for inspection not exceeding 5 years.

An IMMR campaign was last completed in 2024. Post floating asset and damaged flowline removal, IMMR will continue to be carried out as required in accordance with the Van Gogh and Coniston-Novara Subsea IMMR Plan (TV-35-RU-10007), so as to not preclude future removal of subsea infrastructure

The IMMR tasks that may be undertaken include:

- DTM inspections, such as inspecting the DTM buoy and mooring lines
- riser, flowline, and umbilical inspections
- subsea production inspections, such as inspecting the XTs, manifolds, spools and other infrastructure
- disconnecting the XTs from the subsea infrastructure by removing the spools

- installation of pressure caps on the XTs as an environmental barrier
- cathodic protection measurements
- maintenance and repair/replacement, such as replacing anodes or installing anode skids
- recovery of dropped objects
- clearing debris (e.g., calcareous marine growth from infrastructure) using high pressure water jetter and/or flapper tool
- close visual inspection and measurements of critical components
- seabed survey:
  - multi-beam echo sounder
  - side scan sonar
  - sub bottom profiling
  - seabed grab sampling
  - autonomous underwater vehicle
  - towed camera for identification of debris or raise seabed features.

2.9 FPSO Disconnection and Sail Away

Under the Operations EP the flowlines will have already been isolated by closing a series of valves, the surface pipework will have been depressurised, and then flushed or purged with water or nitrogen before physical disconnection.

Under this EP the FPSO will disconnect from the DTM and permanently depart the operational area, where disconnection for the commencement of this EP is defined as being work step 16 “Disconnection of DTM Buoy” in the NV DTM Disconnection Procedure (404-OP-PRD-056), where at this point the facility is transferred from “FPSO mode” to “marine mode”.

After the release of the DTM though the FPSO moonpool, the floating pick up line (rope type) arrangement that is normally left attached to the DTM will be removed from the DTM and disposed of, appropriately onshore as a waste. After disconnection, the DTM will submerge to approximately 20 to 30 m water depth.

On departure from the DTM, and sail away from the operational area, it is envisaged the FPSO will:

- Have all required marine regulatory and statutory permissioning documents (certificates) for the sail away voyage,
- Be tested and certified hydrocarbon free (cargo tanks and topside process vessels), with appropriate gas free certificate issued,
- Contain small volumes of sludge (containing products such as oil solids, sand, rust, scale and other sediments) within the cargo and slops tanks, estimated up to 5 m^3 in total.
- Have had all processing and treatment equipment flushed and any production chemicals stored ready for removal,
- Have a normal inventory of marine oils, solvents, fuel and fluids remaining onboard to operate the FPSO as a marine vessel,
- Have all required marine navigational and safety systems operable, including:
  - power generation, communications and distributions systems (includes use of diesel for power generation)
  - lighting
  - freshwater production
  - non-hazardous and hazardous open drains system
  - waste storage and disposal
  - putrescible waste and sewage treatment.
  - emergency power generation
  - emergency shutdown

- fire and gas detection and firefighting equipment

- Have approximately 31 persons on board (POB) to safely disconnect and operate the FPSO

After permanently departing the operational area, the FPSO will sail to a nearby gazetted safe anchorage (expected to be nearby Dampier Port) that provides the appropriate water depth and protection, to enable the removal of the positioning thruster and removal/backloading of equipment to prepare for transportation to the nominated Ship Recycling Facility. The activities envisaged to be undertaken at an anchorage are:

- Final inspection and issuance of the IHM Certificate (Part 3) – Ready for Recycling,
- Final backloading of packaged chemicals, oils, and other miscellaneous fluids for potential reuse if/where applicable,
- Removal and safe disposal of the isotopes within the topside Radiation Density Profilers for safe disposal onshore at a licensed facility.
- Removal of the positioning thruster, and transportation to an onshore storage facility,
- Any additional minor cleaning, dismantling, and disposal of items/equipment subject to separate legislative requirements of the end point (ship recycling) jurisdiction.

Minor quantities of hydraulic oil and lube oil will be retained to allow functioning of tank valves and mooring systems and winches. Other chemicals, including degreaser, solvents/paints/oils for maintenance, cleaning and firefighting foam will remain on board the FPSO. Further, the FPSO may require an inventory of marine gas oil (MGO) as bunker (fuel) prior to final transportation.

2.9.1 FPSO Disposal

Santos has approached the market in way of an Invitation to Tender (ITT) in early May 2024 for the Provision of Removal and Deconstruction Works for the FPSO (RFT 3203) expected to commence in Q2 2025, immediately following the anchorage period as outlined in **Section 2.9.**

The Removal and Deconstruction (RAD) phase is guided by the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, and the Basel Convention on Controlling Transboundary Movements of Hazardous Wastes and their Disposal. Applicable Legislation, Codes, Conventions, Standards & Specifications can be found in **Appendix B.**

The Hong Kong Convention, while not formally ratified, provides the overarching requirements of what is required by a ship recycling facility, to recycle with an ALARP approach to the environment, and to human health and safety. Accordingly, ship recycle facilities are required to provide a Ship Recycling Plan (SRP) demonstrating how the FPSO will be recycled based on the FPSO characteristics.

The Hazardous Waste (Regulation of Exports and Imports) Act 1989 (the Act) was developed to enable Australia to comply with specific obligations under the Basel Convention. The export of hazardous waste is not an activity covered by the EP, is off title, and if it does occur, it will be the subject of a separate permit. Santos has engaged with DCCEEW regarding the requirements of the Hazardous Waste (Regulation of Exports and Imports) Act 1989 (the Act) and will comply with requirements to the extent applicable.

The application of Australia's Hazardous Waste Export Act to the movement of the FPSO to the nominated recycle facility, involves a comprehensive permit process and requires completion of the Inventory of Hazardous Material (IHM) survey. The IHM will detail the onboard hazardous materials as defined by the Convention.

The IHM process commenced in May 2024, and involves multiple surveys and testing of the entire FPSO. Testing over the operational life of the FPSO to date, has not detected any BTEX or Mercury.

On issuance of the final IHM certificate (Part 3), the FPSO will receive a valid Ship Recycle Certificate from the nominated Ship Recycling Facility which is valid for three (3) months, and this needs to coincide with the Hazardous Waste Export Permit and delivery of the FPSO to the recycle facility.

It is envisaged that the market will provide multiple options for the transportation and recycling of the FPSO, and Santos will select the appropriate proposal in compliance with the aforementioned Conventions. Santos expects options to include RAD to an Australian destination, or international (Europe or South East Asia), with a decision to be made post tender assessment.

2.10 Floating Asset Removal

The equipment that will be recovered from the operational area will be taken to shore for land-based recycling, reuse, or disposal, in accordance with applicable legislation.

In addition to the DTM, the following equipment is planned to be removed during the floating asset removal campaign:

- one (1) 10” gas lift riser – 490m
- one (1) umbilical riser – 326m
- two (2) 10” production risers – 490m
- one (1) 10” water injection riser- 490m

The materials and composition of the riser system are provided in **Table 2-1**.

The DTM mooring lines will be laid on the seabed and wet stored for future decommissioning (Section 2.14) and will be maintained as required to ensure they can be removed in the future in accordance with s572 of the OPGGS Act. If it is safe and practicable to do so, the unburied sections will be removed as part of this campaign.

Each 10” riser is approximately 490 m long and will be removed with its connected riser base and associated end fittings, bend stiffeners and distributed buoyance modules.

Floating asset removal and equipment recovery is anticipated to comprise the following indicative steps with the detailed procedure for removal subject to a future risk assessment:

- survey subsea equipment in WA-35-L using ROV
- remove marine growth using high-pressure water jetting or a flapper tool (or similar) to reduce weight and expose and clean lift points and cutting locations for safe handling
- disconnect production, gas lift, water injection and umbilical risers, mooring lines and other structure using subsea cutting tools or winches to lower through the DTM riser tubes. Allow positively buoyant equipment to rise in a controlled manner to the surface
- risers will be recovered to the vessel deck, cut up and stowed for transport onshore for disposal
- attach lifting or tow devices to existing lifting or tow points on the DTM or alternative locations as required
- tow DTM out of the permit area to shore or lift onto a vessel in the operational area (refer **Section 0**)
- retrieve equipment from the seabed using lifting devices (e.g., spreader baskets, grabs)
- temporary stabilisation bags or mats may be used and will be removed at a later date

Table 2-6 shows the maximum calculated potential residual hydrocarbon content within the subsea production system post flushing campaign, using 50ppm OIW as an overly conservative estimate of remaining hydrocarbon concentration for calculations.

Table 2-6: Estimated residual volumes of hydrocarbons in the Ningaloo Vision subsea production system

Production System Equipment	Volume (m^3)	Calculated Residual Hydrocarbon 50 ppm OIW (L)	Calculated maximum Hydrocarbon Discharge during FAR [1]	Calculated maximum chemical (non-hydrocarbon) discharge during FAR [3]
Production System - Upstream of riser bases (flushed / wet storage)	1,340	67ltrs	0	0
Gas injection System - Upstream of riser base (flushed /wet storage)	200	n/a	n/a	n/a
Water Injection System - Upstream of riser base (flushed / wet storage)	80	4ltrs	0	0
2x Production Risers	50	2.5 ltrs	2.5ltrs	50ltrs (1000ppm)

Production System Equipment	Volume (m^3)	Calculated Residual Hydrocarbon 50 ppm OIW (L)	Calculated maximum Hydrocarbon Discharge during FAR [1]	Calculated maximum chemical (non-hydrocarbon) discharge during FAR [3]
Gas Injection Riser	25	n/a	n/a	25ltrs (1000ppm)
Water injection Riser	25	1.25 ltrs	1.25 ltrs	25ltrs (1000ppm)
Production B Flowline[2] - Damaged 910 m section (unflushed)	66	n/a as damaged section cannot be flushed. Damaged section contains approximately 66 m^3 of production fluids, of which 6% is estimated to be hydrocarbon.	Less than 4m^3	n/a
Umbilical Control System - Upstream of EHU 01 Tether Clamp (wet storage)	4.42 Methanol	0 (flushed)	n/a	n/a
	10.44 Hydraulic Fluid	n/a	n/a	n/a
	4.64 Demulsifier	n/a	n/a	n/a
	8. 72 Scale Inhibitor	n/a	n/a	n/a
EHU 01 Riser – Tether clamp to DTM	0.526 Methanol	0 (flushed during SoOPs under NV Operations EP)	(flushed during SoOPs under NV Operations EP)	(flushed during SoOPs under NV Operations EP)
	0.760 Hydraulic Fluid	n/a	n/a	760ltrs (Transaqua HT2)
	0.351 Demulsifier	n/a	n/a	351ltrs (Tretolite DMO83409AP)
	1.169 Scale Inhibitor	n/a	n/a	1,169ltrs (FORSA SCW24047)

1. It should be noted that in addition to the calculated residual hydrocarbon within the riser and flowline bore, there may be additional hydrocarbon trapped within the rough bore carcass that is unable to be removed by flushing because it will be congealed due to low seawater temperature at depth, as well as hydrocarbon that may have migrated from other sections to the high points along the flowline. Based on conservative calculations, the maximum hydrocarbon release during riser disconnection from the DTM is considered to be approximately 2.5L for the production risers and 1.25L for the water injection riser, (noting that the umbilical riser and gas injection riser do not contain hydrocarbons).
2. The damaged section of production flowline B is currently holding pressure below ambient water pressure. The damaged section will initially be cut in a location that will allow seawater ingress into the section through pressure equalisation, pushing production fluids away from the opening towards DC2 and DC3. At ambient seabed temperature, hydrocarbons are not expected to flow readily and are expected to be congealed. Therefore, the estimated worst case conservative hydrocarbon discharge from the 910m damaged section of production B flowline is 4 m^3. Additionally, the estimated volume of 4 m^3 would not be released in a single event, but rather incrementally over days as the damaged section is cut into more manageable lengths (approx. 10m lengths) on the seabed and recovered to vessel.
3. Secondary Flowline flushing will be flushed with treated seawater, (such as Hydrosure at 1000ppm (or similar product)).

2.10.1 Riser Recovery

To enable the DTM to be recovered, the production, gas lift, umbilical and produced water injection risers (five risers in total) will need to be disconnected from the DTM and then recovered.

Flushing of the subsea system will have been completed prior to FPSO disconnection and sail away, as part of suspension of operations under the inforce Ningaloo Vision Operations Environment Plan (TV-00-RI-00003.01) to levels considered ALARP and acceptable in accordance with that EP.

In summary, the Van Gogh subsea system will have been flushed over a period of 4 – 6 days, to a 24 hour average of 30ppm between the FPSO, DC 1 and on to DC2. This equates to a very small residual volume of approximately 17L of oil being left within 550,000L of water within the flowlines at the start of this EP.

The Coniston Novara system between upstream of DC2 (being from DC2, to DC3 and on to DC4), will also have been flushed to ALARP and acceptable levels. The flowline flushing within this system upstream of DC2, will be restricted due to limiting factors such as:

- the ovalized shape of section of Production Line A restricting flushing delivery pressure, and
- the 910m damaged section of Production Line B, being unable to be flushed.

However, Santos will have flushed that subsea system to a 24-hour average of 50ppm upstream of DC2. This equates to a very small residual volume of approximately 27 litres of oil in the 522m^3 (522,000 litres) of water in the flowlines from DC4 to DC2 at the point of commencement of this EP.

The methanol line within the umbilical control system will have also been flushed and displaced with seawater during the suspension of operations flushing campaign.

The 2 x production risers, 1 x water injection riser and 1 x gas lift riser will be capped, and the 1 x umbilical riser will be fitted with a pull head prior to the FPSO departure. The proven XT (or manifold) valves shall remain as the primary and secondary isolations between the well and environment until P&A of the wells is conducted (subject of a future P&A EP).

The risers will be released from the DTM buoy and lowered through the DTM Buoy riser tubes or cut below the DTM buoy for recovery. The production, water injection and gas lift risers will be disconnected from the seabed flowlines at their associated riser base & the umbilical riser will be cut in way of the umbilical tether clamp. Disconnection may require cutting using a ROV operated subsea cutting tools such as diamond wire saw, hydraulic shear cutter, super grinder or multi cutters.

Once released from the DTM, the risers will be recovered directly to vessel for transport out of the operational area for appropriate waste management. The risers will be reeled or cut into segments on the recovery vessel and stowed in bunded containers to capture any residual oil. As part of the recovery all buoyancy modules will be removed and stowed for transport to port for appropriate waste management.

When the production, water injection and gas lift risers are disconnected from their riser base, the resultant open flowline ends on seabed will be plugged and set aside for future recovery. A minor discharge of treated seawater and residual hydrocarbons is expected from the flowlines during this activity.

When the umbilical riser is cut at the umbilical tether clamp, the resulted cut end of the remaining umbilical will be plugged and set aside for future recovery. A minor discharge of umbilical chemicals is expected from the umbilical during this activity.

During recovery of the production, water injection and gas lift risers, the contents of these risers (treated seawater with 30ppm OIW) will be released to the marine environment. During recovery of the umbilical riser the contents of the umbilical riser (Hydraulic Fluid, Demulsifier and Scale Inhibitor) will be released to the marine environment. The volumes to potentially released to the marine environment are provided in Table 2-6.

2.10.2 DTM Recovery

The DTM is shown in the photos and schematic of **Figure 2-5.**

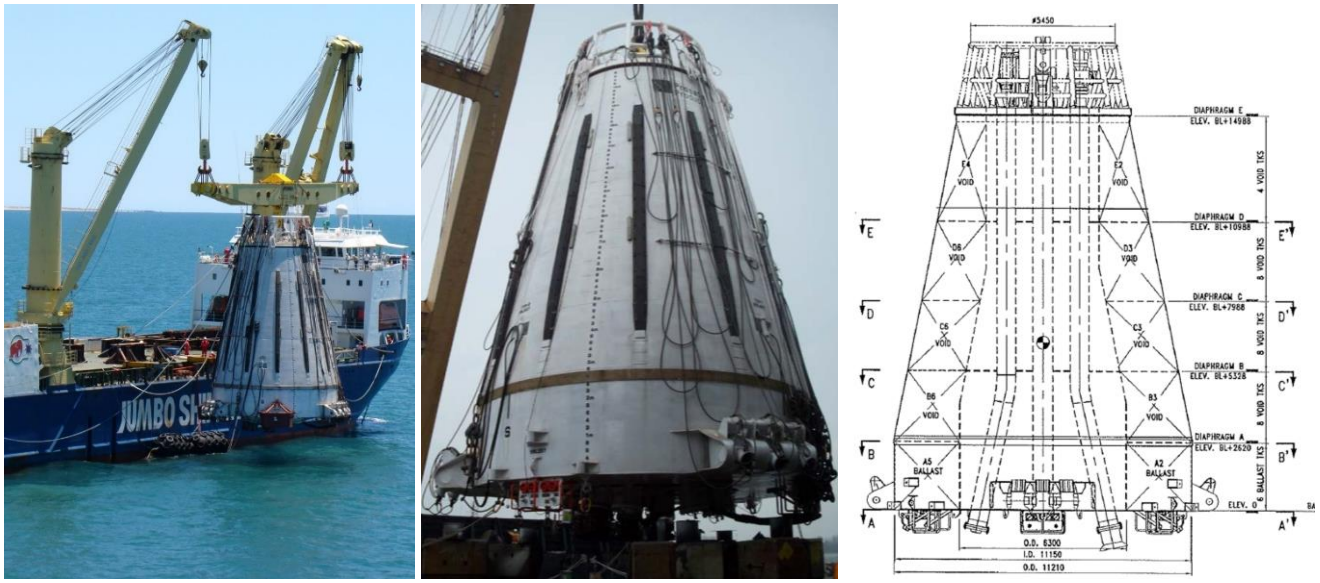


Figure 2-4 Pictures of DTM Buoy at installation and with internal tank configuration schematic

The DTM arrangement consists of the following components and is shown in **Figure 2-5** and **Figure 2-6**:

- DTM Bouy (The DTM consists of radially symmetrical compartments distributed symmetrically along its vertical axis. In all, there are five different sets of compartments and a total of 34 tank voids)
- nine mooring lines made up of wire and chain arrangements
- nine mooring anchors.

Note that the DTM floating pick-up line that allows recovery of the DTM to the FPSO for FPSO connection in its operations phase, will be removed from the DTM when the FPSO disconnects and sails away. A monitoring buoy will be attached to the DTM buoy to allow constant DTM depth and position monitoring. It will allow the depth of the DTM buoy to be monitored in real time for any change. If any increase in DTM depth is detected a vessel with an ROV will be mobilised to inspect the DTM buoy and determine the cause of any change. Engineering will be performed to determine the benefits to removing a single mooring leg from each sector. Removal of mooring legs will reduce the load on the DTM buoy increasing the available buoyancy for any unforeseen flooding of tanks. Presently the DTM tanks are pressurized above 1 atm with nitrogen and they have been pre-dosed with small amounts of biocide and oxygen scavenger to mitigate any internal corrosion.

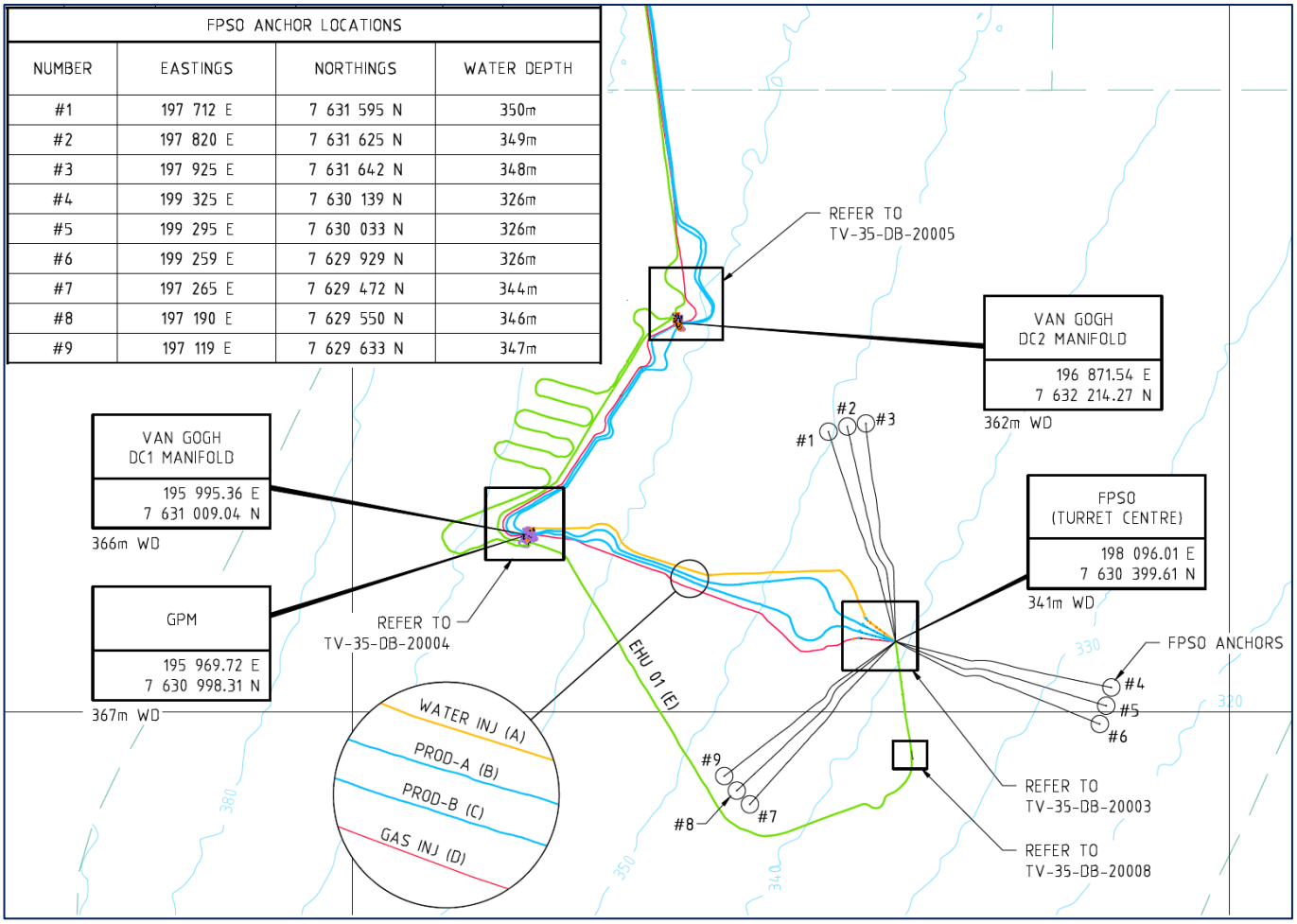


Figure 2-5: DTM Mooring Pattern

TABLE 1
MOORING LINE MAKE-UP

COMPONENT	NAME	SIZE/DIAMETER (MM)	GRADE	MBL (KN)
A	ANCHORING DEVICE	STEVSHARK MK5, 12T + 4.7T BALLAST		
H	'H' TYPE SHACKLE	76/76	R3S	5454
01	STUDLESS CHAIN	76	R3S	5454
H1	'H' TYPE SHACKLE	76/137	R3S	5454
02	STUDLESS CHAIN	137	R3	13829
H2	'H' TYPE SHACKLE	76/137	R3S	5454
03	STUDLESS CHAIN	76	R3S	5454
S1	LTM SHACKLE	TO SUIT 04	R3S	5454
04	SPIRAL STRAND	68	SHEATHED	4445
S2	LTM SHACKLE	TO SUIT 04	R3S	5454
05	STUDLESS CHAIN	76	R3S	5454

+ REFER TO NOTE 1

TABLE 2 Z1

LINE NO.	WATER DEPTH AT ANCHOR, d	PAYOUT LENGTH, (M)	RA (M)	ANCHOR	
				PROOF LOAD (T)	ESTIMATED DRAG LENGTH (M)
L1	348	1367.50	1256.17	187.14	11.66
L2	348	1366.95	1256.09	190.84	12.66
L3	348	1366.12	1254.09	183.44	11.83
L4	329	1358.91	1252.61	192.27	17.07
L5	332	1356.77	1250.27	185.11	15.35
L6	334	1357.45	1250.78	200.54	17.75
L7	344	1357.87	1248.70	184.07	17.65
L8	344	1355.53	1245.41	193.00	17.39
L9	344	1354.95	1245.13	187.76	19.07

DESIGN PROOF LOAD IS TAKEN AS 1.25 x 1429 kN (INTACT LOAD) = 1786.25 kN (182t)

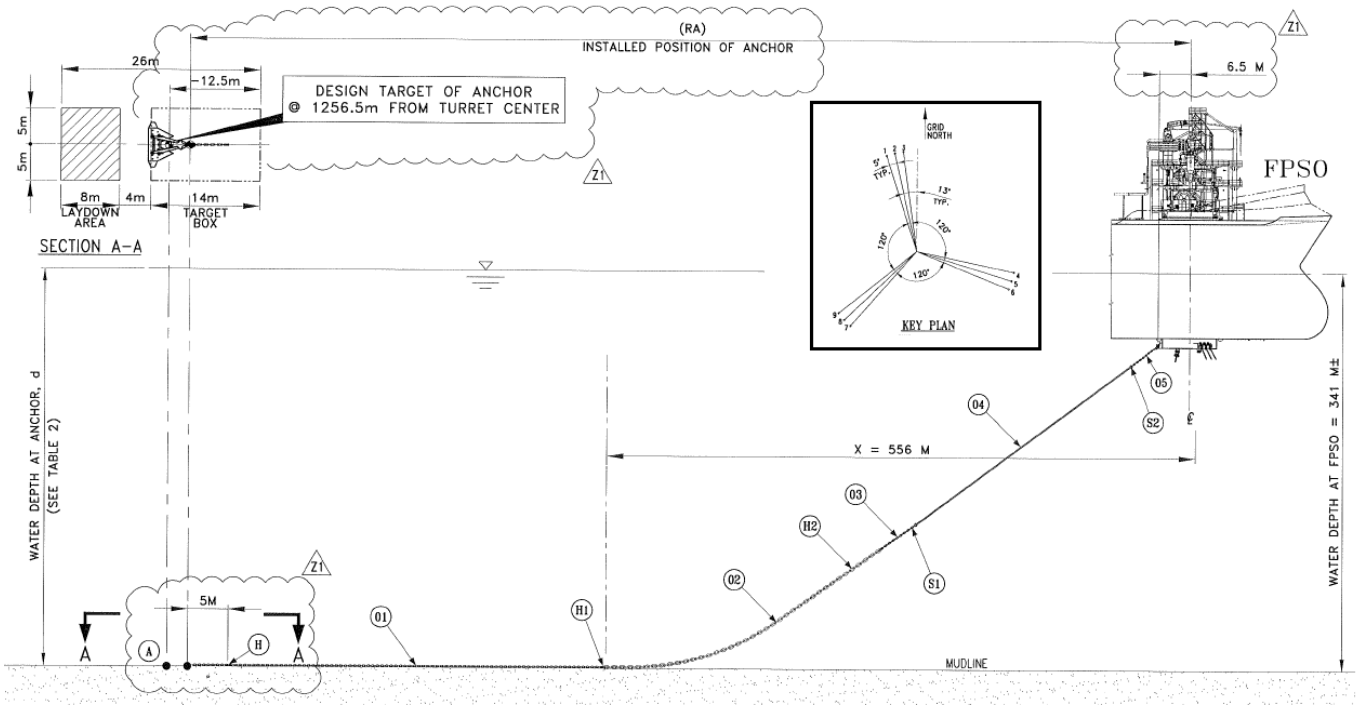


Figure 2-6: DTM Mooring Line Arrangement

After FPSO disconnection and sail away the DTM will be submerged approximately 20 to 30 m below mean sea level and held in position by the existing nine mooring lines made up of an anchor, chain, and wire sections. The DTM weighs 460 tonnes, net of ballast and is primarily made of 98% steel (**Table 2-7**). It is possible that a number (potentially three) mooring lines may be disconnected from the DTM after the FPSO has left the operational area, as a measure to increase the stability and reduce loss of buoyancy risk of the DTM until FAR (**Section 7.1**). Disconnected mooring lines may be recovered during the floating asset removal campaign under this EP or wet parked on the seabed until future decommissioning.

Prior to removal of the DTM, an as found survey will be undertaken with ROV from a vessel to confirm depth and condition of the DTM. Following inspection, the relevant DTM buoy areas will be cleaned of marine growth and temporary release rigging installed. This will consist of attachment points for the DTM tow, lifting points for the mooring legs and hang-off rigging for riser removal. The DTM location and depth will have been monitored using remote real time monitoring via a surface buoy and depth sensor installed post FPSO disconnection (**Section 7.1.3**) To enable the DTM to be released in a controlled manner, the risers will be removed sequentially to allow the DTM to rise through the water column over a series of steps noting the structure is buoyant.

The mooring lines will then be disconnected from the DTM sequentially to allow the DTM to continue to rise to surface over a series of steps.

Release of DTM mooring lines will involve:

- Connection of vessel crane/deck winch to the mooring line being removed.
- Installation and cutting of mooring line just below the DTM chain table at bottom of DTM, via ROV operated hydraulic cutter.

- Upon cutting, the load of the mooring line is transferred to the vessel crane/deck winch.
- The vessel will then partially recover the mooring line (top chain and mooring wire) or lay the whole mooring line down onto the seabed for future recovery. Where the mooring line is to be laid to seabed it will be turned back on itself and remain inside the mooring pattern near each cluster of mooring lines.
- This process will continue until all but 3 mooring lines are removed. Each sector will have a single mooring line still attached at this stage.
- At this stage the DTM will be connected to support lines from the removal vessel and/or connected to the tow tug to control the position of the DTM buoy on the surface while the final mooring lines are released in a controlled manner, and while the DTM buoy is readied for lifting or towing.

Once the DTM is at the sea surface, two possible methods to transport of the DTM buoy to port exist:

- Surface-towed using a towing bridal and tug, or
- Recovery to a vessel/barge.

Surface towing is most likely to be selected due to the mass of the DTM buoy. If surface towing is the selected transportation method, the DTM will be rigged for towing and then towed to port. If lifting onto a vessel deck or barge is the selected transportation method, lifting gear will be attached and the DTM lifted to vessel deck or barge and transported to port. The DTM does not require draining or de-ballasting prior to lifting.

DTM Towing

The DTM may be transported out of the operational area, either secured to the deck (on board suitable vessel), or by towing in water behind a suitable vessel (**Figure 2-7** and **Figure 2-8**). The final decision on whether to lift the DTM out of the water to the back of a vessel deck in the operational area, or to tow directly to port, will be primarily based on vessel availability and safety considerations. At the time of writing this EP, the port location for disposal and recycling of the DTM has not been finalised and will be confirmed post contract award.If the DTM is towed, a tow plan will be prepared and developed with consideration for matters such as navigational hazards, navigational controls, required notifications, way points, applicable nautical charts, places of refuge, Environmental Sensitive Sea Area's (ESSA), sea state considerations and designated Area to be Avoided (ATBA).

Connection points (towing points) on the towed equipment will be inspected and confirmed suitable prior to the install of the towing gear as detailed in the tow plan.

Given that the DTM has remained in a floating and submerged condition since its installation and based on recent IMMR campaigns to confirm condition and integrity, Santos is confident in the DTM integrity, and considers that is highly unlikely that it would sink during recovery or tow. The DTM does not contain any contaminants such as foam, PFAS and other chemicals. However, in the event that the DTM were to lose buoyancy and sink due to other external factors during recovery, the DTM would be cut into smaller, manageable, pieces on the seabed and recovered to surface and transferred via vessel.

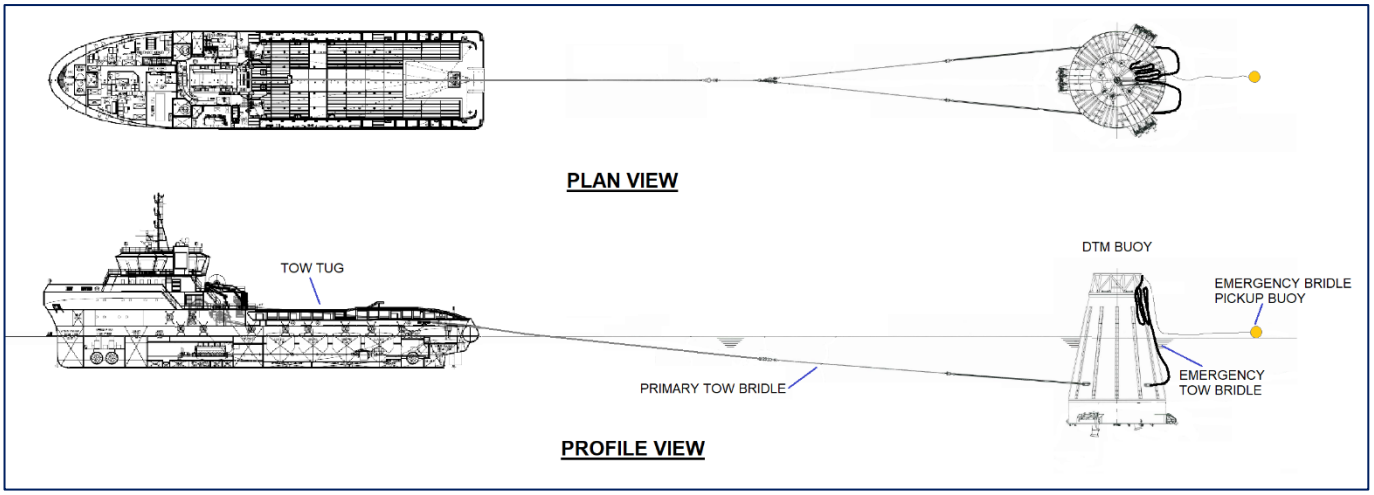


Figure 2-7: Anticipated DTM Tow Bridle Arrangement (per original install tow to field)

Figure 2-8: Pictures of original DTM Buoy tow into field and hookup activities

2.11 Flowline Removal

2.11.1 DC2 to DC3 Production B Flowline Flushing

Additional flushing to that undertaken under the Operations EP as part of Suspension of Operations activities is proposed, as not all of the production system can be flushed to ALARP under the Operations EP due to the damaged section of production flowline B between DC2 and DC3. In order to undertake this flushing operation the midline joints of the unflushed damaged production B flowline section and the adjacent midline joints of the flushed production A flowline will be disconnected and Grayloc flushing caps installed to allow the establishment of flushing loops. As a result of the midline disconnections, the middle section of the production A flowline (approximately 910 m long) will be isolated from the rest of the production system and will be sealed with environmental caps to contain the treated seawater for preservation purposes till future recovery (subject of a future decommissioning EP). There will be minor releases of approximately $1m^3$ of treated seawater containing chemicals such as Hydrosure, biocide and oxygen scavenger at the locations where the flowline midline joints are disconnected. While the disconnected damaged section on production B flowline will be removed as detailed in **Section 2.11.2.**

The remaining four connected sections of the production flowline B will be flushed with downlines from a vessel, that will be connected to the installed flushing caps. All flushing will be from production flowline A (previously flushed under the Operations EP) to production flowline B (sections between DC2 and DC3 not previously flushed). This will effectively remove any residual hydrocarbon not previously flushed under the Operations EP. All flushing fluids will be returned to the Vessel, where they will be treated to separate the hydrocarbons. OIW of flushing returns will be monitored to achieve an average target OIW ppm of 50ppm utilising the same OIW ppm criteria applied to the flushing of the production system upstream of DC2 during Suspension of Operations under the in force Ningaloo Vision Operations EP (refer Section 2.10.1). Separated hydrocarbons will be stored upon the vessel for onshore disposal at a licensed facility.

No discharges of flushing fluid to the marine environment will occur. However, residual dry gas will be released subsea, or dry vented from the vessel, to manage the gas returned to surface for safety reasons.

Figure 2-9 shows the general arrangement of how the two flushing loops will be established.

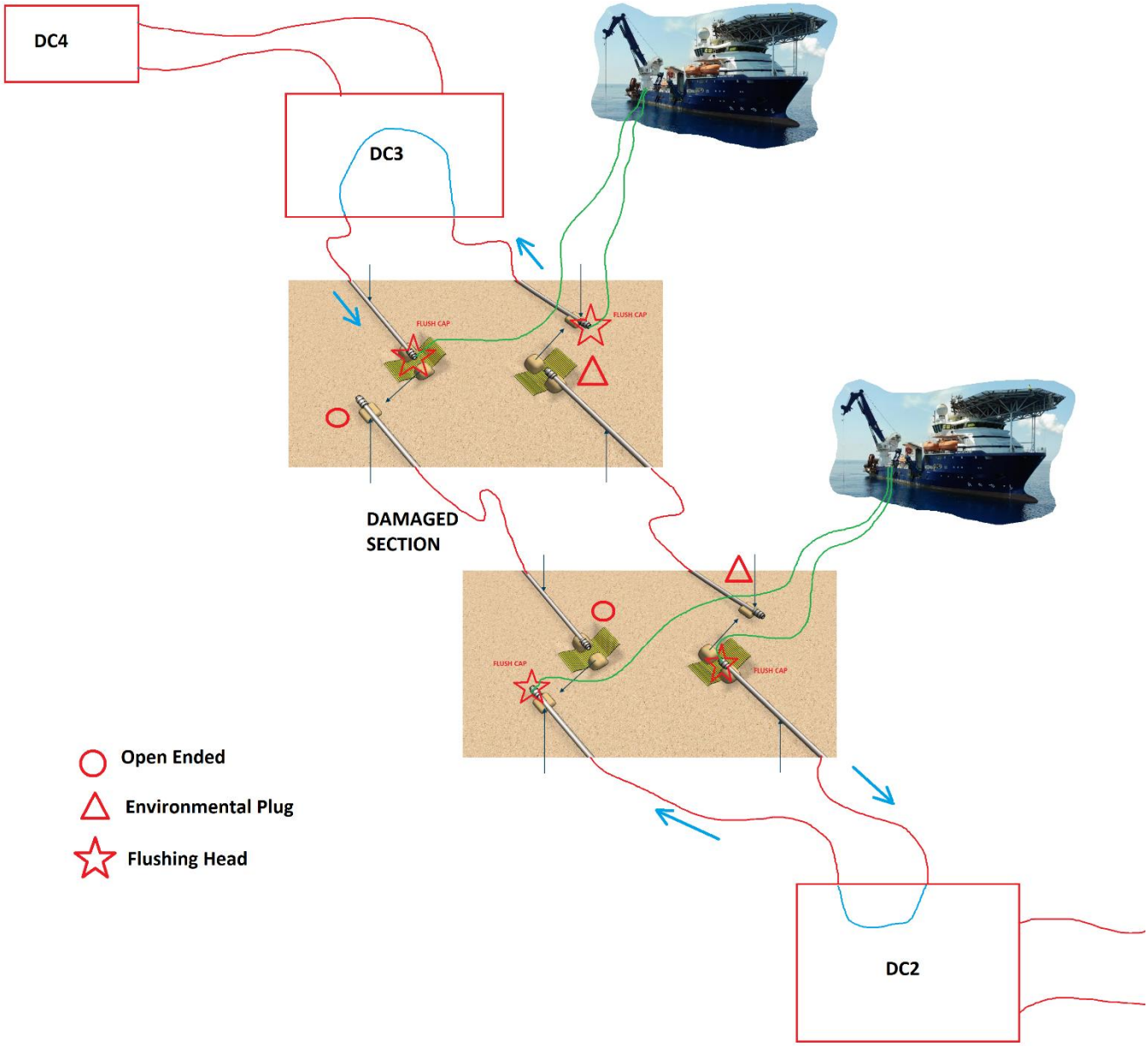


Figure 2-9: Schematic of production flowline B flushing loop arrangement

2.11.2 Removal of Damaged Section of Production Flowline B

A 910 m damaged section of production flowline B between DC2 and DC3 will be removed during the FAR campaign.

The damaged section is the centre section of five 910 m sections of the production flowline B between DC2 and DC3 and will be cut into lengths (approximately 10m) on the seabed and recovered into a work basket, back to deck. Cutting of the flowline could result in a tiny portion of the riser being lost to the environment as swarf pending type of cutting tool utilised (approximately 10mm of the pipeline per cut). An initial cut will be made in the centre of the 910 m damaged section. As the flowline is currently below ambient pressure sea water is expected to rush in displacing the hydrocarbons from the damaged section to the undamaged section. This will reduce the potential volume of hydrocarbons released to the environment when the damaged section is cut and recovered. The ends will then be disconnected and the undamaged flowline sections capped. The installed caps are proposed to include connection points for undertaking the flushing activities described in **Section 2.11.2**. The bulk of the production fluids will be contained in the undamaged sections. Additionally, as the damaged section is cut up the ends will naturally be crimped or partially sealed, by the cutting tool. This may help contain any solidified or highly viscous hydrocarbon.

It is estimated that a maximum of approximately 4m^3 of oil may be released from the damaged section of production flowline B over a period of five days as it is cut and recovered (refer to volumes in **Table 2-6).**

2.12 Management of Recovered Equipment

2.12.1 Overview

All waste resulting from removal of equipment will be managed through application of the waste management hierarchy.

1. Avoid
2. Reduce
3. Reuse
4. Repurpose
5. Recycle
6. Dispose.

Santos will seek opportunities to reuse and recycle materials where possible with disposal as a last resort. Licenced waste management contractors will be engaged to perform the onshore waste management during the infrastructure removal phase of the project. Santos will undertake a waste management contractor selection audit to ensure contractors comply with State and Commonwealth legislation The likely performance of bidders against the waste management hierarchy will be considered in the Santos evaluation of tenders and agreed performance indicators will be included in the final contract.

The waste management contractor will be required to prepare the following documents:

+ Waste management plan (onshore) this plan includes:
    - Requirement for a Radiation/ HAZMAT inspector to inspect recovered equipment that has been in contact with production fluids for NORM and Mercury when handed over, prior to transportation.
    - Details on the applicable waste legislation and standards.
    - Details on required licenses for the quayside/ laydown area for receipt of contaminated materials.
    - Details on handling, storage and disposal of waste.
    - Details on decontamination process (if this is performed quayside prior to transport).
    - Details on material and waste tracking.
+ Waste transportation plan

Recovered equipment may be recycled within Australia or transported overseas for recycling. Onshore waste disposal will be at licensed facilities. All waste streams will be managed in accordance with relevant legislation of the receiving jurisdiction and by suitably qualified contractors.

Waste management planning is expected to continue post-contract award with full details of material end-fates included in project execution plans that will be in place before removal activities commence.

Hazardous material will be managed in accordance with a Santos NORMS and HAZMAT Management Plan (9885-236-HSM-0004). Removed subsea equipment that has been exposed to produced fluids will be monitored for NORMs and mercury contamination by a radiation HAZMAT inspector on the vessel when it is recovered. Any material assessed as NORMS contaminated will be classified as hazardous waste and will be handled and transported in accordance with Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) guidelines and disposed of at a licensed facility.

2.12.2 FPSO Management

Upon sail away from the operational area, the FPSO will transit to either an Australian or international port for cleaning and / or final dismantling, recycling and disposal. The FPSO may contain hazardous substances (subject to an IHM inventory as listed in **Section 2.9**) such as residual sludge in the cargo tanks and oily water in the slops tanks that require handling and disposal once it reaches port.

Waste management contractors will be engaged to perform the onshore waste management for the recovered assets and FPSO. Santos will undertake a waste management contractor selection audit to ensure contractors comply with State and Commonwealth legislation. The performance of bidders against the waste management hierarchy will be considered in the Santos evaluation of tenders and agreed performance indicators will be included in the final contract.

The waste management contractor will be required to prepare the following documents:

- Waste management plan (onshore) this plan includes:
  - requirement for a Radiation/ HAZMAT inspector to inspect recovered equipment that has been in contact with production fluids for NORM and Mercury when handed over, prior to transportation
  - details on the applicable waste legislation and standards
  - details on required licenses for the quayside/ laydown area for receipt of contaminated materials
  - details on handling, storage and disposal of waste
  - details on decontamination process (if this is performed quayside prior to transport)
  - details on material and waste tracking.
- Waste transportation plan

Onshore waste disposal will be at licensed facilities. Waste management planning is expected to continue post-contract award with full details of material end-fates included in project execution plans that will be in place before removal activities commence.

Waste monitoring and reporting will be undertaken in accordance with Santos procedure SMS-EXA-OS01-PD02-PD01 Waste Monitoring and Reporting standard, to enable accurate and consistent reporting and waste performance management

Indicative outcomes for the major seabed equipment categories are provided in **Table 2-7**. Opportunities to improve on the current assumed outcome will continue to be considered as they are identified but are not being actively pursued unless noted as such.

2.12.3 DTM System/Production Line Management

Once the floating assets (excluding FPSO) and damaged section of production flowline B have been delivered to port, they will be cut into pieces suitable for transport to the licensed disposal/recycling facility. Disposal and or recycling shall be undertaken by a contractor with suitable experience and in compliance with applicable legislation and regulations. Disposal and recycling facilities are planned to be in Australia.

No reuse or repurpose opportunities have been identified at the time of preparing this EP for the materials and equipment detailed in Table 2-6 below.

The DTM, mooring lines and riser base structures are primarily made of steel (approximately 98% and 94% respectively), with minor amounts of plastics, polymers and paint (**Table 2-7**). The riser system consists of approximately 60% steel and the damaged section of production flowline B consists of approximately 69% steel. All steel from recovered assets will be considered for steel recycling where practicable, potentially significantly reducing the amount of material requiring disposal via landfill. The materials and composition of the DTM, mooring lines and riser system and damaged section of production flowline B are provided in **Table 2-7**.

Santos does not anticipate any other contaminants (e.g., NORM and mercury) in the recovered assets. Prior to recovery, DTM, risers and recovered flowline will be assessed for contamination. In the case that contamination is identified, the equipment will be managed as per Santos procedures appropriate for the contamination type and level. All waste will be handled and disposed of in accordance with Federal, and State requirements.

Table 2-7: Materials and composition of recovered equipment

Materials/Composition	Mass (t)	Mass (%)	Comment on waste management
DTM			
Steel	450	97.8	Mature steel scrap market exists, and high recycling rates are anticipated.
Polymers	7	1.5	Worst outcome is Landfill
Paint	2	0.4	Worst outcome is Landfill
Other (miscellaneous plastics)	1	0.3	Worst outcome is Landfill
Total	**460**	**100**	

Materials/Composition	Mass (t)	Mass (%)	Comment on waste management
DTM Mooring Lines (may be recovered under this EP)			
Steel (mooring lines)	1,506.2	93.6	Mature steel scrap market exists, and high recycling rates are anticipated.
Steel wire (mooring wires)	85.4	5.3	Mature steel scrap market exists, and high recycling rates are anticipated.
Steel (shackles and plates)	11.3	0.7	Mature steel scrap market exists, and high recycling rates are anticipated.
Plastic (mooring wire sheath)	5.5	0.3	Worst outcome is Landfill
Total	**1,608.4**	**100**	
Riser System			
Steel (duplex steel)	324	46.4	Mature steel scrap market exists, and high recycling rates are anticipated.
Syntactic foam polymer	158.2	22.6	Worst outcome is Landfill
Nylon (Polyamide (PA) 11/12)	39.2	5.6	Worst outcome is Landfill
Polyurethane	11	1.6	Worst outcome is Landfill
Other synthetics (glass fibre tape, hoses, epoxy)	7.4	1.1	Worst outcome is Landfill
Lead	3.7	0.5	Worst outcome is Landfill
Copper	0.3	0.4	Worst outcome is Landfill
Other (titanium, rubber, aramid, super duplex)	<2	0.28	Worst outcome is Landfill
Riser Base Insert Steel	59.3	8.4	Mature steel scrap market exists, and high recycling rates are anticipated.
Riser Base Insert concrete	93.6	13.4	Mature steel scrap market exists, and high recycling rates are anticipated.
Total	**698.7**	**100**	
Production flowline B 910 m Damaged Section			
Steel	106.2	69.4	Mature steel scrap market exists, and high recycling rates are anticipated.
Duplex	27.4	17.9	Worst outcome is Landfill
HDPE	10.2	6.6	Worst outcome is Landfill
Polyurethane	2.5	1.7	Worst outcome is Landfill
Nylon	6.7	4.4	Worst outcome is Landfill
Anodes	0.1	0.07	Worst outcome is Landfill
Total	**153.1**	**100**	

2.13 Marine and Calcareous Growth Removal

Marine and calcareous growth from subsea infrastructure to be recovered, will be removed either in the water column or may be removed on the vessel deck using high-pressure water and brushes.

Marine and calcareous growth to be removed subsea prior to equipment removal, will be by using tools such as either high pressure water jetter, flapper tool, scraping tool and/or acid soaking from an ROV. Any chemicals needed to assist with marine growth removal is subject to chemical assessment as outlined in **Section 2.16**.

If marine growth is removed on the back-deck of a vessel, it will be discharged to the marine environment from the deck as part of cleaning works.

Removal of marine growth is required to enable safe operations and reduce the weight of the infrastructure to aid in lift and tow operations.

2.14 Wet Storage of Infrastructure

During the removal of floating assets, the wet storage/wet parking of equipment on the seabed, such as mooring lines, umbilical, production gas lift and produced water injection risers may be required in the operational area, due to operational requirements or emergency situations. Equipment that is temporarily wet stored until a future decommissioning campaign will be located close to original DTM position, and wholly within the footprint of the existing mooring anchor pattern. Wet-storage areas will be surveyed (pre and post wet parking).

2.15 Diving

Diving operations have been included as there is the possibility that diving is required to support the activities described in this EP. Diving is not considered to pose any credible environmental impacts or risks other than the impacts and risk posed by the vessels. Diving would take place from a dive support vessel and would only consist of relatively shallow diving operations.

2.16 Chemical Assessment and approval

A risk-based approach to select chemical products ranked under the OCNS is applied for those chemicals used and discharged to the marine environment. This scheme lists and ranks all chemicals used in the exploration, exploitation, and associated offshore processing of petroleum on the UK Continental Shelf.

Chemicals are ranked according to their calculated hazard quotients by the Chemical Hazard Assessment and Risk Management (CHARM) mathematical model, which uses aquatic toxicity, biodegradation, and bioaccumulation data. The hazard quotient is converted to a colour banding with Gold and Silver colour bands representing the least environmentally hazardous chemicals. Chemicals not amenable to the CHARM model (i.e., inorganic substances, hydraulic fluids or chemicals used only in pipelines) are assigned an OCNS grouping based on the worst-case ecotoxicity data with Group E and D representing the least hazard potential.

The Santos Operations Chemical Selection, Evaluation and Approval Procedure (EA-91-II-10001) accepts CHARM ranked Gold/Silver, or non-CHARM ranked E/D chemicals for use and discharge without a detailed environmental risk assessment. The same applies to chemicals that are OSPAR Pose Little or No Risk to the Environment (PLONOR) List. The PLONOR Listed, agreed upon by the OSPAR Convention (Convention for the Protection of the Marine Environment of the North-East Atlantic), contains a list of substances that will pose little or no risk to the environment in offshore waters. If chemicals are ranked lower than Gold, Silver, E or D (i.e., CHARM ranked purple, orange, blue or white, or non-CHARM A, B or C ranked chemicals) and no alternatives are available, a risk assessment is conducted providing technical justification for their use and showing their use and associated risk is acceptable and ALARP.

As described above, potential alternative chemicals are investigated when chemicals are ranked lower than CHARM Gold, Silver, E or D (i.e., CHARM ranked purple, orange, blue or white, or non-CHARM A, B or C ranked chemicals). There is a preference for chemical options that are CHARM ranked Gold/Silver, or non-CHARM ranked E/D chemicals and chemicals that have a low aquatic toxicity, are readily biodegradable and do not bioaccumulate (discussed below).

Any chemicals that may be discharged to the marine environment and not OCNS CHARM or non-CHARM ranked are risk assessed using the OCNS CHARM or non-CHARM models. The chemical is assigned a pseudo-ranking based on the available aquatic toxicity, biodegradation, and bioaccumulation data (discussed below) and assessed for environmental acceptability for discharge to the marine environment.

2.16.1 Ecotoxicity Assessment

Table 2-8 and **Table 2-9** act as guidance in assessing the ecotoxicity of chemicals during the investigation of potential alternatives. **Table 2-8** is used by Cefas to group a chemical based on ecotoxicity results, ‘A’ representing highest

toxicity/risk to environment and 'E' lowest. **Table 2-9** shows classifications/categories of toxicity against aquatic toxicity results.

Table 2-8: Initial Offshore Chemical Notification Scheme Ranking

Initial Grouping	A	B	C	D	E
Result for aquatic-toxicity data (ppm)	<1	≥1-10	>10-100	>100-1000	>1000
Result for sediment-toxicity data (ppm)	<10	≥10-100	>100-1000	>1000-10,000	>10,000

Note: Aquatic toxicity refers to the *Skeletonema costatum* EC50, *Acartia tonsa* LC50, and *Scophthalmus maximus* (juvenile turbot) LC50 toxicity tests. Sediment toxicity refers to the *Corophium volutator* LC50 test.

Source: Cefas Standard Procedure 2019, OCNS 011 NL Protocol PART 1: Core Elements

Table 2-9: Aquatic Species Toxicity Grouping

Category	Species	LC_{50} and EC_{50} Criteria
Category Acute 1 Hazard statement – Very toxic to aquatic life	Fish	LC_{50} (96hr) of ≤1 mg/L
	Crustacea	EC_{50} (48hr) of ≤1 mg/L
	Algae/other aquatic plant species	ErC_{50} (72 or 96hr) of ≤1 mg/L
Category Acute 2 Hazard statement – Toxic to aquatic life	Fish	LC_{50} (96hr) of >1 mg/L to ≤10 mg/L
	Crustacea	EC_{50} (48hr) of >1 mg/L to ≤10 mg/L
	Algae/other aquatic plant species	ErC_{50} (72 or 96hr) of >1 mg/L to ≤10 mg/L
Category Acute 3 Hazard statement – Harmful to aquatic life	Fish	LC_{50} (96hr) of >10 mg/L to ≤100 mg/L
	Crustacea	EC_{50} (48hr) of >10 mg/L to ≤100 mg/L
	Algae/other aquatic plant species	ErC_{50} (72 or 96hr) of >10 mg/L to ≤100 mg/L

2.16.2 Biodegradation Assessment

The biodegradation of chemicals is assessed using the Cefas biodegradation criteria, which aligns with the categorisation outlined in the United Nations GHS Annex 9 Guidance on Hazards to the Aquatic Environment (2019). The below is used as a guide during the investigation of potential chemical alternatives. Preference is to select readily biodegradable chemicals.

Cefas categorises biodegradation into the following groups:

a) readily biodegradable: results of >X% biodegradation in 28 days to an OSPAR harmonised offshore chemical notification format (HOCNF) accepted ready biodegradation protocol

b) moderately biodegradable: results >20% and <X% to an OSPAR HOCNF accepted ready biodegradation protocol

c) poorly biodegradable: results from OSPAR HOCNF accepted ready biodegradation protocol.

Where X is equal to:

- 60% in 28 days in OECD 306, Marine BODIS or any other acceptable marine protocols, or in the absence of valid results for such tests
- 60% in 28 days (OECD 301B, 301C, 301D, 301F, Freshwater BODIS), or
- 70% in 28 days (OECD 301A, 301E).

2.16.3 Bioaccumulation Assessment

The bioaccumulation of chemicals is assessed using the Cefas bioaccumulation criteria, which aligns with the categorisation outlined in the United Nations GHS Annex 9 Guidance on Hazards to the Aquatic Environment (2019). Preference is to select non bio accumulative chemicals.

The following guidance is used by Cefas:

a) non-bio accumulative/non-bioaccumulating: Log Pow <3, or results from a bioaccumulation test (preferably using Mytilus edulis) demonstrates a satisfactory rate of uptake and depuration, and the molecular mass is ≥700.

b) bio accumulative/Bioaccumulates: Log Pow ≥3, or results from a bioaccumulation test (preferably using Mytilus edulis) demonstrates an unsatisfactory rate of uptake and depuration, and the molecular mass is <700.

All chemicals will be selected in accordance with the Santos Operations Chemical Selection, Evaluation and Approval Procedure (EA-91-II-10001), as applicable.

2.17 Future decommissioning on title

After the removal of FPSO, floating assets and partial flowline removal as describe in **Section 2.9** to **Section 2.11**, the infrastructure remaining on title until end state decommissioning will include:

- 2 flexible production flowlines in multiple segments
- 1 flexible gas lift flowline in multiple segments
- 1 produced water re-injection flexible flowline
- 4 riser bases, including mudmat.
- 4 production manifolds with integrated base foundations
- 1 gas production manifold
- 25 rigid production spools
- 18 flexible gas lift jumpers
- 5 x umbilical lengths
- 31 electro-hydraulic flying leads and 18 electrical flying leads
- 10 UTAs
- 1 PLET
- 26 XTs and flowbases / guidebases
- 9 x Above ground mooring arrangements (Chain, connectors and plastic-coated wire, if not recovered under this EP)
- Buried mooring anchors and buried chain.
- Subsea guidebase post dropped on title at DC4 during the Novara-4H drilling on WA-35-L
- Stabilisation sandbags.

The decommissioning of the above-listed infrastructure, and any infrastructure not recovered under this EP (refer **Section 2.14**) will be covered under a separate, future Decommissioning EP (refer to **Section 1.5**1.5). The methodology for future removal is currently being established through a series of engineering studies which will be outlined in a future revision to this EP to support end state decommissioning.

3. Existing Environment Description

OPGGS(E)R 2023 Requirements
Section21. Environmental assessment
Description of the environment 21(2) The environment plan must — (a) describe the existing environment that may be affected by the petroleum activity; and (b) include details of the particular relevant values and sensitivities (if any) of that environment. Note: The definition of environment in Section5 includes its social, economic, and cultural features. 21(3) Without limiting paragraph (2)(b), particular relevant values and sensitivities may include the following: (a) the world heritage values of a declared World Heritage property within the meaning of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). (b) the national heritage values of a National Heritage place within the meaning of that Act. (c) the ecological character of a declared Ramsar wetland within the meaning of that Act. (d) the presence of a listed threatened species or listed threatened ecological community within the meaning of that Act. (e) the presence of a listed migratory species within the meaning of that Act. (f) any values and sensitivities that exist in, or in relation to, part or all of: (i) a Commonwealth marine area within the meaning of that Act; or (ii) Commonwealth land within the meaning of that Act

3.1 Environment that May be Affected

This section summarises the key physical, biological, socio-economic, and cultural characteristics of the existing environment that may be affected (EMBA), both from planned activities and unplanned events associated with the activity. The description of the environment applies to two areas:

- the operational area, as defined in **Section 2.3** and presented in **Figure 2-1**
- EMBA, as shown in **Figure 3-1**.

A detailed and comprehensive description of the environment (required by OPGGS(E)R 2023, Section 21(2)(3)) in the operational area and the wider EMBA is provided within the Ningaloo Vision CoPFAR Values and Sensitivities of the Marine and Coastal Environment document (**Appendix C)**.

3.1.1 Determining the Environment that Maybe Affected

Stochastic hydrocarbon dispersion and fate modelling was undertaken for the worst-case credible spill scenarios (defined in Section 7.5). Stochastic modelling is created by overlaying 150 to 300 individual hypothetical oil spill simulations from an oil spill into a single map, with each simulation subject to a different set of metocean conditions drawn from historical records. Stochastic modelling is completed to reduce uncertainty in risk assessment and spill response planning may not represent the actual path that an actual spill could take.

To ensure a representative EMBA was correctly assessed in this EP, the EMBA for all of the modelled worst-case scenarios (e.g., loss of well control and vessel collision) were combined to create a single EMBA representing the greatest spatial extent.

The modelling considered four key physical or chemical phases of hydrocarbons that pose differing environmental and socioeconomic risks: surface, entrained, dissolved aromatic and shoreline accumulated hydrocarbons. The modelling used defined hydrocarbon exposure values for each hydrocarbon phase, as relevant, to identify an area that might be contacted by hydrocarbons, and to inform the environment risk assessment and oil spill response planning. The three exposure values used were:

- the low exposure values to define the EMBA
- the moderate exposure values to define the moderate exposure value area (MEVA)
- the high exposure values to define the high exposure value area (HEVA).

Refer to **Table 3-1** for the exposure values used, **Figure 3-1** for their spatial extent, and to **Section 7.5.4** for further information on the reasons why these exposure values were selected and how they relate to the risk assessment.

The EMBA is based on stochastic modelling, using the low exposure values. The EMBA encompasses the outer most boundary of the overlaid worst-case spatial extent of the four hydrocarbon phases listed above for the worst-

case credible spill scenarios and as such, encompasses the full range of environmental receptors that might be contacted by hydrocarbons in the highly unlikely event of a worst-case hydrocarbon spill (from a loss of well control or vessel collision). Most planned and unplanned events associated with the activity may affect the environment up to a few kilometres from the operational area e.g., from noise impacts. A large unplanned hydrocarbon spill would extend beyond this (**Section 7.5**).

The low exposure values used to set the outer boundaries of the EMBA are not expected to result in ecological impacts. The low exposure value for surface hydrocarbons represents a visible oil (rainbow) sheen and has been used to provide an indication of the extent to which other marine users may visually observe oil on the sea surface. This is considered to provide a conservative extent of potential impacts to other marine users. Biological impacts may occur within the moderate exposure value area (MEVA) and high exposure value area (HEVA), both of which represent a subset of the EMBA. Consequently, the evaluation of potential environmental consequences of a hydrocarbon release (impact assessment) were based on the MEVA and HEVA. Refer to **Section 7.5.4** for further information on the spill trajectory modelling thresholds that have been selected.

Table 3-1: Hydrocarbon exposure values of the environment that may be affected

Hydrocarbon Phase	Exposure Value		
	Low	Moderate	High
Surface (g/m^2)	1	10	50
Shoreline accumulation (g/m^2)	10	100	1000
Dissolved aromatics (ppb)	10	50	400
Entrained (ppb)	1000	-	-

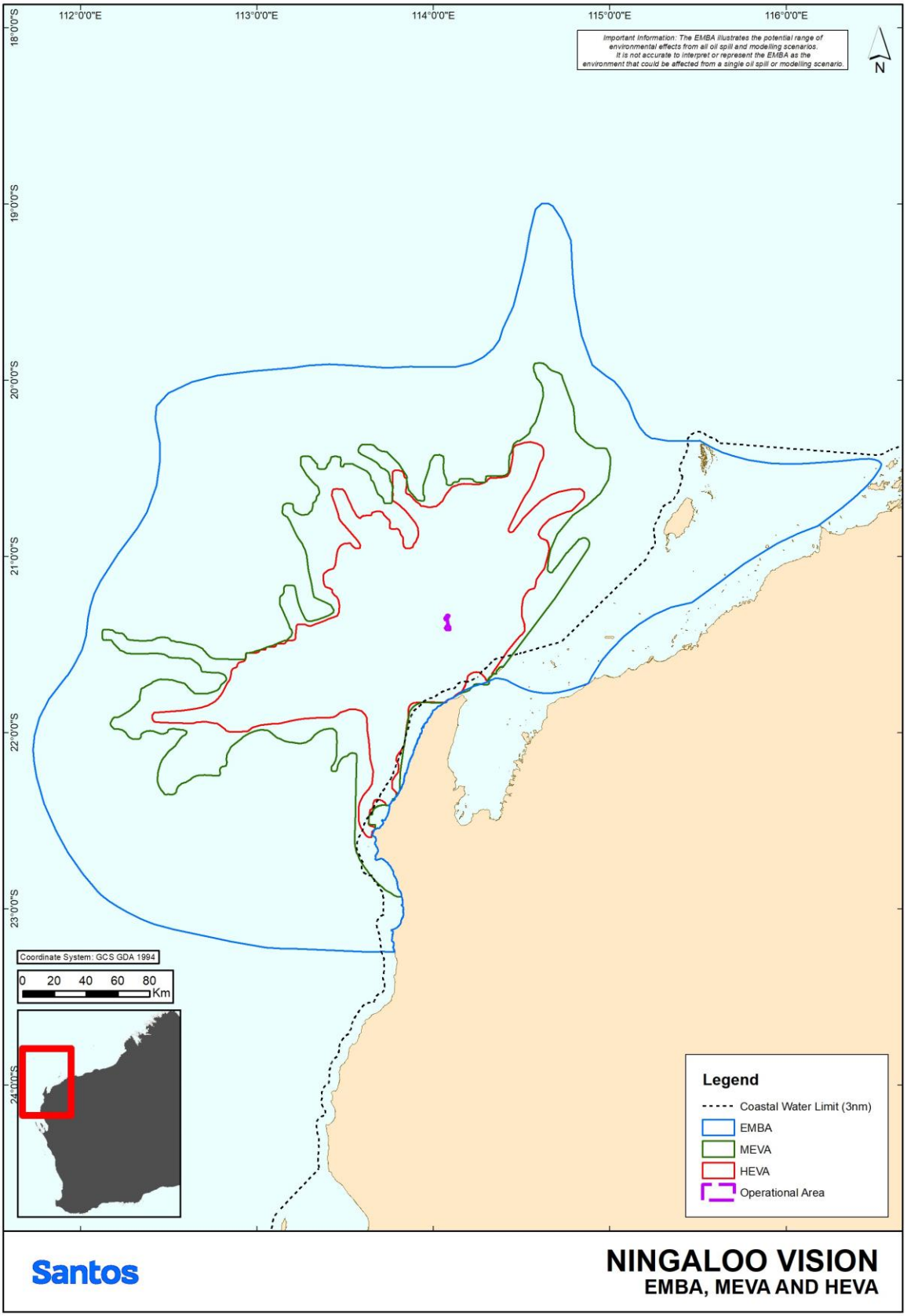


Figure 3-1 Overall environment that may be affected, moderate exposure value area and high exposure value area for the loss of well control and marine diesel oil scenarios

3.2 Environmental Values and Sensitivities

This section summarises environmental values and sensitivities, including physical, biological, socio-economic, and cultural features in the marine and coastal environment that are relevant to the operational area and the EMBA.

A comprehensive description of the environmental values and sensitivities of the existing environment within the operational area and the EMBA is provided for in The Ningaloo Vision CoPFAR Values and Sensitivities of the Marine and Coastal Environment (**Appendix C**) which provides a compilation of environmental values and sensitivities including physical, biological, social, economic and cultural features within the marine and coastal environment that are relevant to this EP.

3.2.1 Protected Matters Search Tool Reports

Protected Matters Search Tool (PMST) searches were undertaken in December 2023 on the operational area, and in May 2024 for the MEVA, the HEVA, and the EMBA. The PMST searches were completed using the exact co-ordinates that are used to produce the figures throughout **Section 3**, ensuring the EMBA encompasses the full range of environmental receptors that might be contacted by surface and subsurface hydrocarbons at the low exposure level, in the highly unlikely event of a worst-case oil spill.

The results of these searches are provided **in Appendix D**.

3.2.2 Physical Environment

3.2.2.1 Oceanography

Ocean currents on the North West Shelf (NWS) are dominated by the southward-flowing warm surface Indonesian Throughflow which flows from the tropics to the waters of southwest Western Australia (CSIRO, 2007), with the Leeuwin Current a distinct current south of North West Cape, near Exmouth (DSEWPaC, 2007).

Ocean currents are semi-diurnal, flowing across the local bathymetry in a south-east/north-west direction. Tropical cyclone storm currents seldom penetrate below 100 m water depth, therefore, near-seabed extremes are caused by turn of tide, internal waves and baroclinic currents. Internal waves and baroclinic currents are caused by summertime water stratification and density differences between water bodies.

Swells are predominately from the south-west to west, but wind generated waves can develop from any direction, reflecting the region at the time. Sea surface currents over the NWS are generated by several components, including tidal-forcing, local wind-forcing and residual drift. Tidal and wind-forcing are the dominant contributions to local sea surface currents. The orientation and degree of drop off of the continental shelf slope influences the oceanography of the area.

3.2.2.2 Tides

The tides of the NWS have a strong semi-diurnal signal with four tide changes per day (Holloway and Nye 1985). Peak tidal flows are from the north-northwest on the ebb, and to the south-southeast on the flood (Holloway and Nye 1985; SSE 1993). Measurements of tidal currents mid shelf are predicted to attain average speeds of approximately 0.25 knots during neap tides and up to 0.5 knots during spring tides (NSR 1995; WNI 1995).

3.2.2.3 Waves

The wave climate in the northwest of Australia is composed of locally generated wind waves (seas) and swells that are propagated from distant areas (WNI 1995). In summer the seas typically approach from the west and southwest, while in winter the seas typically approach from the south and east. Mean sea wave heights are typically less than 1 m and peak heights of less than 2 m are experienced in all months of the year (WNI 1995).

Indonesian waters, especially the eastern part of the archipelago, play an important role in the global water mass transport system, in which warm water at the surface conveys heat to the deeper cold water in what is known as the great ocean conveyor belt. The eastern archipelago is the only place in the Pacific Ocean that connects with the Indian Ocean at lower latitudes. The water mass transport from the Pacific to the Indian Ocean through various channels in Indonesia is called Arlindo (Arus Lintas Indonesia), also known as the Indonesian Throughflow (Zhang et.al 2018). Surface currents in Indonesian waters are more strongly influenced by circulation from the Pacific Ocean than from the Indian Ocean. The currents are also greatly influenced by the winds of the prevailing monsoon.

Average swell heights are low, around 0.4–0.6 m in all months. The greatest exposure to swells is from the west (SSE 1993). Tropical cyclones have generated significant swell heights of up to 5 m in this area, although the predicted frequency of swells exceeding 2 m is less than 5% (WNI 1996). In the open ocean, sustained winds result in wind-forced currents of approximately 3% of the wind speed (Holloway & Nye 1985).

3.2.2.4 Water and Sediment Quality

The following description is based on data obtained from the environmental baseline monitoring program undertaken within the NV operational area in May 2021 for the operational area surrounding Ningaloo Vision (Santos, 2021).

Water quality profiles from the monitoring program included temperature, salinity, dissolved oxygen, and turbidity. These profiles showed a warm, low salinity and low turbidity surface layer, with no evidence of thermoclines or upwelling/downwelling within the top 35 m of water. Surface water temperatures surrounding NV FPSO were similar to temperatures recorded along the Ningaloo Reef (Hanson et al. 2005, Hanson et al 2007).

Concentrations of petroleum hydrocarbons and trace metals in surface water samples were all below Australian and New Zealand Water Guidelines (ANZG) (2018) 99% species protection guidelines. Nutrients and radium in surface waters were all below limit of reporting (LoR).

The sediment surrounding the NV FPSO is predominantly comprised of silt and fine sands with a sparse benthic infauna community, dominated by polychaetes and crustaceans. Hydrocarbon and metal concentrations in marine sediment samples were also below the LoRs at all sites and met the applicable ANZG (2018) 99% species protection guidelines.

Previous seabed surveys of Coniston/Novara fields and the Van Gogh field identified a similar infauna community to the NV FPSO, dominated by polychaetes and crustaceans (RPS 2011; referenced in Santos 2020a). Ningaloo Vision – Environmental Baseline Monitoring Program did not find any benthic infauna of regional significance, and no benthic primary producers were observed in any sample, which is to be expected given the depth (>340 m).

There were no discernible differences in water or sediment characteristics with respect to direction or distance from the NV FPSO, which reflects the homogeneity of the region and lack of disturbance as a result of current infrastructure at this site.

Sediment and water quality results from the most recent survey were free from chemical contaminants, which is typical of the region, and similar to other studies in the Pilbara region. The total organic carbon (TOC) content of all samples was very low and it can be concluded that there has been no enrichment of organic matter in these sediments resulting from previous activities in the area.

3.2.3 Bioregions

Based on the Integrated Marine and Coastal Regionalisation of Australia (IMCRA), Version 4.0 (Commonwealth of Australia, 2006), the regional descriptions relevant to the operational area and the EMBA are provided in **Table 3-2.**

Table 3-2: Integrated Marine and Coastal Regionalisation of Australia 4.0 provincial bioregions relevant to the activity

Bioregion	Operational Area	EMBA
North West Marine Region		
Northwest Province	✓	✓
Northwest Shelf Province	×	✓
Central Western Transition	×	✓
Central Western Shelf Transition	×	✓

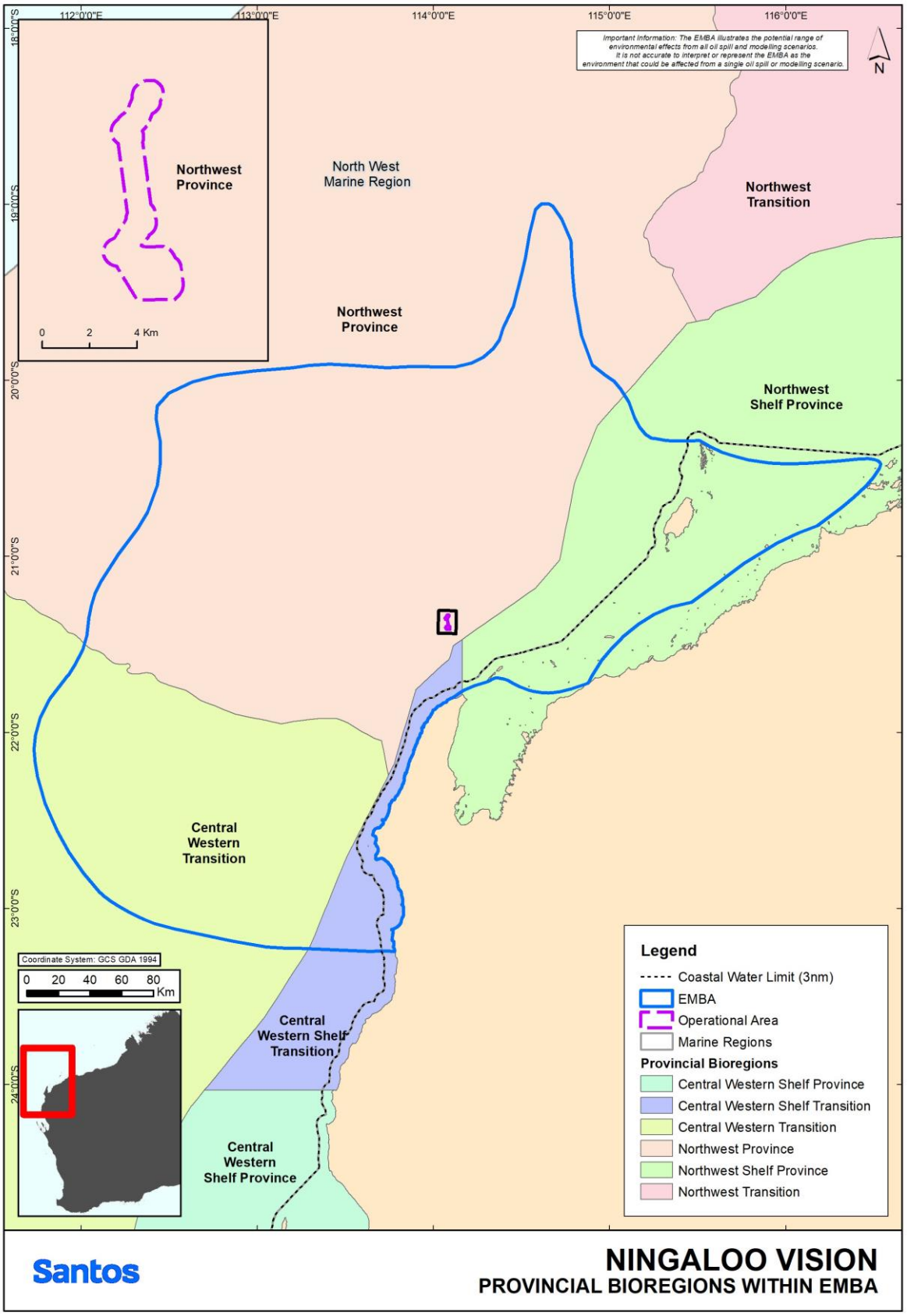


Figure 3-2: Integrated Marine and Coastal Regionalisation of Australia 4.0 provincial bioregions in relation to the environment that may be affected

3.2.4 Benthic Habitats

The operational area does not contain any shoreline habitat. The operational areas is approximately 41 km north-northwest off the Cape Range Peninsula in Western Australia.

The benthic (at or just below the seabed) habitats in the operational area lie in water depths ranging from 340 m to 400 m. The operational area consists of soft sediment seabeds as the dominant habitat. A survey of seabed habitat has previously been conducted at the Coniston/Novara fields (RPS, 2011) and at the Van Gogh Field (Apache, 2009). The seabed survey at the Coniston/Novara fields, along the flowlines and production manifold locations, has revealed a flat soft sediment habitat comprising sand, silt and mud with a sparse epibenthic fauna (including anemones, sea stars, soft corals, crabs, shrimp and sea urchins) and an infaunal community dominated by polychaetes and crustaceans. This survey found no unique communities or communities of regional significance (RPS, 2011). Similarly, a seabed survey at the Van Gogh field has revealed a flat substrate comprising mud and silts sediments with sparse epifauna (including sponges, echinoderms and crustaceans) and an infaunal community comprising mainly polychaetes and crustaceans (Apache, 2009).

The depth of the operational area (>300 m) precludes the existence of benthic primary producers (i.e. photosynthetic organisms including hard corals, seagrasses and macroalgae), which are typical of shallower coastal areas, as seabed light availability at these depths is insufficient to support photosynthesis (Gattuso et al, 2006).

There are no known offshore reefs or islands within or in close proximity (less than 20 km) to the operational area. However, there are a number of emergent oceanic reefs and islands in the EMBA, including Ningaloo Reef, Muiron Islands, Barrow Island, Montebello Islands and Lowendal Islands. Benthic habitats identified from the EMBA (include benthic primary producers (coral reefs, macroalgae, seagrasses and mangroves), soft sediments, rocky substrates, intertidal mud/sandflats, rocky shorelines and sandy beaches.

Within the EMBA, habitat diversity is highest in shallower waters (<30 m) associated with the mainland and offshore islands/shoals where light availability promotes the occurrence of benthic primary producers, and in areas where hard substrate provides attachment points for a greater diversity of habitat forming organisms. Within the EMBA benthic habitat diversity is therefore highest within waters along the Ningaloo coastline, shallow waters around offshore islands extending from North West Cape to Onslow (e.g. Muiron Islands) and the Montebello/Barrow/Lowendal Islands.

A description of the values and sensitivities associated with these reefs and islands within the EMBA is provided in **Appendix C.** The presence of marine and coastal habitats within the operational area and EMBA is summarised in **Table 3-3.**

Table 3-3: Benthic habitats within the operational area and EMBA

Category	Receptor	Operational Area Presence	EMBA Presence				Relevant Events That May Impact on The Receptors
			Northwest Province	Northwest Shelf Province	Central Western Transition	Central Western Shelf Transition	
Benthic Habitats	Coral reefs	✗	✗	✓	✗	✓	Unplanned Hydrocarbon release due to subsea or surface loss of well control. Diesel release from vessel collision
	Seagrass	✓	✓	✓	✓	✓	
	Macroalgae	✗	✗	✓	✗	✓	
	Non-coral benthic invertebrates	✓	✓	✗	✓	✗	Planned Seabed disturbance. Planned operational discharges. Unplanned Hydrocarbon release due to subsea or surface loss of well control. Diesel release from vessel collision. Unplanned release of solids.
Shoreline Habitats	Mangroves	✗	✗	✓	✗	✗	Unplanned Hydrocarbon release due to subsea or surface loss of well control.
	Intertidal platforms	✗	✗	✓	✗	✓	
	Sandy beaches	✗	✗	✓	✗	✓	
	Rocky shorelines	✗	✗	✓	✗	✓	

3.2.5 Protected and Significant Areas

3.2.5.1 Australian Marine Parks and State Marine Parks, Management Areas and Reserves

The operational area does not intercept any Australian Marine Parks (AMPs) or state marine parks, management areas or reserves. The closest AMP is the Ningaloo AMP, located approximately 27 km southeast of the operational area. The closest state marine park is the Muiron Islands Marine Management Area, located approximately 32 km southeast of the operational area.

The EMBA overlaps a number of AMPs and state marine parks, management areas and nature reserves; refer **Table 3-4** and **Figure 3-3** and **Figure 3-4** with further discussion in **Appendix C**.

AMPs are recognised under the EPBC Act for protecting and maintaining biological diversity and contributing to a national representative network of marine protected areas. Management plans for AMPs have been developed and came into force on 1 July 2018. Under these plans, AMPs are allocated conservation objectives based on the Australian IUCN reserve management principles in Schedule 8 of the EPBC Regulations 2000. These principles determine what activities are acceptable within a protected area under the EPBC Act. The marine park management zones that are relevant to the AMPs and State marine parks within the EMBA are listed in **Table 3-5**. **Section 3.2.7.1** includes additional details regarding cultural heritage and marine parks.

Oil and gas operations and associated oil spill response may be conducted in a Multiple Use Zone (IUCN VI) subject to the class approval and prescriptions in the North-West Marine Parks Network Management Plan (North-west MPNMP) (Director of National Parks, 2018). The Class Approval – Mining Operations and Greenhouse Gas Activities for the North-west MPNMP, which is applicable to petroleum-related activities, came into effect on 1 July 2018. Prescriptions/conditions of the North-west MPNMP and Class Approval for the North-west MPNMP that are considered relevant to the scope of this EP are provided in **Table 3-6**.

3.2.5.2 Key Ecological Features

Key ecological features (KEFs) which are components of the marine ecosystem that are considered to be important for biodiversity or ecosystem function and integrity of the Commonwealth Marine Area, are also included in the EPBC Act PMST results **Appendix D**). The Continental Slope Demersal Fish Communities KEF intersects the Operational area. A number of other KEFs are present within the EMBA (**Figure 3-5**).

3.2.5.3 Heritage Areas

Australia's heritage is managed by various levels of government and peak bodies that identify and list places for their heritage values. Significant heritage places are identified and grouped (by type) into lists that guide the protection and management of heritage values. No heritage areas are located within the operational areas, but several are within the EMBA. These areas are shown in Figure 3-6 and are further discussed in **Appendix C**.

3.2.5.4 Wetlands of International or National Importance

Wetlands are a critical part of our natural environment. They protect our shores from wave action, reduce the impacts of floods, absorb pollutants, and improve water quality. They provide habitat for animals and plants, and many contain a wide diversity of life, supporting plants and animals that are found nowhere else. The nationally important wetland of the Cape Range Subterranean Waterways is located within the EMBA.

Table 3-4: Distance from respective operational area boundaries to protected areas within the environment that may be affected

Name	Status, Zone or IUCN Classification	Presence in Operational Area	Presence in MEVA	Presence in EMBA	Distance to Operational Area
North-West Marine Region					
Australian Marine Parks					
Gascoyne AMP	Multiple Use Zone (IUCN VI)	✓	✓	✓	28
	Habitat Protection Zone (IUCN IV)	✓	✓	✓	129
Ningaloo AMP	Recreational Use Zone (IUCN IV)	✓	✓	✓	27
	National Park Zone (IUCN II)	✗	✗	✓	148
Montebello AMP	Multiple Use Zone (IUCN VI)	✗	✗	✓	133
State Marine Parks, Management Areas, and Reserves					
Montebello Islands MP	General Use Zone	✗	✗	✓	164
Muiron Islands Marine Management Area	Unzoned area Conservation Area (IUCN IA)	✓	✓	✓	32
Ningaloo MP	Recreational Use Zone, Sanctuary Zone, Special Purpose Zone, Special Purpose Zones, General Use Zone.	✓	✓	✓	33
Barrow Island MP	Multiple Use Zone (IUCN VI)	✗	✗	✓	139
Barrow Island Marine Management Area	Unzoned (with exception of Bandicoot Bay Conservation Area)	✗	✗	✓	130

Table 3-5: Australian and State Marine management zones

Management Zones	Objective
Australian Marine Parks	
Multiple Use (IUCN VI)	The objective is to provide for ecologically sustainable use and the conservation of ecosystems, habitats, and native species.
Recreational Use (IUCN IV)	The objective is to provide for the conservation of ecosystems, habitats, and native species in as natural a state as possible, while providing for recreational use.
Habitat Protection Zone (IUCN IV)	The objective is to provide for the conservation of ecosystems, habitats, and native species in as natural a state as possible, while allowing activities that do not harm or cause destruction to seafloor habitats.
National Park Zone (IUCN II)	The objective is to protect natural biodiversity with its underlying ecological structure and supporting environmental processes, and to promote education and recreation.
Special Purpose Zone	The objective is to protect natural ecosystems and use natural resources sustainably, when conservation and sustainable use can be mutually beneficial.
State Marine Parks	
Sanctuary Zones	The primary purpose of sanctuary zones is for the protection and conservation of marine biodiversity. Sanctuary zones are 'no-take' areas managed solely for nature conservation and low-impact recreation and tourism.
Special Purpose Zones	*Special purpose (benthic protection) zone*: This zone has the priority purpose of conservation of benthic habitat. *Special purpose (shore-based activities) zone:* Special purpose zones in marine parks are managed for a priority purpose or use, such as a seasonal event (e.g., wildlife breeding, whale watching) or a commercial activity (e.g., pearling).
Recreation Zones	Recreation zones have the primary purpose of providing opportunities for recreational activities, including fishing, for visitors and for commercial tourism operators, where these activities are compatible with the maintenance of the values of the zone.
General Use Zones	Conservation of natural values is still the priority of general use zones, but activities such as sustainable commercial and recreational fishing, aquaculture, pearling and petroleum exploration and production may be permitted provided they do not compromise the ecological values of the marine park.

Table 3-6: Prescriptions/conditions from the North-West and North Marine Parks Network Management Plan 2018 relevant to the activities in this Environment Plan

Prescription/ Condition Number	Prescription/Condition	Relevant Section of EP
North-West MPNMP (Director of National Parks (DNP), 2018a)		
4.2.9.8	Notwithstanding Section 4.2.9.1 (of the North-West MPNMP), actions required to respond to oil pollution incidents, including environmental monitoring and remediation, in connection with mining operations authorised under the OPGGS Act, may be conducted in all zones without an authorisation issued by the Director, provided that the actions are taken in accordance with: • an environment plan that has been accepted by NOPSEMA • the Director is notified in the event of oil pollution within a marine park, or where an oil spill response action must be taken within a marine park, so far as reasonably practicable, prior to response action being taken.	This EP (Section 4) (Stakeholder Consultation), reporting under Section 7 of the OPEP
Class Approval – Mining Operations and Green House Gas Activities – for North-West MPNMP (DNP, 2018)		
1	Approved action must be conducted in accordance with: an Environment Plan accepted under the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations (2023)	The OPEP (some proposed response activities in the event of an oil pollution incident may be undertaken within the North-West Marine Park Network)
	the EPBC Act	Appendix B (Legislation)
	the EPBC Regulations	This EP
	the North-west Network Management Plan	This table
	any prohibitions, restrictions or determinations made under the EPBC Regulations by the Director of National Parks	Not applicable
	all other applicable Commonwealth and state and territory laws (to the extent those laws are capable of operating concurrently with the laws and instruments described in paragraphs a to e)).	Appendix B (Legislation), and the OPEP
2	If requested by the Director of National Parks, an Approved Person must notify the Director prior to conducting Approved Actions within Approved Zones. Note: the timeframe for prior notice will be agreed to by the Director of National Parks and the Approved Person.	Section 8 (Reporting) and Section 7 of the OPEP
3	If requested by the Director of National Parks, an Approved Person must provide the Director with information relating to undertaking the Approved Actions (or gathered while undertaking the Approved Actions), that is relevant to the Director's management of the Approved Zones. Note: the information required, and timeframe within which it is required, will be agreed to by the Director of National Parks and the Approved Person.	Not applicable

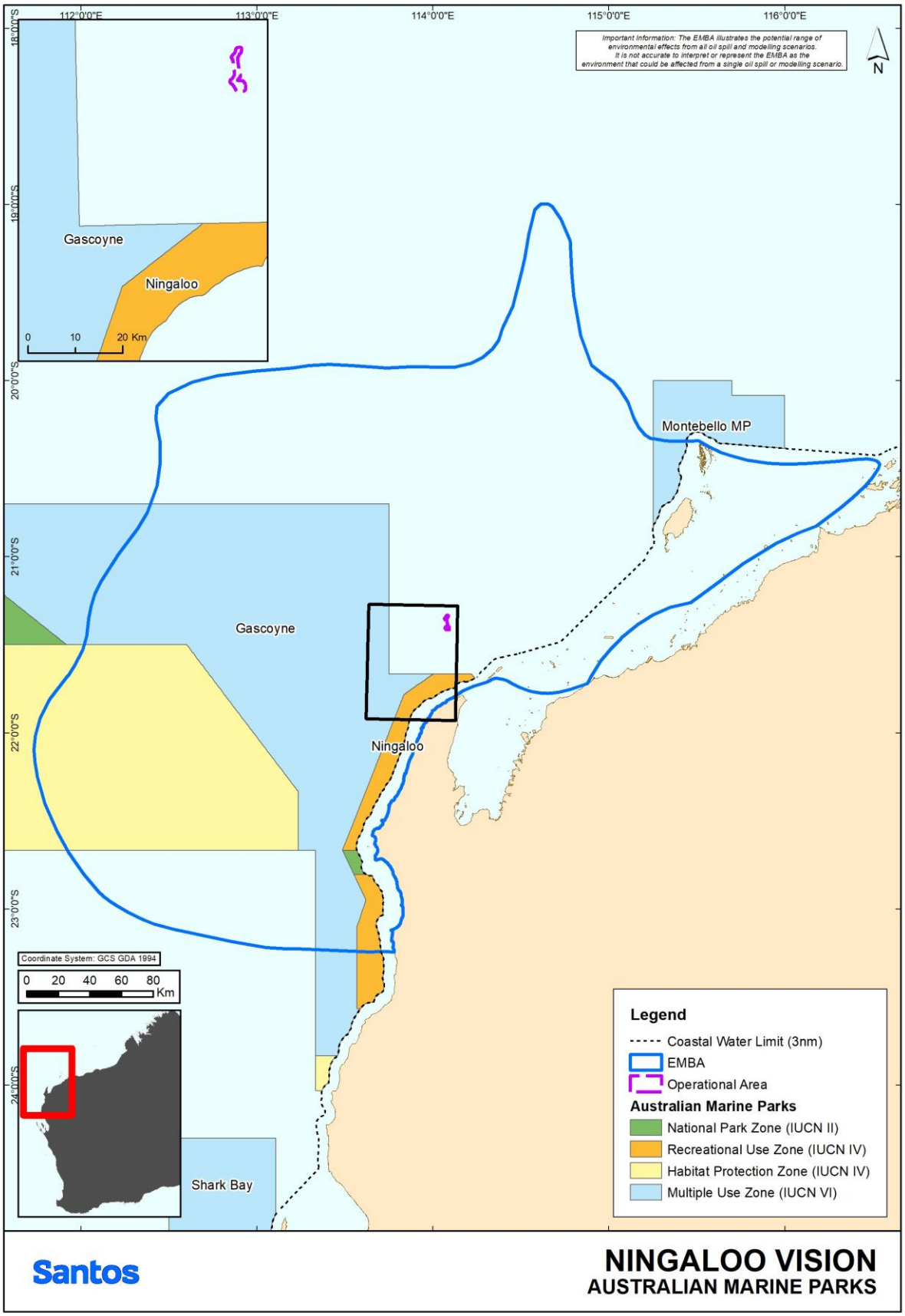


Figure 3-3: Australian marine parks within the environment that may be affected and operational area

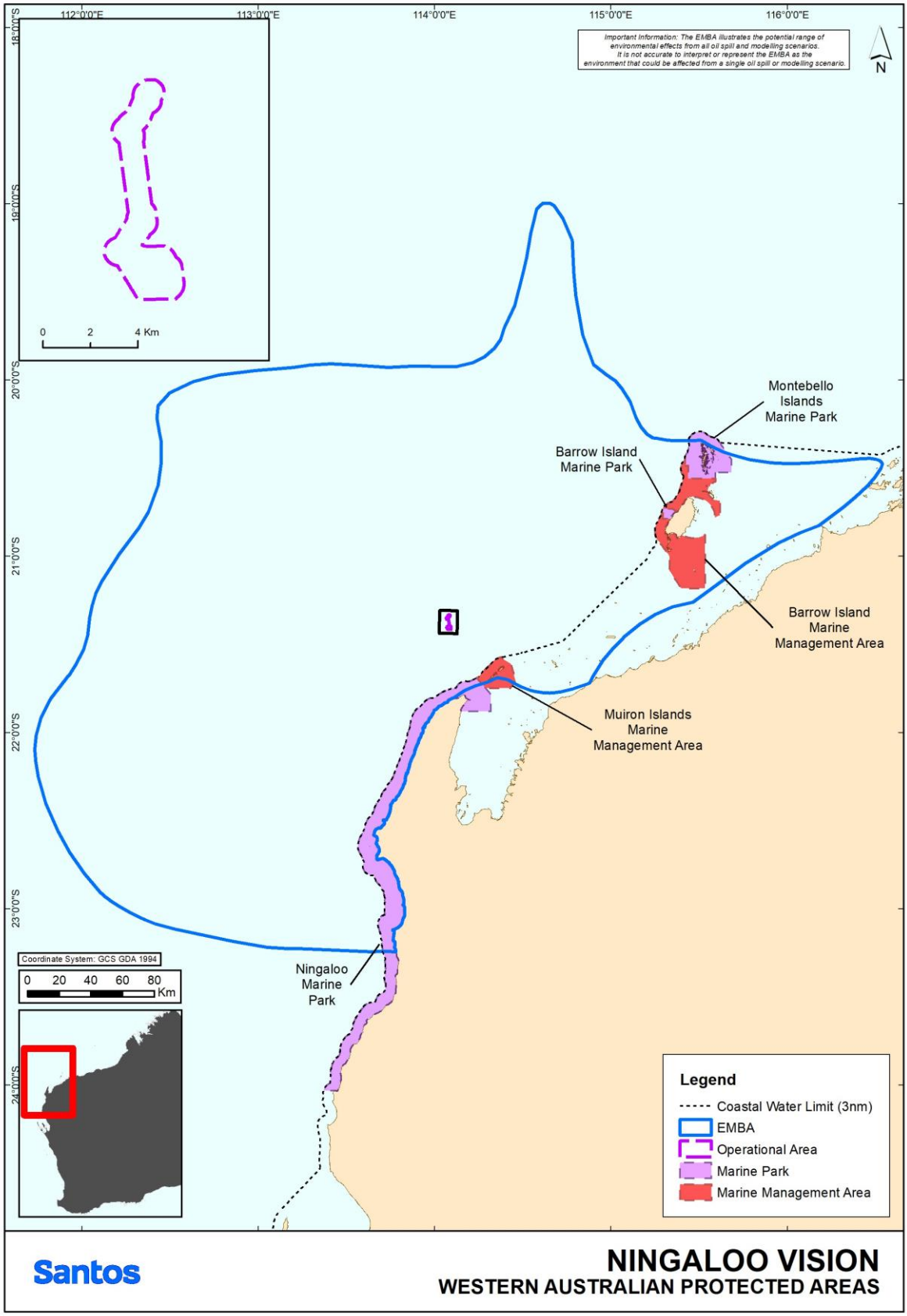


Figure 3-4: State marine protected areas within the environment that may be affected and operational area

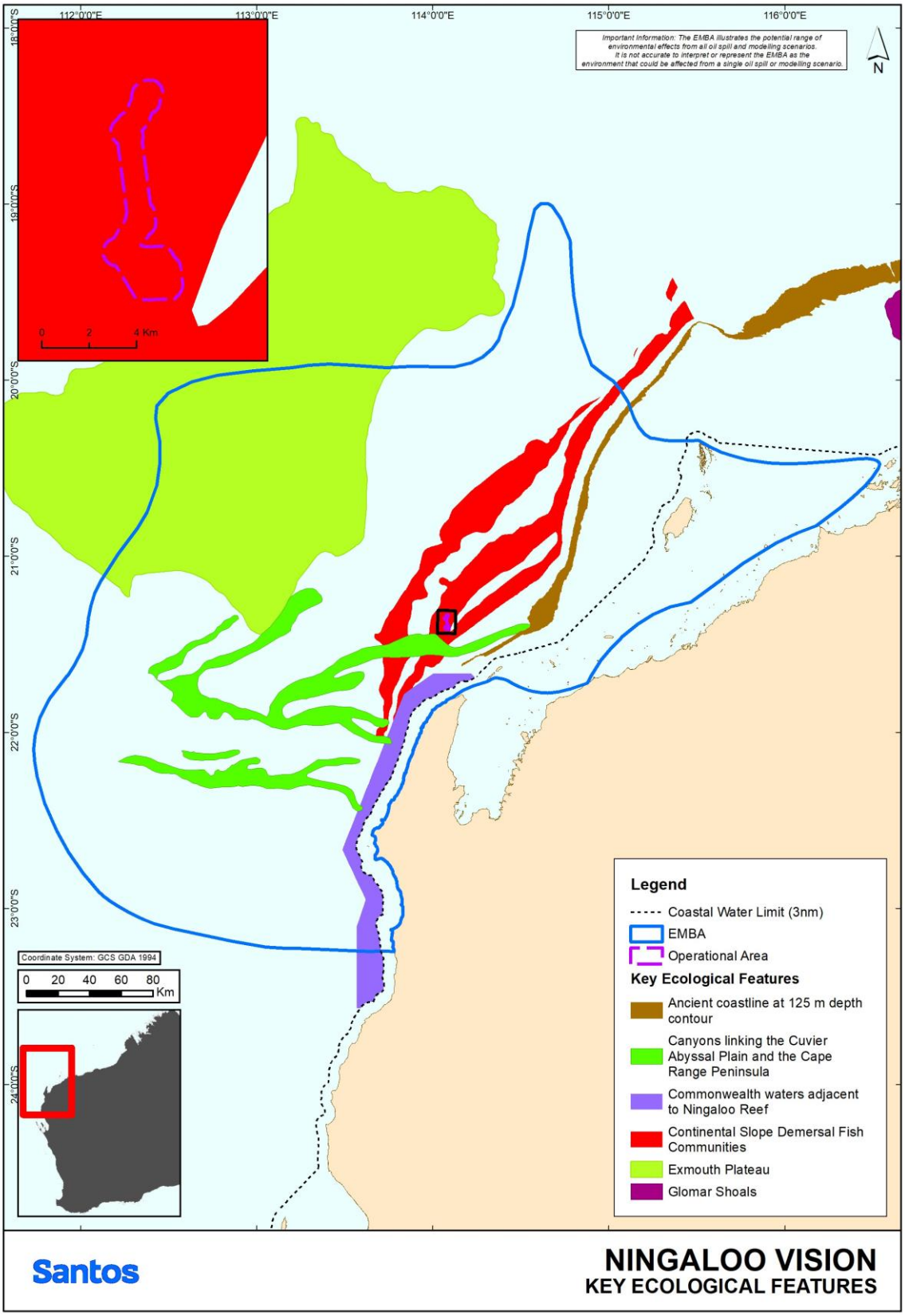


Figure 3-5: Key ecological features within and near the environment that may be affected and operational area

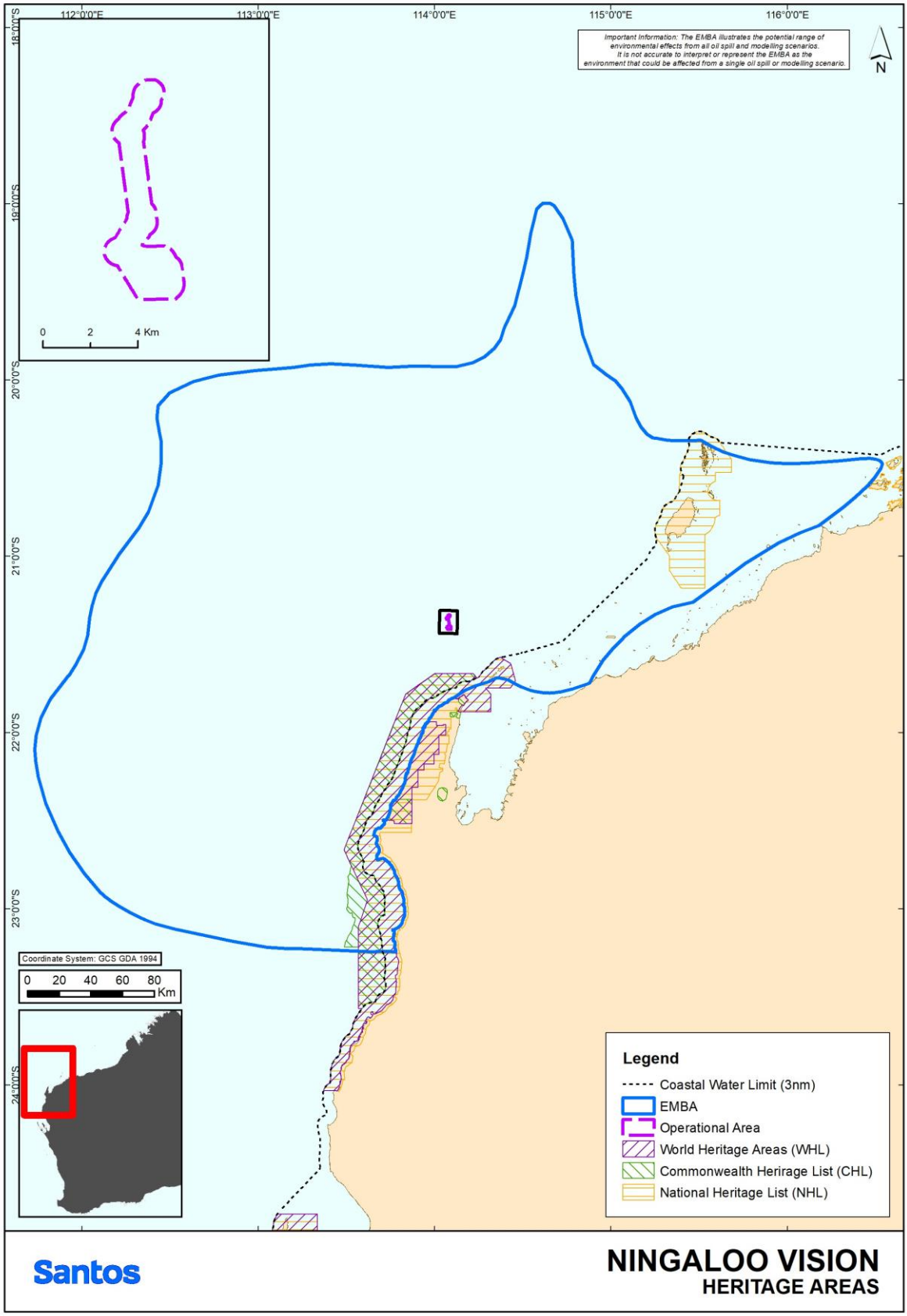


Figure 3-6: Heritage areas in the vicinity of the operational area and within the environment that may be affected

3.2.6 Threatened and Migratory Fauna

Table 3-7 presents the threatened and migratory species within the operational area and EMBA. These include all relevant MNES protected under the EPBC Act as identified in the PMST report for the operational area and EMBA (Appendix D). For each species identified, their status under the *Western Australia Biodiversity Conservation Act 2016* (BC Act 2016) is also provided as well as the extent of likely presence, including any overlap with designated biologically important areas (BIAs).

The PMST report for the operational area identified 28 marine fauna species listed as 'threatened' and 42 marine fauna species listed as 'migratory'. In the EMBA there were 80 marine fauna species listed as 'threatened' or 'migratory' species. Note that terrestrial species that appear in the PMST report for the EMBA but do not interact with the marine environment are not relevant to the activity impacts and risks and therefore have been excluded from **Table 3-7**.

Table 3-7: Environmental values and sensitivities within the environment that may be affected and operational area – threatened and migratory marine fauna

Value/sensitivity		EPBC Act Threatened and Migratory Status	BC Act 2016 Threatened and Migratory Status	Operational Area		MEVA		EMBA		Relevant Events
Common name	Scientific name			Presence	Type of Presence	Presence	Type of Presence	Presence	Type of Presence	
Protected Species and Communities: Fish and Sharks										
Scalloped Hammerhead	*Sphyrna lewini*	Conservation Dependent	-	✓	Species or species habitat likely to occur within area	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	Planned • Light emissions • Noise emissions • Planned operational discharges • Planned chemical and hydrocarbon discharges • Spill response operations Unplanned • Hydrocarbon releases/spills • Interaction with marine fauna • Introduction of invasive marine species (IMS)
Southern Bluefin Tuna	*Thunnus maccoyii*	Conservation Dependent	-	✓	Species or species habitat likely to occur within area	✓	Breeding known to occur within area	✓	Breeding known to occur within area	
Northern River Shark	*Glyphis garricki*	Endangered	Priority 1	×	NA	×	NA	✓	Species or species habitat may occur within area	
Dwarf Sawfish, Queensland Sawfish	*Pristis clavata*	Vulnerable, Migratory	Priority 1 Migratory	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	
Grey Nurse Shark (west coast population)	*Carcharias taurus (west coast population)*	Vulnerable	Vulnerable	✓	Species or species habitat may occur within area	✓	Congregation or aggregation known to occur within area	✓	Congregation or aggregation known to occur within area	
White Shark, Great White Shark	*Carcharodon carcharias*	Vulnerable, Migratory	Vulnerable, Migratory	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	

Value/sensitivity		EPBC Act Threatened and Migratory Status	BC Act 2016 Threatened and Migratory Status	Operational Area		MEVA		EMBA		Relevant Events
Common name	Scientific name			Presence	Type of Presence	Presence	Type of Presence	Presence	Type of Presence	
Cape Range Cave Gudgeon, Blind Gudgeon	*Milyeringa veritas*	Vulnerable	Vulnerable	×	NA	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	
Blind Cave Eel	*Ophisternon candidum*	Vulnerable	Vulnerable	×	NA	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	
Whale Shark	*Rhincodon typus*	Vulnerable, Migratory	Migratory	✓	Foraging, feeding or related behaviour known to occur within area	✓	Foraging, feeding, or related behaviour known to occur within area	✓	Foraging, feeding, or related behaviour known to occur within area Overlaps with BIA for foraging	
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish	*Pristis pristis*	Vulnerable, Migratory	-	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	
Green Sawfish, Dindagubba, Narrowsnout Sawfish	*Pristis zijsron*	Vulnerable, Migratory	-	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	

Value/sensitivity		EPBC Act Threatened and Migratory Status	BC Act 2016 Threatened and Migratory Status	Operational Area		MEVA		EMBA		Relevant Events
Common name	Scientific name			Presence	Type of Presence	Presence	Type of Presence	Presence	Type of Presence	
Porbeagle, Mackerel Shark	*Lamna nasus*	Migratory	Migratory	×	NA	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Shortfin Mako, Mako Shark	*Isurus oxyrinchus*	Migratory	Migratory	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	
Oceanic Whitetip Shark	*Carcharhinus longimanus*	Migratory	-	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	
Longfin Mako	*Isurus paucus*	Migratory	Migratory	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	
Narrow Sawfish, Knifetooth Sawfish	*Anoxypristis cuspidata*	Migratory	Migratory	✓	Species or species habitat may occur within area	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	
Giant Manta Ray	*Mobula birostris*	Migratory	Migratory	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	

Value/sensitivity		EPBC Act Threatened and Migratory Status	BC Act 2016 Threatened and Migratory Status	Operational Area		MEVA		EMBA		Relevant Events
Common name	Scientific name			Presence	Type of Presence	Presence	Type of Presence	Presence	Type of Presence	
Reef Manta Ray, Coastal Manta Ray	*Mobula alfredi*	Migratory	Migratory	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	
Protected Species and Communities: Marine Mammals										
Southern Right Whale	*Eubalaena australis*	Endangered, Migratory	Vulnerable	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area Overlaps BIA for migration	Planned • Light emissions • Noise emissions • Planned operational discharges • Planned chemical and hydrocarbon discharges • Spill response operations Unplanned • Hydrocarbon releases/spills • Interaction with marine fauna • Introduction of invasive marine species (IMS)
Blue Whale	*Balaenoptera musculus*	Endangered, Migratory	Endangered	✓	Migration route known to occur within area	✓	Migration route known to occur within area	✓	Migration route known to occur within area Overlaps BIAs for foraging, migration	
Sei Whale	*Balaenoptera borealis*	Endangered, Migratory	Endangered	✓	Species or species habitat likely to occur within area	✓	Foraging, feeding or related behaviour likely to occur within area	✓	Foraging, feeding or related behaviour likely to occur within area	
Fin Whale	*Balaenoptera physalus*	Vulnerable, Migratory	Endangered	✓	Species or species habitat likely to occur within area	✓	Foraging, feeding or related behaviour likely to occur within area	✓	Foraging, feeding or related behaviour likely to occur within area	
Australian Humpback Dolphin	*Sousa sahulensis*	Migratory	Priority 4 Migratory	✓	Species or species habitat may occur within area	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	

Value/sensitivity		EPBC Act Threatened and Migratory Status	BC Act 2016 Threatened and Migratory Status	Operational Area		MEVA		EMBA		Relevant Events
Common name	Scientific name			Presence	Type of Presence	Presence	Type of Presence	Presence	Type of Presence	
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations)	*Tursiops aduncus (Arafura/Timor Sea populations)*	Migratory	-	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	
Killer Whale, Orca	*Orcinus orca*	Migratory	Migratory	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Australian Snubfin Dolphin	*Orcaella heinsohni*	Migratory	Priority 4 Migratory	✓	Species or species habitat may occur within area	✓	Species or species habitat likely to occur within area	✓	Species or species habitat known to occur within area	
Sperm Whale	*Physeter macrocephalus*	Migratory	Vulnerable	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Dugong	*Dugong dugon*	Migratory	Migratory	✖	NA	✓	Breeding known to occur within area.	✓	Breeding known to occur within area. Overlap with BIA for reproduction, foraging (high density seagrass beds), nursing and calving	
Humpback Whale	*Megaptera novaeangliae*	Migratory	Conservation Dependent Migratory	✓	Breeding known to occur within area	✓	Breeding known to occur within area.	✓	Breeding known to occur within area. Overlap with BIA for migration and resting	

Value/sensitivity		EPBC Act Threatened and Migratory Status	BC Act 2016 Threatened and Migratory Status	Operational Area		MEVA		EMBA		Relevant Events
Common name	Scientific name			Presence	Type of Presence	Presence	Type of Presence	Presence	Type of Presence	
Bryde's Whale	*Balaenoptera edeni*	Migratory	Migratory	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	
Antarctic Minke Whale, Dark-shoulder Minke Whale	*Balaenoptera bonaerensis*	Migratory	Migratory	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	
Protected Species and Communities: Marine Reptiles										
Short-nosed Sea Snake, Short-nosed Seasnake	*Aipysurus apraefrontalis*	Critically Endangered	Critically Endangered	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	✓	Species or species habitat known to occur within area	Planned • Light emissions • Noise emissions • Planned operational discharges • Planned chemical and hydrocarbon discharges • Spill response operations Unplanned • Hydrocarbon releases/spills • Interaction with marine fauna • Introduction of invasive marine species (IMS)
Leaf-scaled Sea Snake, Leaf-scaled Seasnake	*Aipysurus foliosquama*	Critically Endangered	Critically Endangered	×	NA	✓	NA	✓	Species or species habitat known to occur within area	
Loggerhead Turtle	*Caretta caretta*	Endangered, Migratory	Endangered	✓	Congregation or aggregation known to occur within area	✓	Breeding known to occur within area	✓	Breeding known to occur within area. Overlaps with BIA for \ reproduction	
Leatherback Turtle, Leathery Turtle, Luth	*Dermochelys coriacea*	Endangered, Migratory	Vulnerable	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	

Value/sensitivity		EPBC Act Threatened and Migratory Status	BC Act 2016 Threatened and Migratory Status	Operational Area		MEVA		EMBA		Relevant Events
Common name	Scientific name			Presence	Type of Presence	Presence	Type of Presence	Presence	Type of Presence	
Green Turtle	*Chelonia mydas*	Vulnerable, Migratory	Vulnerable	✓	Congregation or aggregation known to occur within area	✓	Breeding known to occur within area	✓	Breeding known to occur within area Overlaps with BIA for aggregation, resting, reproduction, and foraging	
Hawksbill Turtle	*Eretmochelys imbricata*	Vulnerable, Migratory	Vulnerable	✓	Congregation or aggregation known to occur within area	✓	Breeding known to occur within area	✓	Breeding known to occur within area. Overlaps with BIA for foraging, and reproduction	
Flatback Turtle	*Natator depressus*	Vulnerable, Migratory	Vulnerable	✓	Congregation or aggregation known to occur within area	✓	Breeding known to occur within area	✓	Breeding known to occur within area. Overlaps with BIA forforaging and reproduction. .	
Protected Species and Communities: Marine Birds										
Eastern Curlew, Far Eastern Curlew	*Numenius madagascariensis*	Critically Endangered, Migratory	Critically Endangered	✓	Species or species habitat may occur within area	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	Planned • Light emissions • Planned operational discharges • Spill response operations Unplanned • Hydrocarbon releases/spills

Value/sensitivity		EPBC Act Threatened and Migratory Status	BC Act 2016 Threatened and Migratory Status	Operational Area		MEVA		EMBA		Relevant Events
Common name	Scientific name			Presence	Type of Presence	Presence	Type of Presence	Presence	Type of Presence	
Curlew Sandpiper	*Calidris ferruginea*	Critically Endangered, Migratory	Critically Endangered	✓	Species or species habitat may occur within area	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	
Abbott's Booby	*Papasula abbotti*	Endangered, Migratory	-	·×	NA	×	NA	✓	Species or species habitat may occur within area	
Southern Giant-Petrel, Southern Giant Petrel	*Macronectes giganteus*	Endangered, Migratory	Migratory	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Christmas Island White-tailed Tropicbird, Golden Bosunbird	*Phaethon lepturus fulvus*	Endangered	-	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Australian Painted Snipe	*Rostratula australis*	Endangered	Endangered	×	NA	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	
Red-tailed Tropicbird (Indian Ocean)	*Phaethon rubricauda westralis*	Endangered	Priority 4, Migratory	×	NA	✓	Species or species habitat may occur within area	✓	Species or species habitat known to occur within area	
Red Goshawk	*Erythtotriorchis radiatus*	Endangered	Vulnerable	×	NA	✓	Species or species habitat may occur within area	✓	Species or species habitat known to occur within area	

Value/sensitivity		EPBC Act Threatened and Migratory Status	BC Act 2016 Threatened and Migratory Status	Operational Area		MEVA		EMBA		Relevant Events
Common name	Scientific name			Presence	Type of Presence	Presence	Type of Presence	Presence	Type of Presence	
Northern Siberian Bar-tailed Godwit	*Limosa lapponica menzbieri*	Endangered	Critically Endangered	×	NA	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	
Night Parrot	*Pezoporus occidentalis*	Endangered	Endangered	×	NA	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Common Greenshank, Greenshank	*Tringa nebularia*	Endangered	Migratory	×	NA	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	
Red Knot, Knot	*Calidris canutus*	Vulnerable, Migratory	Endangered	✓	Species or species habitat may occur within area	✓	Species or species habitat likely to occur within area	✓	Species or species habitat known to occur within area	
Indian Yellow-nosed Albatross	*Thalassarche carteri*	Vulnerable, Migratory	Endangered	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Campbell Albatross, Campbell Black-browed Albatross	*Thalassarche impavida*	Vulnerable, Migratory	Vulnerable	×	NA	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Greater Sand Plover, Large Sand Plover	*Charadrius leschenaultii*	Vulnerable, Migratory	Vulnerable	×	NA	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	
Australian Lesser Noddy	*Anous tenuirostris melanops*	Vulnerable	Endangered	×	NA	×	NA	✓	Species or species habitat may occur within area	
Australian Fairy Tern	*Sternula nereis nereis*	Vulnerable	Migratory	✓	Foraging, feeding or related behaviour likely to occur within area	✓	Breeding known to occur within area	✓	Breeding known to occur within area. Overlaps with BIA for reproduction.	

Value/sensitivity		EPBC Act Threatened and Migratory Status	BC Act 2016 Threatened and Migratory Status	Operational Area		MEVA		EMBA		Relevant Events
Common name	Scientific name			Presence	Type of Presence	Presence	Type of Presence	Presence	Type of Presence	
Grey Falcon	*Falco hypoleucos*	Vulnerable	Vulnerable	×	NA	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	
Soft-plumaged Petrel	*Pterodroma mollis*	Vulnerable	-	✓	Species or species habitat may occur within area	✓	Foraging, feeding or related behaviour likely to occur within area	✓	Foraging, feeding or related behaviour likely to occur within area	
Sharp-tailed Sandpiper	*Calidris acuminata*	Vulnerable	Migratory	✓	Species or species habitat may occur within area	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	
Caspian Tern	*Hydroprogne caspia*	Migratory	Migratory	×	NA	✓	Breeding known to occur within area	✓	Breeding known to occur within area	
Red-footed Booby	*Sula sula*	Migratory	-	×	NA	×	NA	✓	Breeding known to occur within area.	
Bar-tailed Godwit	*Limosa lapponica*	Migratory	Migratory	×	NA	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	
Oriental Plover, Oriental Dotterel	*Charadrius veredus*	Migratory	Migratory	×	NA	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Osprey	*Pandion haliaetus*	Migratory	Migratory	×	NA	✓	Breeding known to occur within area	✓	Breeding known to occur within area	
Common Noddy	*Anous stolidus*	Migratory	Migratory	✓	Species or species habitat may occur within area	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	
Fork-tailed Swift	*Apus pacificus*	Migratory	Migratory	×	NA	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	

Value/sensitivity		EPBC Act Threatened and Migratory Status	BC Act 2016 Threatened and Migratory Status	Operational Area		MEVA		EMBA		Relevant Events
Common name	Scientific name			Presence	Type of Presence	Presence	Type of Presence	Presence	Type of Presence	
Bridled Tern	*Onychoprion anaethetus*	Migratory	Migratory	×	NA	×	NA	✓	Breeding known to occur within area	
Streaked Shearwater	*Calonectris leucomelas*	Migratory	Migratory	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	
Roseate Tern	*Sterna dougallii*	Migratory	Migratory	×	NA	✓	Breeding known to occur within area	✓	Breeding known to occur within area. Overlaps with BIA for reproduction	
Little Tern	*Sternula albifrons*	Migratory	Migratory	×	NA	✓	Breeding known to occur within area.	✓	Breeding known to occur within area	
Asian Dowitcher	*Limnodromus semipalmatus*	Migratory	Migratory	×	NA	×	NA	✓	Species or species habitat may occur within area	
Oriental Pratincole	*Glareola maldivarum*	Migratory	Migratory	×	NA	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	
Greater Crested Tern	*Thalasseus bergii*	Migratory	Migratory	×	NA	✓	Breeding known to occur within area	✓	Breeding known to occur within area	
Great Frigatebird, Greater Frigatebird	*Fregata minor*	Migratory	Migratory	×	NA	×	NA	✓	Species or species habitat may occur within area	
Lesser Frigatebird, Least Frigatebird	*Fregata ariel*	Migratory	Migratory	✓	Species or species habitat likely to occur within area	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	

Value/sensitivity		EPBC Act Threatened and Migratory Status	BC Act 2016 Threatened and Migratory Status	Operational Area		MEVA		EMBA		Relevant Events
Common name	Scientific name			Presence	Type of Presence	Presence	Type of Presence	Presence	Type of Presence	
White-tailed Tropicbird	*Phaethon lepturus*	Migratory	Migratory	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	
Wedge-tailed Shearwater	*Ardenna pacifica*	Migratory	Migratory	×	NA	✓	Breeding known to occur within area	✓	Breeding known to occur within area. Overlaps with BIA for reproduction	
Red-rumped Swallow	*Cecropis daurica*	Migratory	Migratory	×	NA	×	NA	✓	Species or species habitat may occur within area	
Common Sandpiper	*Actitis hypoleucos*	Migratory	Migratory	✓	Species or species habitat may occur within area	✓	Species or species habitat known to occur within area	✓	Species or species habitat known to occur within area	
Pectoral Sandpiper	*Calidris melanotos*	Migratory	Migratory	✓	Species or species habitat may occur within area	✓	Species or species habitat may occur within area	✓	Species or species habitat likely to occur within area	
Flesh-footed Shearwater, Fleshy-footed Shearwater	*Ardenna carneipes*	Migratory	Migratory	✓	Species or species habitat may occur within area	✓	Species or species habitat likely to occur within area	✓	Species or species habitat likely to occur within area	

3.2.6.1 Biologically Important Areas and Critical Habitat

BIAs are areas that have been identified where threated or migratory species protected under the EPBC Act carry out critical lifecycle activities. In addition to BIAs, habitat critical for the survival of the species has also been identified for marine turtles and these are areas in addition to BIAs where marine turtles carry out critical lifecycle activities.

There is no habitat critical for the survival of the species within the operational area, however the following BIAs are present in the operational area (including 20 km buffer):

- pygmy blue whale (migration)
- humpback whale (migration north and south)
- wedge-tailed shearwater (reproduction and foraging)
- flatback turtle (reproduction inside 20 km buffer only)
- loggerhead turtle (reproduction inside 20 km buffer only)
- hawksbill turtle (reproduction inside 20 km buffer only)
- green turtle (reproduction inside 20 km buffer only)
- whale shark (foraging, inside 20 km buffer only).

BIAs such as an aggregation, reproduction, foraging or known migratory routes and areas deemed habitat critical for the survival of a species within the operational area and EMBA, are listed in **Table 3-8** and shown in **Figure 3-7** to **Figure 3-14** and described further in **Appendix C**.

Santos understands that DCEEW are currently undertaking a review of BIA information. At the time of preparing this EP, only BIA information for the Southern Right Whale has been updated and released publicly. All BIA's for this species are outside the EMBA for Ningaloo Vision CoPFAR activities.

3.2.6.2 Habitat Critical to the Survival of a Species

Habitat critical to the survival of species is defined by the EPBC Act Significant Impact Guidelines 1.1 Matters of National Environmental Significance as areas necessary:

- for activities such as foraging, reproduction or dispersal
- for the long-term maintenance of the species (including the maintenance of species essential to the survival of the species)
- to maintain genetic diversity and long term evolutionary development
- for the reintroduction of populations or recovery of the species.

The Recovery Plan for Marine Turtles in Australia 2017 – 2027 (Commonwealth of Australia, 2017) identifies draft habitat critical to the survival of a species for marine turtles as:

- nesting habitat critical to the survival of green, loggerhead, flatback and hawksbill turtles includes at least 70 per cent of nesting for the stock
- nesting habitat critical to the survival of olive ridley turtles includes all documented nesting areas in Queensland and Western Australia, and beaches where nesting has been recorded with greater than ten nesting females in the Northern Territory (noting inter-annual fluctuations)
- nesting habitat critical to the survival of leatherback turtles includes all areas where nesting has occurred in Australia since 1996
- nesting habitat critical to survival of marine turtles is of a geographically relevant scale. For example, green turtles are known to move between islands of the Capricorn Bunker Group within a nesting season, while leatherback turtles may move up to 400 km within a season
- where relevant, nesting habitat determined to be critical to the survival of marine turtles includes areas that are: geographically dispersed; major and minor rookeries; mainland and island beaches; and winter or summer nesting
- to ensure the validity of long-term monitoring programs for assessing trends in nesting turtle abundance, all index beaches are considered habitat critical to survival of marine turtles
- internesting habitat critical to the survival of marine turtles is located immediately seaward of designated nesting habitat critical to the survival of marine turtles. The internesting habitat critical buffer for green, loggerhead, hawksbill, olive ridley and leatherback turtles is 20 km and 60 km for flatback turtles.

Habitat critical to the survival of marine turtles within the operational area and EMBA for the Ningaloo Vision CoPFAR activities is described in Table 3-8 and shown in Figure 3-10 to Figure 3-13.

3.2.6.3 Recovery Plans, conservation advice and species management plans

To support the protection of threatened and migratory species a series of recovery plans, conservation advice and species management plans have been developed by the Commonwealth of Australia. These documents identify threats to the specific species they are associated with and, in some cases, recommend conservation actions that should be undertaken to protect that species.

Table 3-9 summarises the recovery plans, conservation advice and species management plans relevant to the threatened and migratory species that have been identified as potentially occurring within the operational area, HEVA, MEVA and EMBA. Table 3-9 also identifies the actions within these documents that are relevant to the petroleum activity.

Table 3-8: Biologically important areas identified in the operational area and environment that may be affected

Fauna group	Species	BIA Type	Presence in Operational Area	Presence in MEVA	Presence in EMBA	Habitat Critical within EMBA
Sharks and Rays	Whale shark	Foraging	×	✓	✓	N/A
Marine Mammals	Dugong	Reproduction	×	×	✓	N/A
		Foraging	×	×	✓	N/A
	Humpback whale	Migration	✓	✓	✓	N/A
		Resting	×	✓	✓	N/A
	Pygmy blue whale	Migration	✓	✓	✓	N/A
		Foraging	×	✓	✓	N/A
	Southern right whale	Migration	×	×	✓	N/A
Marine Reptiles	Flatback Turtle	Reproduction	×	✓	✓	Barrow Island, Montebello Islands, coastal islands from Cape Preston to Locker Island.
		Foraging	×	×	✓	
		Aggregation	×	×	✓	
	Green turtle	Foraging	×	×	✓	Exmouth Gulf and Ningaloo coast.
		Reproduction	×	✓	✓	
		Aggregation	×	×	✓	
		Resting	×	×	✓	
	Hawksbill turtle	Foraging	×	×	✓	Cape Preston to mouth of Exmouth Gulf including Montebello Islands and Lowendal Islands. 20km internesting buffer
		Reproduction	×	✓	✓	
	Loggerhead turtle	Reproduction	×	✓	✓	Exmouth Gulf and Ningaloo coast. 20km internesting buffer
Marine Birds	Lesser crested tern	Reproduction	×	✓	✓	N/A
	Fairy tern	Reproduction	×	✓	✓	N/A
	Roseate tern	Reproduction	×	✓	✓	N/A
	Wedge-tailed shearwater	Reproduction	✓	✓	✓	N/A

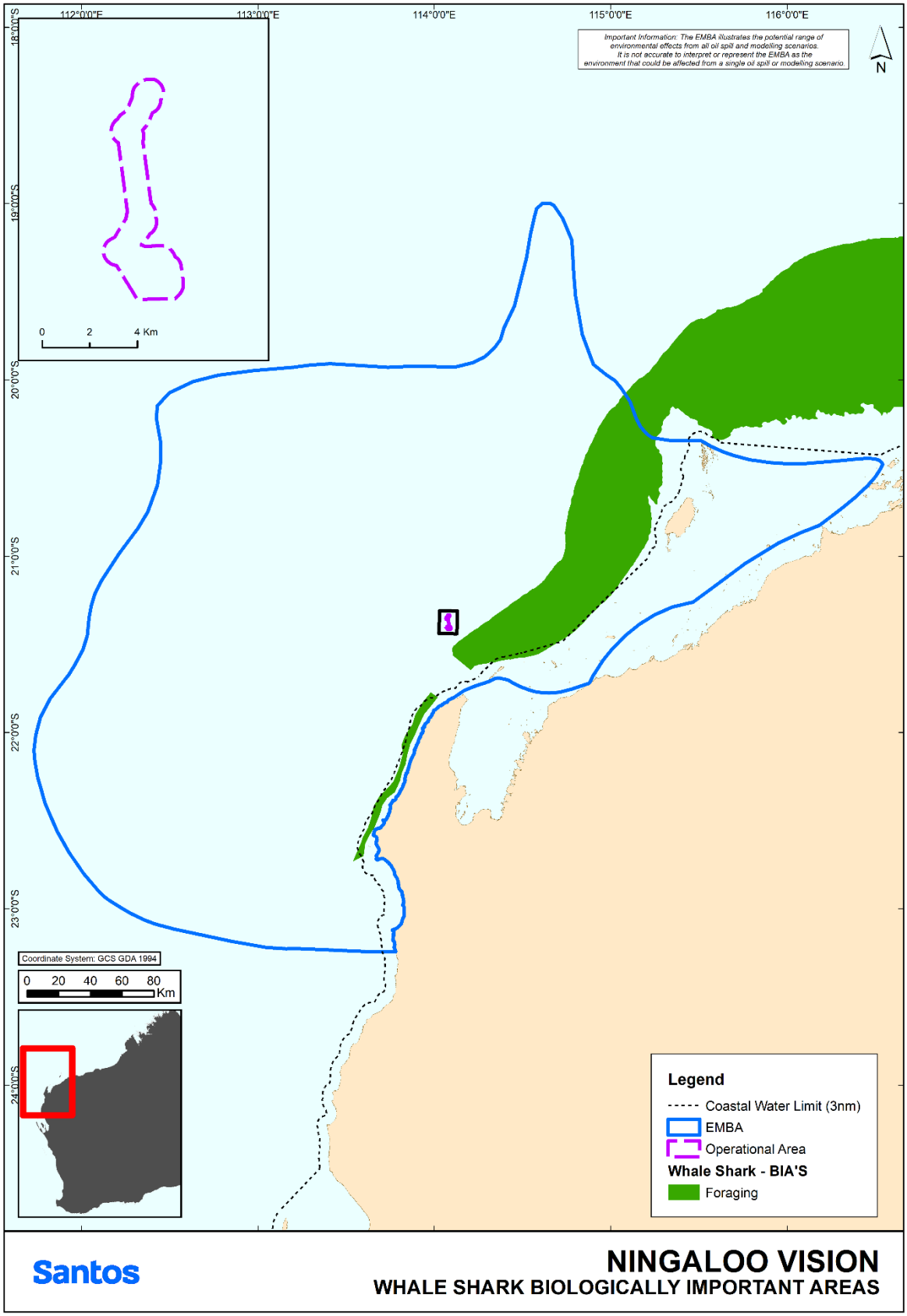


Figure 3-7: Biologically important areas for protected whale sharks within the vicinity of the environment that may be affected and operational area

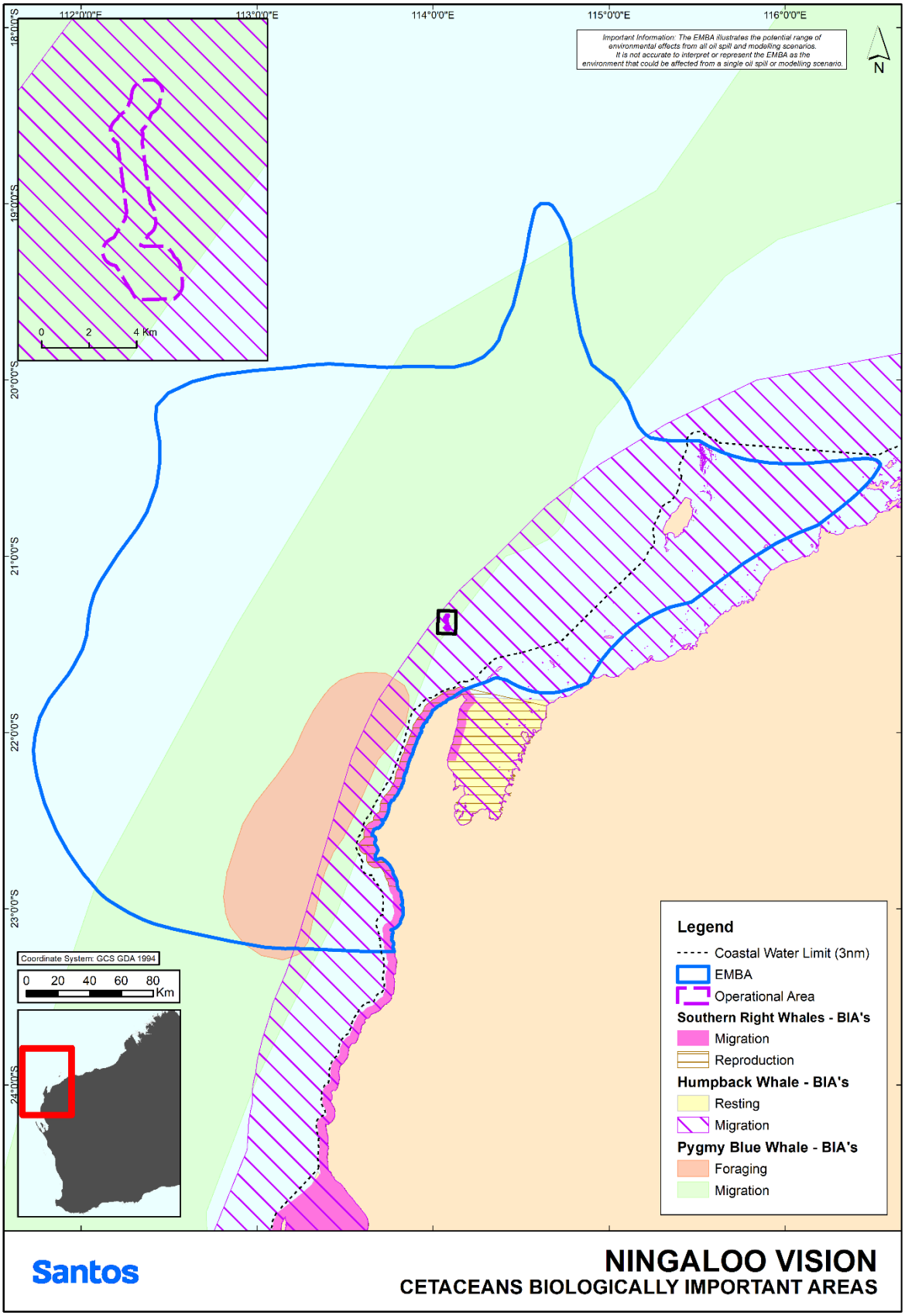


Figure 3-8*:* Biologically important areas for protected cetaceans within the vicinity of the environment that may be affected and operational area

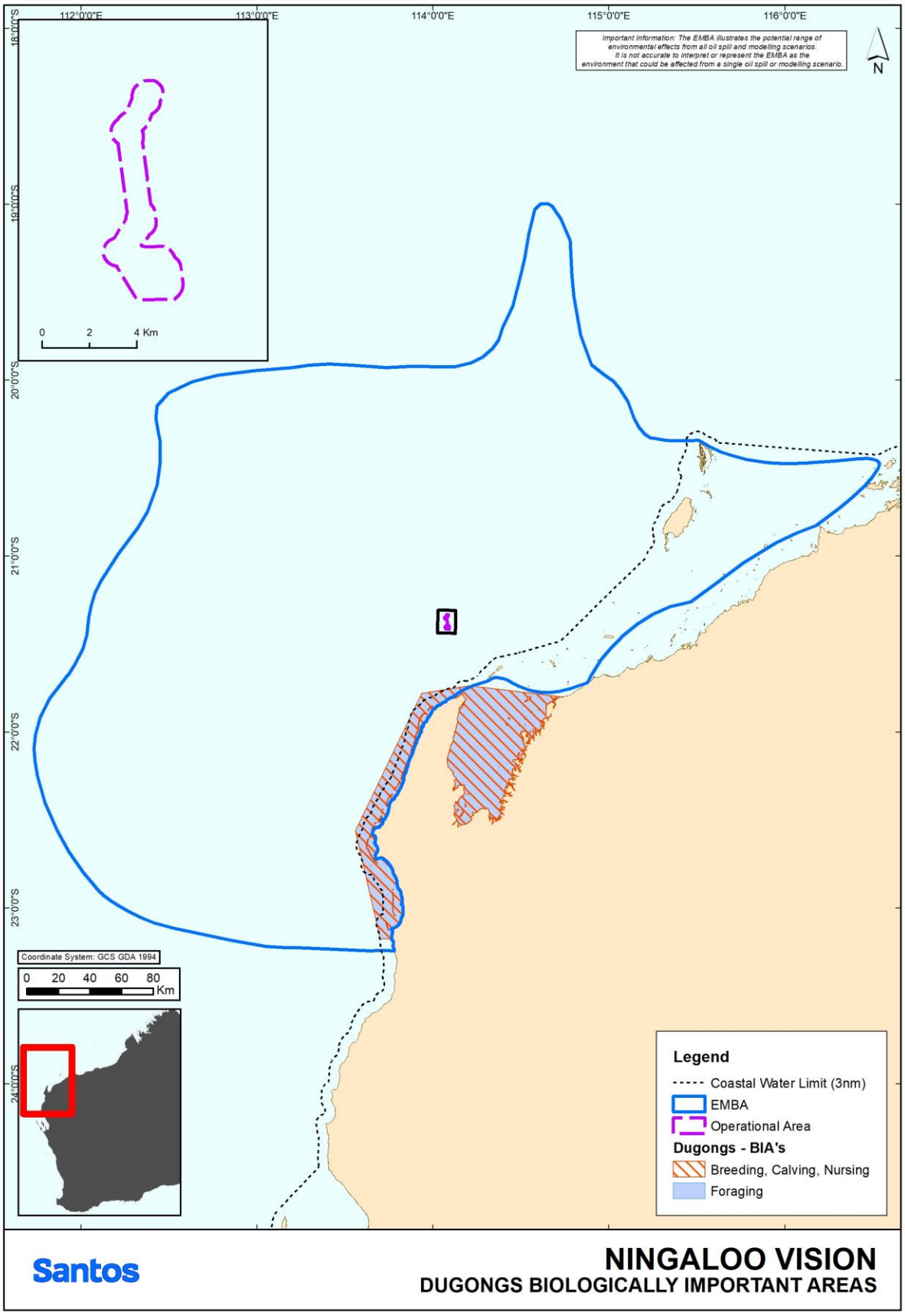


Figure 3-9*:* Biologically important areas for dugong within the vicinity of the environment that may be affected and operational area

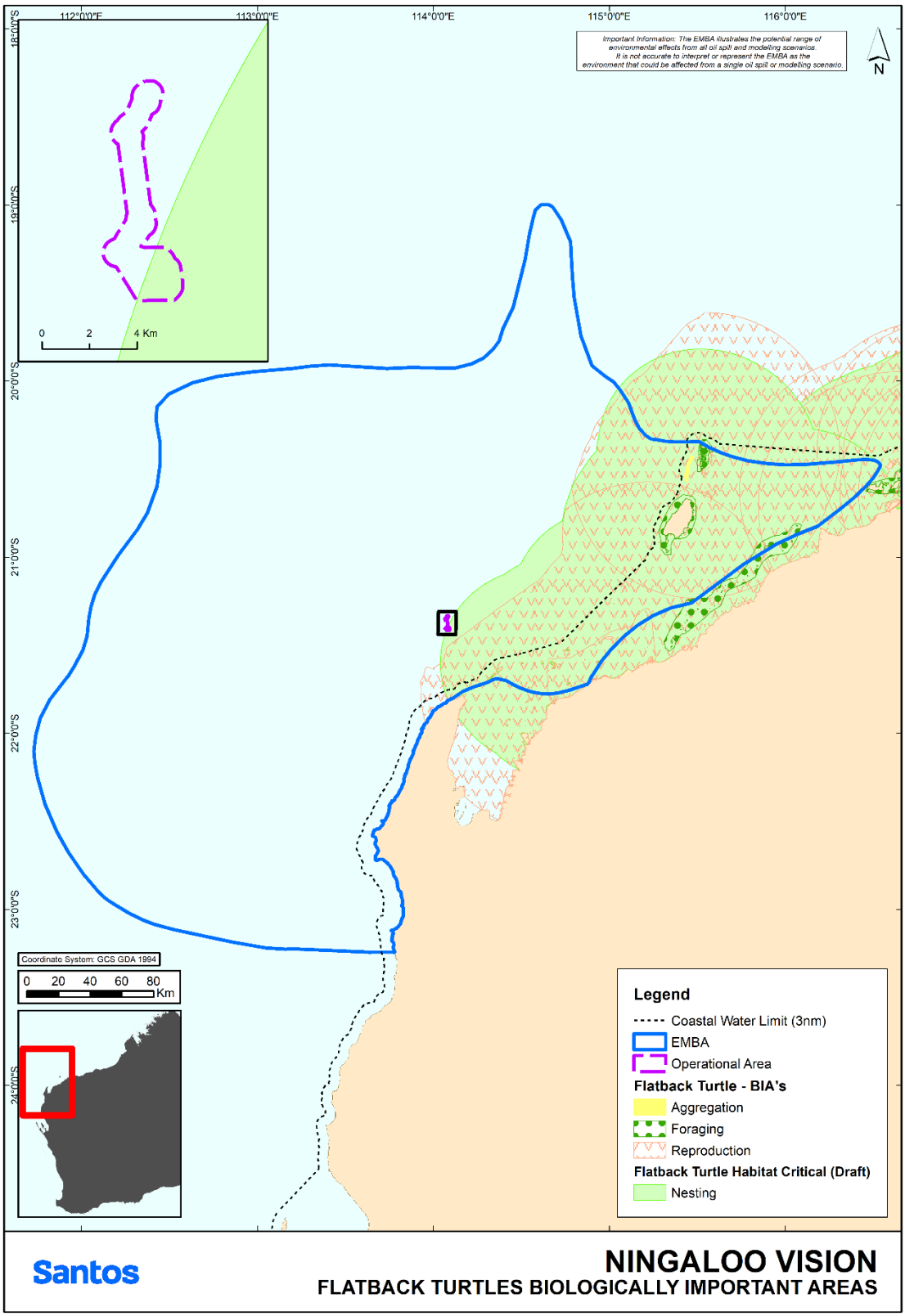


Figure 3-10*:* Biologically important areas for loggerhead turtles within the vicinity of the environment that may be affected and operational area

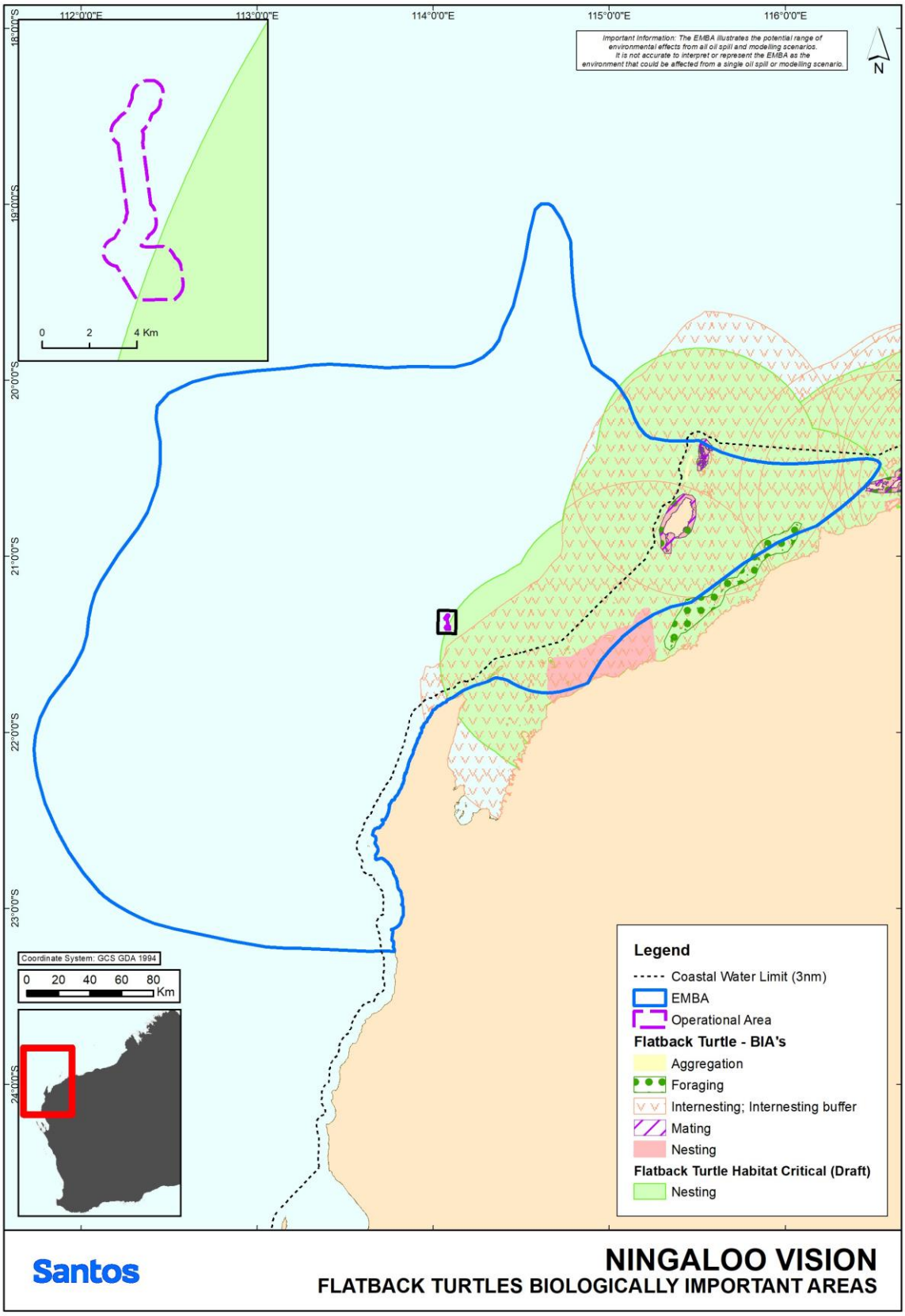


Figure 3-11*:* Biologically important areas for flatback turtles within the vicinity of the environment that may be affected and operational area

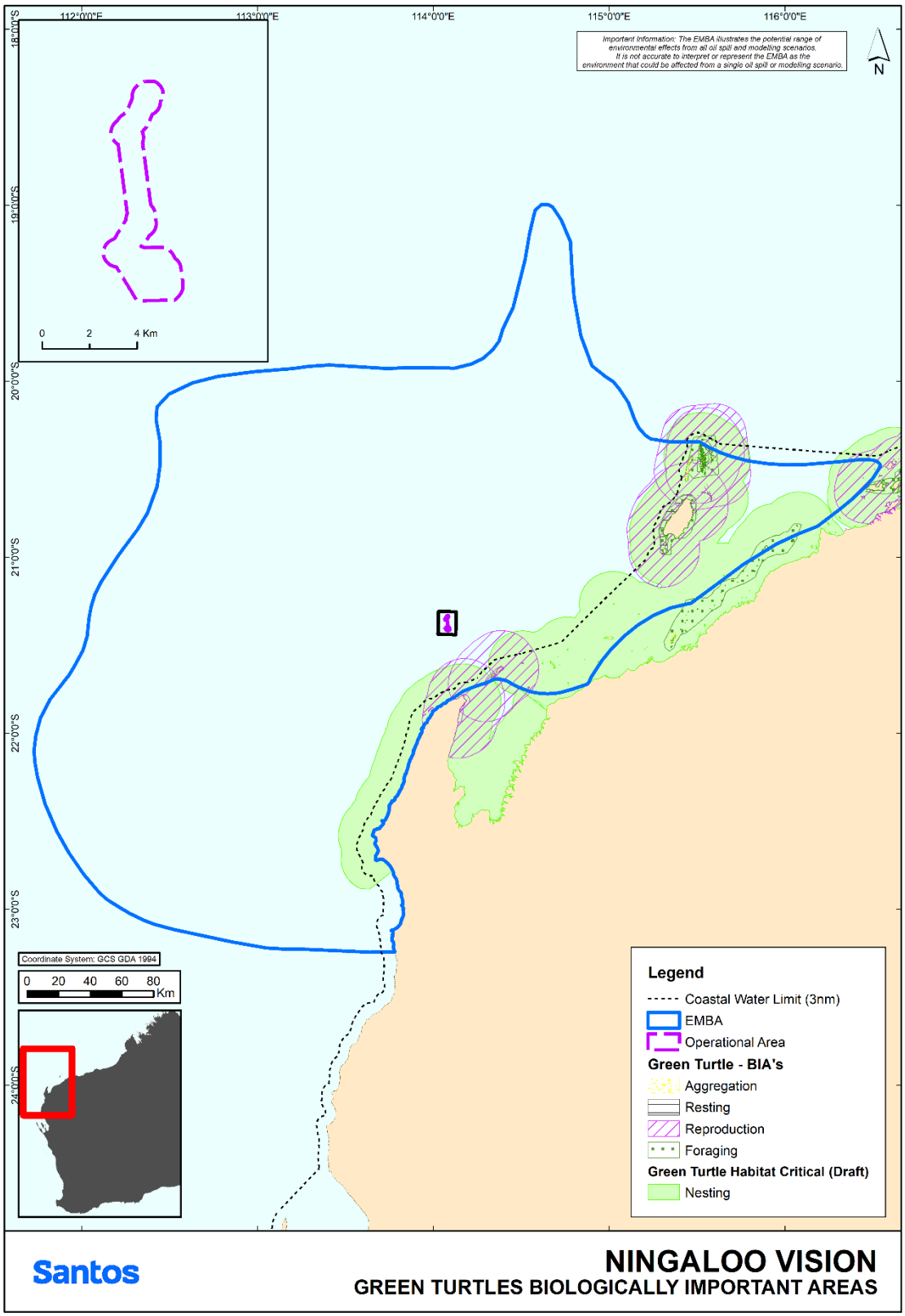


Figure 3-12 Biologically important areas for green turtles within the vicinity of the environment that may be affected and operational area

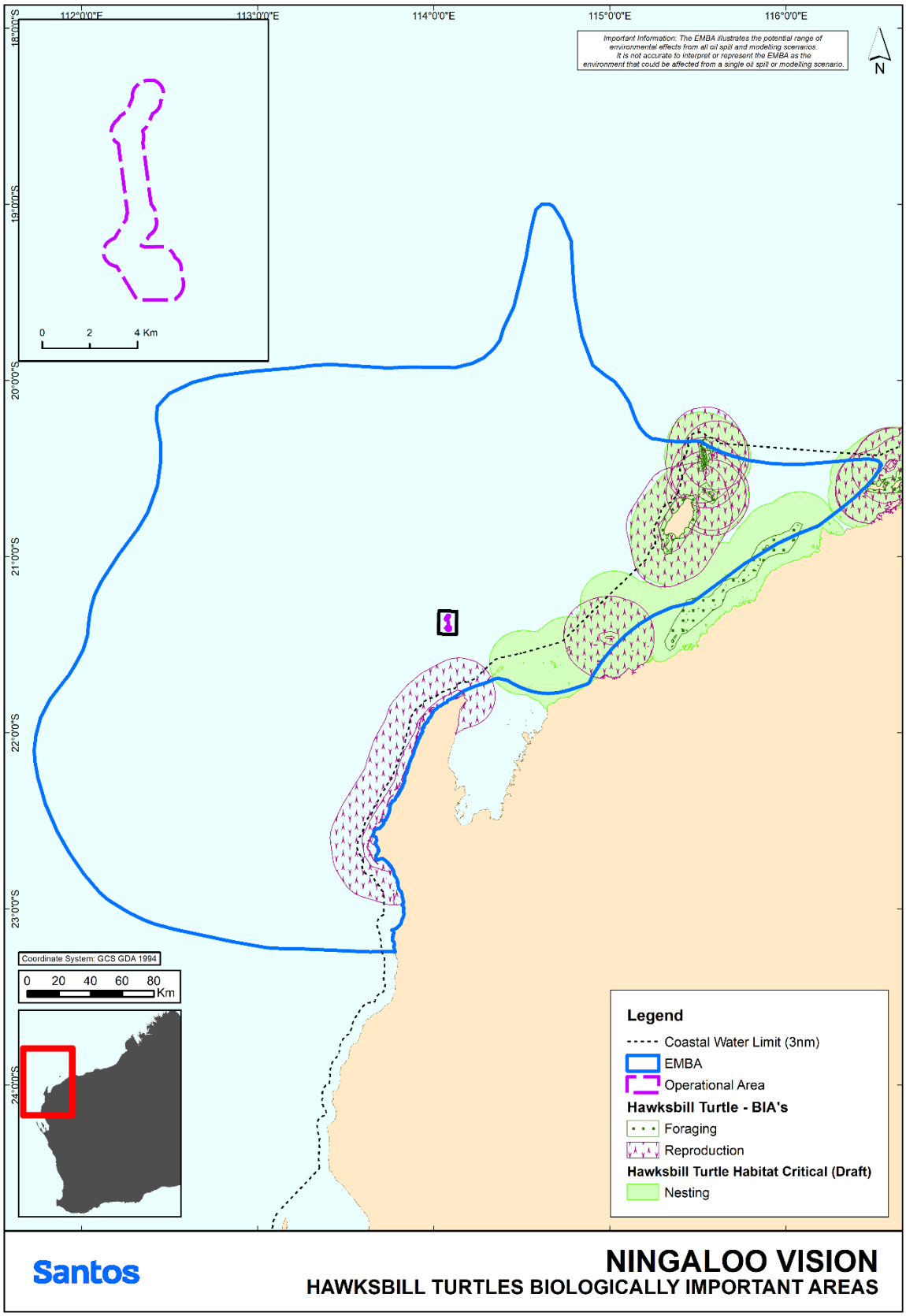


Figure 3-13: Biologically important areas for hawksbill turtles within the vicinity of the environment that may be affected and operational area

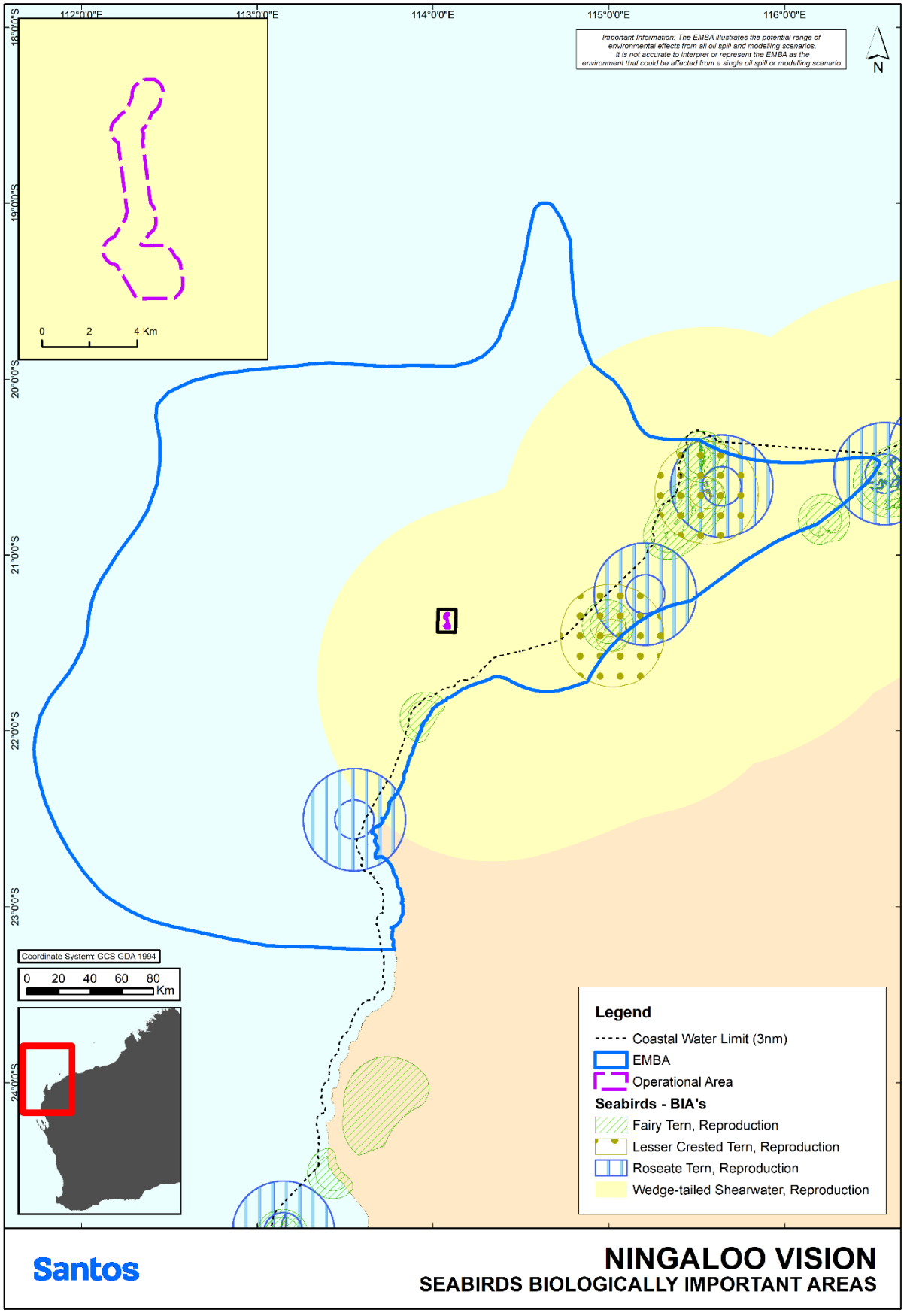


Figure 3-14: Biologically important areas for seabirds within the vicinity of the environment that may be affected and operational area

Table 3-9: Relevant threats identified in recovery plans, conservation advice and management plans for species that occur or may occur within the operational area and environment that may be affected

Name	Recovery Plan/Conservation Advice/Management Plan	Threats/strategies identified as relevant to the activity	Relevant Conservation Actions	Addressed (where relevant) in EP Section
All Fauna				
All vertebrate fauna	Threat Abatement Plan for Impacts of Marine Debris on Vertebrate wildlife of Australia's coasts and oceans (Commonwealth of Australia,2018)	Marine debris	No explicit management actions for non-fisheries related industries (note that management actions in the plan relate largely to management of fishing waste (for example 'ghost' gear), and State and Commonwealth management through regulation.	7.1
Fish and Sharks				
Dwarf sawfish	Sawfish and River Sharks Multispecies Recovery Plan (DoE, 2015a)	Habitat degradation and modification	Identify risks to important sawfish and river shark habitat and measures needed to reduce those risks.	6.6, 7.1, 7.6, 7.7, 7.8
Green sawfish	Commonwealth Conservation Advice on *Pristis zijsron* (green sawfish) (DEWHA, 2008) Sawfish and River Sharks Multispecies Recovery Plan (DoE, 2015a)	Habitat degradation and modification	Identify risks to important sawfish and river shark habitat and measures needed to reduce those risks	7.6, 7.7
Narrow sawfish	Sawfish and River Sharks Multispecies Recovery Plan (DoE, 2015a)	Habitat degradation and modification	Identify risks to important sawfish and river shark habitat and measures needed to reduce those risks	7.6, 7.7
Great white shark	Recovery plan for the White Shark (*Carcharodon carcharias*) (DSEWPaC, 2013a)	Ecosystem effects as a result of habitat modification and climate change	No explicit relevant management actions: habitat modification and climate identified as a threat	7.6, 7.7
Grey nurse shark	Recovery Plan for the Grey Nurse Shark (*Carcharias taurus*) (DoE, 2014)	Pollution and disease	Review and assess the potential threat of introduced species, pathogens and pollutants.	7.6, 7.7

Name	Recovery Plan/Conservation Advice/Management Plan	Threats/strategies identified as relevant to the activity	Relevant Conservation Actions	Addressed (where relevant) in EP Section
		Ecosystem effects – habitat modification and climate change	• Review the level and spatial extent of protection measures at key aggregation sites to ensure appropriate levels of protection, and a consistent approach to the designation and implementation of protective measures, are applied. • Use BIAs to help inform the development of appropriate conservation measures, including through the application of advice in the marine bioregional plans on the types of actions which are likely to have a significant impact on the species and updating such conservation measures as new information becomes available.	7.6, 7.7
		Ecosystem effects - climate change	No explicit relevant management actions: climate change identified as a threat.	
Whale shark	Approved Conservation Advice for *Rhincodon typus* (whale shark) (TSSC, 2015a)	Vessel strike, habitat modification	• Minimise offshore developments and transit time of large vessels in areas close to marine features likely to correlate with Whale Shark aggregations along the northward migration route that follows the northern Western Australian coastline along the 200 m isobath (as set out in the Conservation Values Atlas, DoE, 2014). • Implement measures to reduce adverse impacts of habitat degradation and/or modification.	7.6, 7.7
Marine Mammals				

Name	Recovery Plan/Conservation Advice/Management Plan	Threats/strategies identified as relevant to the activity	Relevant Conservation Actions	Addressed (where relevant) in EP Section
Blue whale	Conservation Management Plan for the blue whale: A Recovery Plan under the Environment Protection and Biodiversity Conservation Act 1999 2015-2025(Commonwealth of Australia, 2015b)	Noise interference, vessel strike, marine debris	Assess and address anthropogenic noise: shipping, industrial and seismic noise.	6.4, 7.37.6, 7.7
	Guidance on key terms within the Blue Whale Conservation Management Plan (Department of Agriculture, Water, and the Environment, 2021)	Vessel disturbance	Minimise vessel collisions: • Develop a national vessel strike strategy that investigates the risk of vessel strike on blue whales and also identifies potential mitigation measures. • Ensure all vessel strike incidents are reported in the National Ship Strike Database. • Ensure the risk of vessel strikes on blue whales is considered when assessing actions that increase vessel traffic in areas where blue whales occur and, if required, appropriate mitigation measures are implemented.	7.3
Southern right whale	National Recovery Plan for the Southern Right Whale (DCEEW, 2024)	Anthropogenic climate change and climate variability, marine debris, anthropogenic underwater noise including vessel noise, collision / vessel strike, pollution	• Understand impacts of climate variability and anthropogenic climate change on the species biology and population recovery. • Manage and mitigate the threat of entanglements from commercial active or discarded fishing gear throughout the species' range in Australian waters. • Assess, manage, and mitigate impacts from anthropogenic underwater noise. • Manage, minimise, and mitigate the threat of vessel strike.	6.4, 6.5, 7.3, 7.6, 7.7

Name	Recovery Plan/Conservation Advice/Management Plan	Threats/strategies identified as relevant to the activity	Relevant Conservation Actions	Addressed (where relevant) in EP Section
Fin whale	Approved Conservation Advice for *Balaenoptera physalus* (fin whale) (TSSC, 2015b)	Noise interference, vessel strike, marine debris	• Once the spatial and temporal distribution (including biologically important areas) of Fin Whales is further defined, assess the impacts of increasing anthropogenic noise (including seismic surveys, port expansion, and coastal development). • Develop a national vessel strike strategy that investigates the risk of vessel strikes on Fin Whales and identifies potential mitigation measures. Ensure all vessel strike incidents are reported in the National Vessel Strike Database. • No explicit management measures for marine debris	6.4, 7.3, 7.6, 7.7
Sei whale	Approved Conservation Advice for *Balaenoptera borealis* (sei whale) (TSSC, 2015c)	Noise interference, vessel strike	Once the spatial and temporal distribution (including biologically important areas) of Sei Whales is further defined, assess the impacts of increasing anthropogenic noise (including seismic surveys, port expansion, and coastal development).	6.4, 7.3, 7.6, 7.7
Marine Reptiles				
Leaf Scale Sea snake	Approved Conservation Advice for Aipysurus foliosquama (Leaf-scaled Sea Snake) (Threatened Species Scientific Committee, 2010a)	Habitat degradation and modification	No explicit relevant management actions	6.3, 6.4, 6.6, 7.3, 7.6, 7.7
Short-nosed Sea snake	Approved Conservation Advice for *Aipysurus apraefrontalis* (Short-nosed Sea Snake) (TSSC, 2010a)	Habitat degradation and modification	• Monitor known populations to identify key threats. • Ensure there is no anthropogenic disturbance in areas where the species occurs, excluding necessary actions to manage the conservation of the species.	6.3, 6.4, 6.6, 7.3, 7.6, 7.7

Name	Recovery Plan/Conservation Advice/Management Plan	Threats/strategies identified as relevant to the activity	Relevant Conservation Actions	Addressed (where relevant) in EP Section
All marine turtles	National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (Commonwealth of Australia, 2023)	Light pollution The aim of the Guidelines is that artificial light will be managed so wildlife is: • Not disrupted within, nor displaced from, important habitat • Able to undertake critical behaviours such as foraging, reproduction and dispersal.	Best practice lighting design incorporates the following design principles: • Start with natural darkness and only add light for specific purposes. • Use adaptive light controls to manage light timing, intensity and colour. • Light only the object or area intended – keep lights close to the ground, directed and shielded to avoid light spill. • Use the lowest intensity lighting appropriate for the task. • Use non-reflective, dark-coloured surfaces. • Use lights with reduced or filtered blue, violet and ultra-violet wavelengths.	6.3
	Recovery Plan for Marine Turtles in Australia 2017 – 2027 (Commonwealth of Australia, 2017)	Marine debris	Reduce impacts from marine debris: Support the implementation of the EPBC Act Threat Abatement Plan for the impacts of marine debris on vertebrate marine life.	7.1
		Vessel disturbance	Vessel interactions identifies as a threat; no specific management actions in relation to vessels prescribed in the plan.	7.3

Name	Recovery Plan/Conservation Advice/Management Plan	Threats/strategies identified as relevant to the activity	Relevant Conservation Actions	Addressed (where relevant) in EP Section
		Light pollution	Minimise light pollution: • 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. • Develop and implement best practice light management guidelines for existing and future developments adjacent to marine turtle nesting beaches. • Identify the cumulative impact on turtles from multiple sources of onshore and offshore light pollution.	6.3
Seabirds				
All migratory shorebirds and seabirds	National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds (Commonwealth of Australia, 2023)	Light pollution The aim of the Guidelines is that artificial light will be managed so wildlife is: • Not disrupted within, nor displaced from, important habitat • Able to undertake critical behaviours such as foraging, reproduction and dispersal.	Best practice lighting design incorporates the following design principles: • Start with natural darkness and only add light for specific purposes. • Use adaptive light controls to manage light timing, intensity and colour. • Light only the object or area intended – keep lights close to the ground, directed and shielded to avoid light spill. • Use the lowest intensity lighting appropriate for the task. • Use non-reflective, dark-coloured surfaces. • Use lights with reduced or filtered blue, violet and ultra-violet wavelengths.	6.3

Name	Recovery Plan/Conservation Advice/Management Plan	Threats/strategies identified as relevant to the activity	Relevant Conservation Actions	Addressed (where relevant) in EP Section
All migratory shorebirds	Wildlife Conservation Plan for Migratory Shorebirds (Commonwealth of Australia, 2015c)	Anthropogenic Disturbance	• Ensure all areas of important habitat for seabirds are considered in the development assessment process. • Manage the effects of anthropogenic disturbance to seabird breeding and roosting areas.	6.3, 6.4, 6.6, 7.6, 7.7
All seabirds	Wildlife Conservation Plan for Seabirds (Commonwealth of Australia, 2020b)	Habitat modification, marine debris	No explicit relevant management actions	6.6, 7.6, 7.7
All albatross and petrels	Threat Abatement Plan for the Incidental Catch (or Bycatch) of Seabirds During Oceanic Longline Fishing Operations (Commonwealth of Australia, 2018b)	Direct mortality	No explicit relevant management actions; oil pollution recognised as a threat.	6.6, 7.6, 7.7
	National Recovery Plan for Albatrosses and Petrels (Commonwealth of Australia, 2022b)	Marine debris, habitat degradation and modification	No explicit relevant management actions; oil pollution recognised as a threat.	6.6, 7.6, 7.7
Australian Fairy Tern	Commonwealth Conservation Advice on *Sternula nereis nereis* (Fairy Tern) (DSEWPaC 2011b) National Recovery Plan for the Australian Fairy Tern(Commonwealth of Australia, 2020c)	Habitat loss and degradation Habitat degradation	No explicit relevant management actions: oil pollution recognised as a threat.	7.6, 7.7

Name	Recovery Plan/Conservation Advice/Management Plan	Threats/strategies identified as relevant to the activity	Relevant Conservation Actions	Addressed (where relevant) in EP Section
Curlew Sandpiper	Approved Conservation Advice for *Calidris ferruginea* (Curlew Sandpiper) (DoE 2015d)	Habitat degradation and modification	No explicit relevant management actions: oil pollution recognised as a threat.	7.6, 7.7
Eastern curlew	Approved Conservation Advice for *Numenius madagascariensis* (Eastern Curlew) (DoE, 2015c)	Habitat loss and degradation	No explicit relevant management actions: oil pollution recognised as a threat.	7.6, 7.7
Red knot	Approved Conservation Advice for *Calidris canutus* (Red knot) (TSSC, 2016a)	Pollution/contamination impacts and Habitat loss and degradation	No explicit relevant management actions: oil pollution recognised as a threat.	7.6, 7.7
Australian painted snipe	Approved Conservation Advice for *Rostratula australis* (Australian Painted Snipe) (DSEWPaC, 2013b)	Habitat loss and degradation	No explicit relevant management actions: oil pollution recognised as a threat.	7.6, 7.7
Abbotts booby	Conservation Advice for Abbott's Booby - Papasula abbotti (Threatened Species Scientific Committee, 2020b)	Marine debris	No explicit relevant management actions; oil pollution recognised as a threat.	7.6, 7.7
Australian Lesser Noddy	Conservation Advice Anous tenuirostris melanops Australian lesser noddy (Threatened Species Scientific Committee, 2015d)	Habitat degradation and modification	No explicit relevant management actions; oil pollution recognised as a threat.	7.6, 7.7

Name	Recovery Plan/Conservation Advice/Management Plan	Threats/strategies identified as relevant to the activity	Relevant Conservation Actions	Addressed (where relevant) in EP Section
Christmas Island white-tailed tropicbird, golden bosunbird	Conservation Advice Phaethon lepturus fulvus white-tailed tropicbird (Christmas Island) (Threatened Species Scientific Committee, 2014)	Habitat disturbance (feeding)	No explicit relevant management actions: oil pollution recognised as a threat.	7.6, 7.7
Greater sand plover	Conservation Advice Charadrius leschenaultia Greater Sand Plover (Threatened Species Scientific Committee, 2016c)	Habitat loss and degradation	No explicit relevant management actions: oil pollution recognised as a threat.	7.6, 7.7

3.2.7 Socio-economic Receptors

The operational area is located around 35 km north-northwest Ningaloo coast. Socio-economic activities that may occur in the operational area and EMBA include cultural features, commercial fishing, oil and gas exploration and production, and, to a lesser extent, recreational fishing, and tourism.

3.2.7.1 Cultural Features

Introduction

Santos acknowledges the tradition of the First Nations people of Australia includes a cultural and spiritual connection to their land and waters, including sea country. These connections are rooted in their traditional communal beliefs and practices. First Nations people view their land and waters as integral to their identity, culture, and spirituality and they have a deep respect for the natural world.

The cultural heritage of First Nations peoples includes a vast array of tangible and intangible cultural artifacts, practices, and beliefs. The protected heritage of First Nations peoples is also of cultural value to Australia and the global community. The cultural value of First Nations protected heritage to Australia is evidenced and given force by a range of factors, including the laws, regulations and institutions established across Australia that are designed specifically to protect First Nations rights and interests in relation to sacred sites and other aspects of First Nations cultural heritage.

Country is an important concept to First Nations people and the term is often to describe family origins and associations with particular parts of Australia, both land and sea (Smyth, 2007). The expressions Country and Sea Country are used to refer to the land and waters which constitute Aboriginal traditional areas as ancestrally distinct and linguistically bounded geographic areas (Kearney et al, 2023 p106).

Country is inclusive of many environments that are ecologically, geographically, ancestrally, and socially configured (Kearney et al 2023). For First Nations Indigenous People, Country is a combination of the land, sea, rivers, and islands and all that they contain and sustain. “Country refers to more than just a geographical area: it is shorthand for all the values, places, resources, stories and cultural obligations associated with that geographical area.” (Smyth, 2007).

It is recognised that spiritual corridors extend from terrestrial areas into nearshore and offshore waters, that a number of marine animals are totems for Indigenous people.

Aboriginal people use and actively manage the coastal and marine environments as a resource and to maintain cultural identity, health, and wellbeing. Fishing, hunting and the maintenance of culture and heritage through ritual, stories and traditional knowledge continue as important uses of nearshore and adjacent areas.

First Nations people in northwest WA continue to rely on coastal and marine environments and resources of the region for their cultural identity, health and wellbeing, and their domestic and commercial economies (Smyth, 2007).

Sea country

Sea country is described in State, Territory and Commonwealth Marine Park Management Plans. The Australian Marine Parks North-west Marine Parks Network Management Plan 2018 defines sea country as “*the areas of the sea that Aboriginal and Torres Strait Islander groups are particularly affiliated with through their traditional lore and customs*” (DNP, 2018). Sea country is valued for Aboriginal cultural identity, health, and wellbeing.

The Australian Marine Park Management Plans include the objective to provide for the protection and conservation of biodiversity and other natural, cultural and heritage values of marine parks. The plans define cultural values as “*living and cultural heritage recognising Indigenous beliefs, practices and obligations for country, places of cultural significance and cultural heritage sites*” (DNP, 2018). Australian Marine Park Management Plans list the Aboriginal people who have responsibilities for sea country in the Marine Parks, and the Native Title Representative Body for the region.

Aboriginal people of north-western Australia have been sustainably using and managing their sea country for tens of thousands of years, in some cases since before rising sea levels created these marine environments (DNP, 2018).

A common feature of coastal Aboriginal cultures is the connectedness of land and sea: together they form a country of significant cultural sites and dreaming tracks of the creation ancestors (NOO, 2002). As a result, coastal environments are an integrated cultural landscape/seascape that is conceptually different from the broader Australian view of land and sea (NOO, 2002).

Animals can be totems for Aboriginal people. Aboriginal people share the land and water with animals and their relationship with totem animals is fundamental to continued practice and cultural responsibility; for food, health, shelter, cultural expression, and spiritual wellbeing (VAHC, 2021). Caring for plants, animals and their habitats is therefore seen as a keyway of expressing culture (VAHC, 2021).

As presented in Section 3.2.5.1, the PMST Report identified the EMBA for this EP overlaps the North-west Marine Park network which is managed by the North-west Marine Parks Network Management Plan. The following information is considered correct at the time of writing from the North-West Marine Parks Network Management Plan 2018 (DNP, 2018).

- Gascoyne Marine Park and Ningaloo Marine Park. The Gnulli people have responsibility for sea country in these Marine Parks.
- There is limited information about the cultural significance of the Montebello Marine Park.
- The Yamatji Marlpa Aboriginal Corporation is the Native Title Representative Body for the Pilbara region.

These people/groups have been consulted, in some cases via representative prescribed body corporates as outlined in Section 4.

Indigenous Land Use Agreements

An Indigenous Land Use Agreement (ILUA) is a voluntary agreement between native title parties and other people or bodies about the use and management of areas of land and/or waters. An ILUA can be made over areas where:

- native title has been determined to exist in at least part of the area
- a native title claim has been made
- no native title claim has been made.

While registered, ILUAs bind all native title holders to the terms of the agreement. ILUAs also operate as a contract between the parties. The Register of ILUAs is kept by the Native Title Registrar in accordance with s199A of the NTA and includes a description of the ILUA area, the parties' names, the term of the ILUA and other information as the Registrar considers is appropriate (s199B of the *Native Title Act 1993* (NTA).

Registration confers a contractual effect on the ILUA and binds all persons holding native title regardless as to whether they are already parties to the ILUA (s24EA of the NTA).

A search of the Native Title Register found the following:

- There are no Native Title determinations or Indigenous Land Use Agreements (ILUAs) within the operational area
- Three Native Title determinations and five certified ILUAs overlap or are in close proximity to the EMBA.

Native Title determinations:

- Yaburara and Marduhunera People (Wirrawandi Aboriginal Corporation (WAC))
- Thalanyji people (Buurabalayji Thalanyji Aboriginal Corporation (BTAC))
- Gnulli, Gnulli #2 and Gnulli #3 - Yinggarda, Baiyungu and Thalanyji People.

The Gnulli, Gnulli #2 and Gnulli #3 Native Title determined area is jointly managed by Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC) in the north, and Yinggarda Aboriginal Corporation (YAC) in the south. At closest point, the EMBA is more than 140 km from YAC country, and the Operating Area is more than 350 km. YAC are not considered a Relevant Person on the basis of non-proximity.

ILUAs:

- KM & YM Indigenous Land Use Agreement 2018 - Area Agreement
- Cape Preston Project Deed (YM Mardie Indigenous Land Use Agreement)
- Macedon Indigenous Land Use Agreement
- Ningaloo Conservation Estate Indigenous Land Use Agreement.

Indigenous Protected Areas

Indigenous Protected Areas (IPAs) are areas of land and sea that Traditional Owners have agreed to manage for biodiversity conservation. IPAs represent more than 50% of National Reserve System.

The Sea Country Indigenous Protected Areas (IPA) Program seeks to increase the area of sea in IPAs to strengthen the conservation and protection of Australia's unique marine and coastal environments, while creating employment and economic opportunities for Indigenous Australians.

A search of the Native Title Register identified no IPAs within the operational area or EMBA.

Aboriginal Cultural Heritage Inquiry System

The Department of Planning, Lands and Heritage (DPLH) Aboriginal Cultural Heritage Inquiry System (ACHIS) provides information about Aboriginal sites (as defined under the *Aboriginal Heritage Act 1972* (WA)) in Western Australia. To identify Aboriginal sites that may be affected by the Activities, a search of the ACHIS (undertaken May 2024, DPLH, 2024 – **Appendix E**) indicated there are:

- no registered Aboriginal sites within the operational area
- 47 registered Aboriginal sites within the EMBA, comprising:
  - Camp Thirteen Burial
  - Montebello Is: Noala Cave.
  - Montebello Is: Haynes Cave.
  - Point Anderson
  - Mulanda 2
  - Mulanda 3
  - Osprey Bay 6
  - Osprey Bay Interdunal 1
  - Bloodwood Creek Midden 1
  - Bloodwood Creek Midden 2
  - Bloodwood Creek Midden 3
  - Bloodwood Creek Shoreline
  - Low Point Midden
  - Milyering Midden
  - Camp 17 South Middens
  - Camp 17 North Middens
  - Mulanda 1
  - 28 Mile Creek North 1
  - Mandu Mandu Creek South
  - Mandu Mandu Creek North
  - Yardie Creek South 1
  - Yardie Beach Midden
  - Oyster Stacks Midden
  - North T-Bone Bay
  - Osprey Bay 1
  - Osprey Bay 2
  - Osprey Bay 3
  - Osprey Bay 4
  - Osprey Bay 5
  - Coral Bay Skeleton
  - Mesa Camp
  - Bauboodjoo Point (Bauboodjoo Midden Site)
  - Twin Hill Fishing Place
  - Wealjugoo Midden
  - Maud Landing
  - Sandy Bay North
  - Lake Side View
  - Yardie Creek
  - Mandu Mandu Ck Rock shelters
  - Tulki Well Midden
  - Pilgramunna Bay Midden
  - Mangrove Bay.
  - Vlaming Head
  - Ningaloo (Near)
  - Enderby Island 01
  - Baler Bluff
  - Ningaloo Station.

3.2.7.2 Heritage Values and Shipwrecks

There are no listed World Heritage areas, Aboriginal heritage, cultural heritage places or records of shipwrecks within or in the vicinity of the operational area. The closest known shipwreck to the operational area is the Gem shipwreck which was wrecked in 1893 approximately 10 km southeast of the operational area.

Based on the predictions from the spill modelling, the Ningaloo Coast is the only World Heritage Area within the EMBA in the event of a worst-case spill.

Refer to **Appendix C** for further information.

3.2.7.3 Commercial Fisheries

Offshore and coastal waters in the North-West Marine Region support a valuable and diverse commercial fishing industry. The major fisheries in the Pilbara region target tropical finfish, large pelagic fish, crustaceans (prawns and scampi) and pearl oysters (Patterson *et al*., 2019).

These North-West Marine region fisheries are managed by either the Department of Primary Industries and Regional Development (DPIRD) (State fisheries) with specific management plans, regulations, and a variety of subsidiary regulatory instruments under the *Fish Resources Management Act 199*4, or by the Australian Fisheries Management Authority (AFMA) which manages Commonwealth fisheries (within the 200 nautical mile Australian Fishing Zone).

Commonwealth and State fisheries overlapping with the operational area and the EMBA are described in **Table 3-10** and shown in **Figure 3-15** to **Figure 3-17**.

Table 3-10: Commonwealth and State managed fisheries permitted within the operational area

Fishery	Fishery Licence Area Overlap			Description[1]	Fishing activity within operational area
	Operational Area	MEVA	EMBA		
Commonwealth Managed Fisheries					
Western Tuna and Billfish Fishery	✓	✓	✓	Extends west from Cape York Peninsula (Queensland) to 34° S off the Western Australian coast. The fishery also extends east across the Great Australian Bight to 141° E. Fishing effort concentrated off south-west Western Australia (WA). Since 2005, there has been fewer than five vessels active in the Western Tuna and Billfish Fishery each year, which has reportedly declined from 50 active vessels in 2000. Fishing activity in the Western Tuna and Billfish Fishery concentrates in waters off southwest Western Australia, and off South Australia.	No active commercial fishing in or near the operational area in the past 5 years
Southern Bluefin Tuna Fishery	✓	✓	✓	Consists of all Australian waters to 200 nm from the coast. Fishing activity concentrated off South east Australia and in the Great Australian Bight.	No active commercial fishing effort reported in WA, as fishing efforts are concentrated off South Australia.
Western Skipjack Tuna Fishery	✓	✓	✓	Separated into two sectors (east and west). Fishery is located in all Australian waters west of 142° 30’ 00°E, out to 200 nm from the coast.	There has been no effort in the fishery since the 2008-09 fishing season.
North West Slope Trawl Fishery	✓	✓	✓	Fishery extends from 114° E to approximately 125° E off the WA coast between the 200 m isobath and the outer limit of the Australian Fishing Zone (AFZ). Demersal crustacean trawl occurs seaward of the 200m isobath.	No active commercial fishing in or near the operational area in the past ten years
Western Deepwater Trawl Fishery	✗	✓	✓	Extends in the north from the boundary of the AFZ to 114° E, to the southern boundary of the AFZ to 115°08’ E. Fishing occurs from the 200 m isobath to the edge of the AFZ.	No active commercial fishing in or near the operational area in the past ten years

[1] *All descriptions based on Newman et al. (2023) and Patterson et al. (2023) unless otherwise cited*

Fishery	Fishery Licence Area Overlap			Description[1]	Fishing activity within operational area
	Operational Area	MEVA	EMBA		
State Managed Fisheries					
Exmouth Gulf Prawn Managed Fishery	✗	✗	✓	This fishery operates in sheltered waters on the western half of the Exmouth Gulf. The Muiron Islands and Point Murat provide western boundary; Serrurier Island provides northern limit.	FishCube data shows no recent active fishing in the operational area.
Onslow Prawn Limited Entry Fishery	✗	✗	✓	The boundaries of this fishery are 'all the WA waters between the Exmouth Prawn Fishery and the Nickol Bay Prawn Fishery east of 114°39.9' on the landward side of the 200 m depth isobath'. Prawn trawling activities focus on inshore areas between Onslow and Karratha.	FishCube data shows no recent active fishing in the operational area.
Pilbara Demersal Scalefish Fisheries (includes trap and trawl fisheries)	✗	✓	✓	Comprised of the Pilbara Fish Trawl (Interim) Managed Fishery occupying the waters north of latitude 21°35'S and between longitudes 114°9'36"E and 120°E. Seaward of the 50 m isobath and landward of the 200 m isobath, consists of two zones. Includes the Pilbara Trap Managed Fishery, permitted to operate between 21°56´ S latitude and the high water mark on the western side of the North West Cape.	FishCube data shows no recent active fishing in the operational area. FishCube data shows no recent active fishing in the operational area.
Pilbara Developmental Crab Managed Fishery	✓	✓	✓	Concentrated in coastal embayment's and estuaries between Geographe Bay and Nickol Bay. Fishing in the Pilbara coast primarily occurs from Onslow to Port Hedland in inshore waters.	FishCube data shows no recent active fishing in the operational area.
Mackerel Managed Fishery	✓	✓	✓	Trolling or handline. Near-surface trolling gear from vessels in coastal areas around reefs, shoals, and headlands.	FishCube data shows no recent active fishing in the operational area.
West Coast Rock Lobster Managed Fishery	✗	✓	✓	This fishery targets the western rock lobster between Shark Bay and Cape Leeuwin. Baited traps (pots) and with a commercial and recreational fishing season.	FishCube data shows no recent fishing activity in operational area
Gascoyne Demersal Scalefish Managed Fishery	✗	✗	✓	The fishery operates between latitudes 23°07'30"S and 26°30'S in the waters of the Indian Ocean and Shark Bay. Vessels not permitted to fish in inner Shark Bay. Merchandised handlines.	FishCube data shows no recent active fishing in the operational area.

Fishery	Fishery Licence Area Overlap			Description[1]	Fishing activity within operational area
	Operational Area	MEVA	EMBA		
Northern Demersal Scalefish Managed Fishery	✗	✗	✓	This fishery operates off the northwest coast of Western Australia in the waters east of 120° E longitude. These waters extend out to the edge of the Australian Fishing Zone (200 nautical miles). Consists of three zones: Zone A (inshore area), Zone B (most active fishing area) and Zone C (offshore deep slope developmental area). Further divided into two sections consisting of an offshore and inshore sector.	FishCube data shows no recent fishing occurring in operational area
State Managed Fisheries (whole of the state)					
Marine Aquarium Fish Managed Fishery	✓	✓	✓	Operates in Western Australian state waters. Restricted by diving depths. Commercial operators are permitted to take over 250 species of finfish as well as coral, live rock, algae, seagrass, and invertebrates.	FishCube data shows no recent active fishing in the operational area.
Specimen Shell Managed Fishery	✓	✓	✓	Dive based fishery, operates all year through Western Australian waters between the high-water mark and the 200m isobath'. Hand harvest method used; an exemption method being employed is using a remote-controlled underwater vehicle between depths of 60-300 m.	FishCube data shows no recent active fishing in the operational area.
West Coast Deep Sea Crustacean Managed Fishery	✓	✓	✓	This fishery operates north of latitude 34° 24' S (Cape Leeuwin) and west of the Northern Territory border on the seaward side of the 150 m isobath out to the extent of the AFZ, mostly in 500 to 800 m of water. Baited pots operate in a longline formation in the shelf edge waters (>150 m).	FishCube data shows no recent active fishing in the operational area
Abalone Managed Fishery	✗	✗	✓	Shallow coastal waters off the coast of Western Australia. Divided into eight management areas, commercial fishing for greenlip/brownlip abalone is managed in three sectors.	FishCube data shows no recent active fishing in the operational area.
South-West Coast Salmon Fishery	✓	✓	✓	There are currently six licences. Licensees are not restricted to specific beaches but in practice only a few beaches are fished. In 2018 there were three active vessels in this fishery.	FishCube data shows no recent active fishing in the operational area.

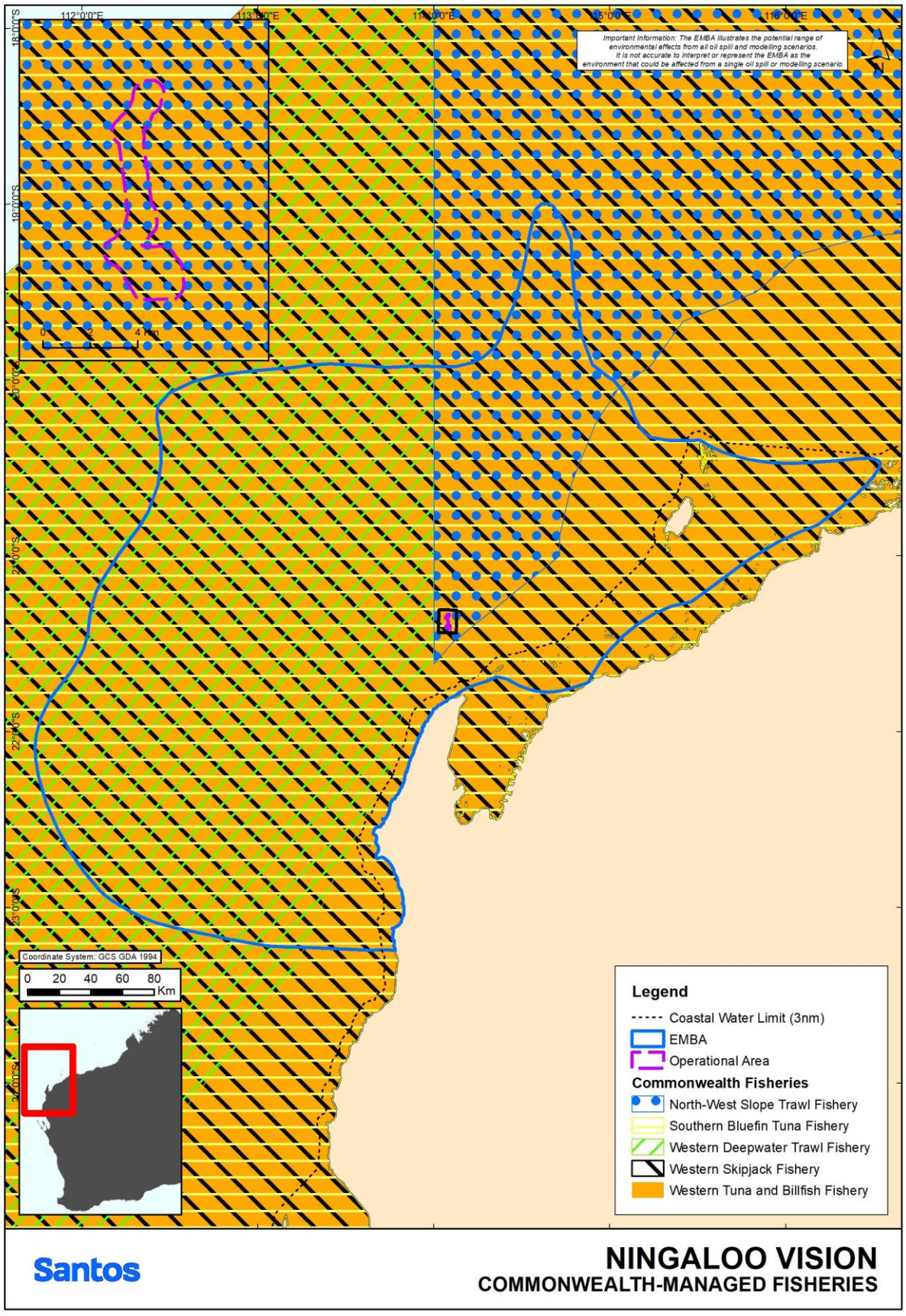


Figure 3-15: Commonwealth commercial fisheries within the environment that may be affected and operational area

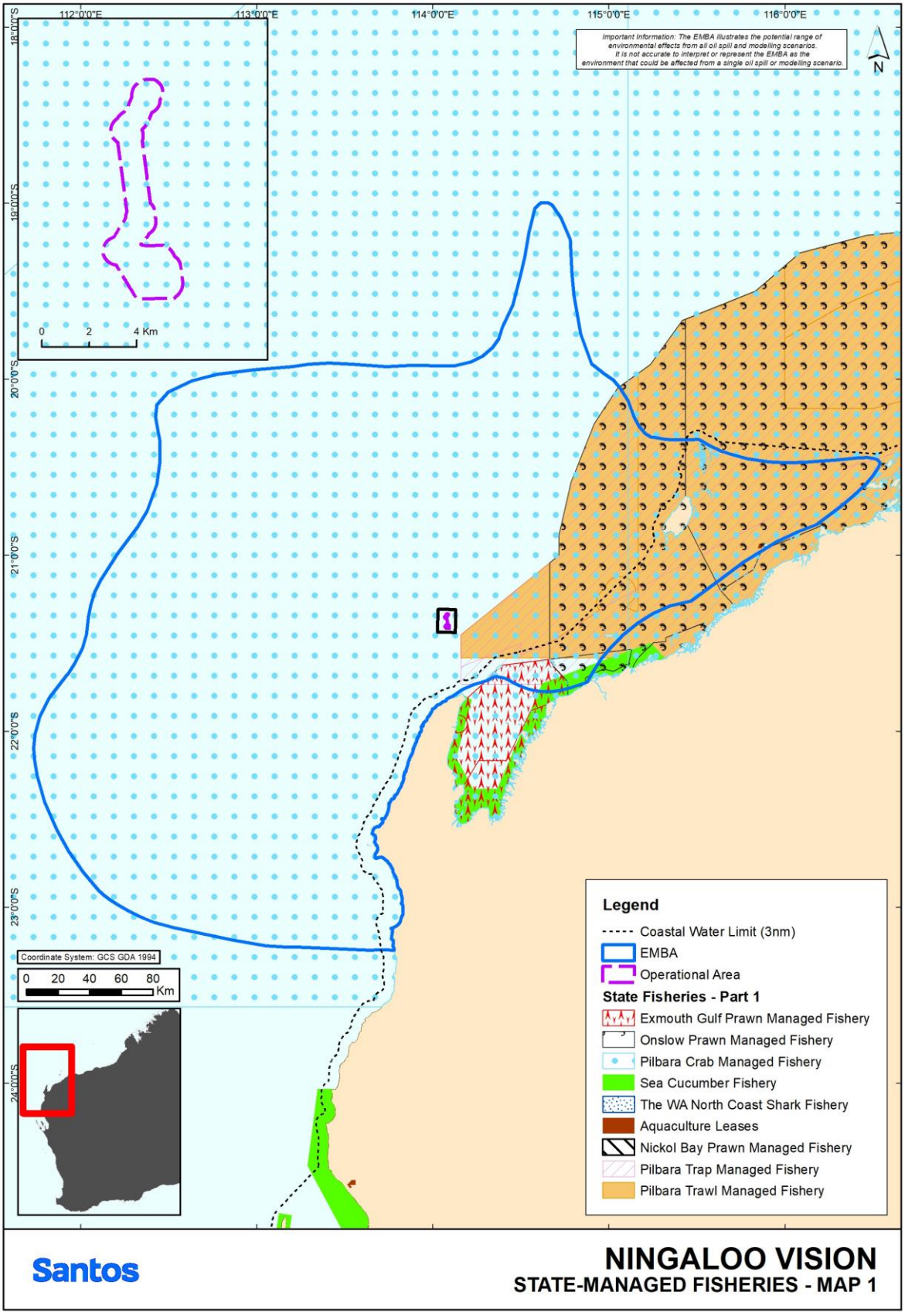


Figure 3-16*:* State commercial fisheries within the environment that may be affected and the operational area

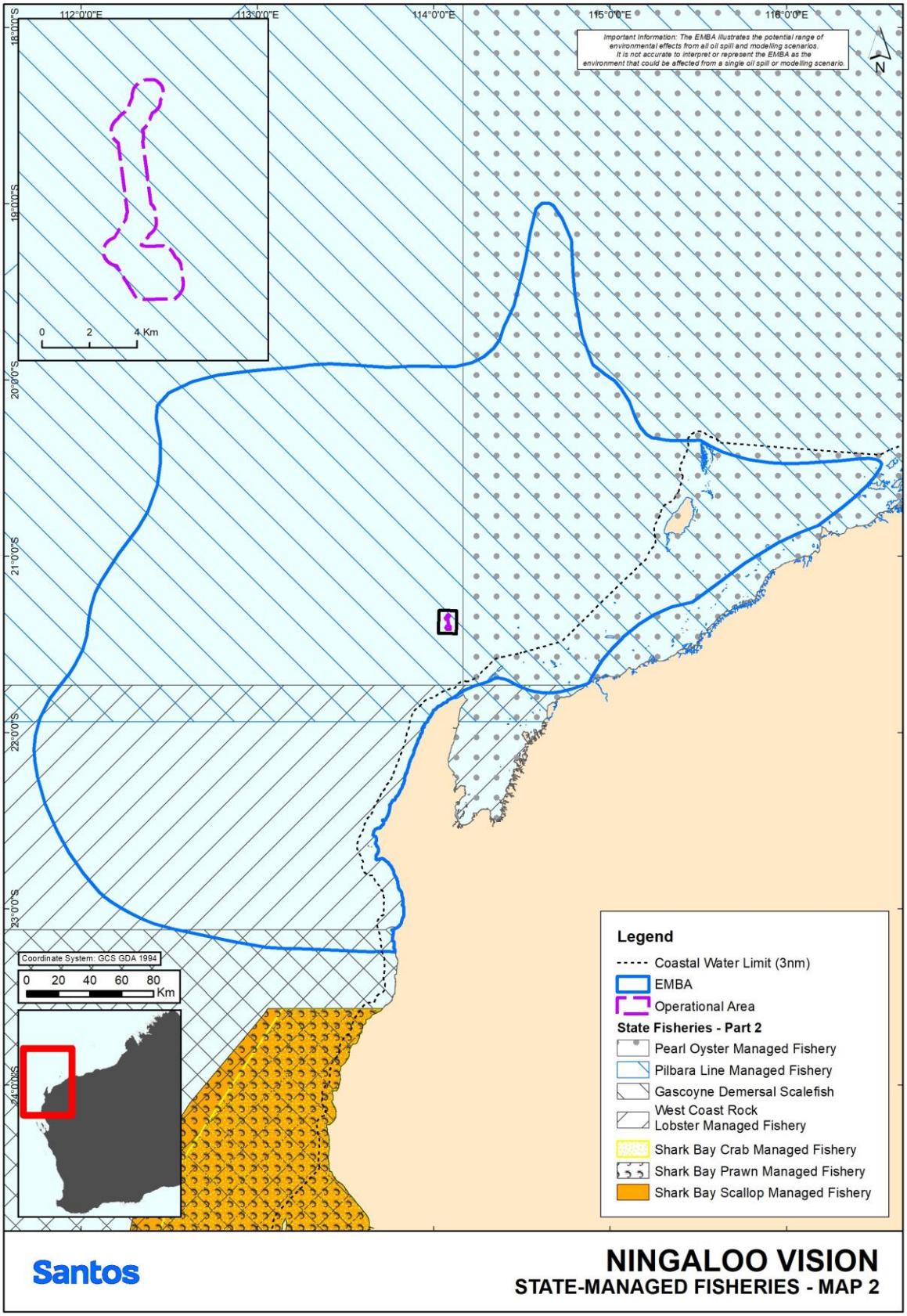


Figure 3-17*:* State commercial fisheries within the environment that may be affected and the operational area

3.2.7.4 Recreational Fisheries

Given the water depths (>340 m), lack of seabed features and distance offshore of the operational area, recreational fishing activity is not expected. Therefore, no interaction with recreational fishers is anticipated in the operational area but may occur in the EMBA.

The closest recreational fishing activities expected to occur within the EMBA are around the Ningaloo Marine Park which is located approximately 27 km from the operational area. The Ningaloo Marine Park is known to support diverse and abundant marine life and is considered a highly valued recreational fishing location. The Ningaloo Marine Park is well known among avid fishers for the productive fishing and various fishing charter businesses.

3.2.7.5 Tourism and Recreation

Tourism activities are not expected to occur in the operational area given the water depths (>340 m) and distance from shore (approximately 42 km north of North West Cape). Whale shark tours, fishing charters and whale watching tours all likely to occur closer to the mainland and may occur within the EMBA, including seasonal nature-based tourism, such as humpback whale watching, whale shark encounters and tours of turtle hatching around Ningaloo Reef and Cape Range National Park.

Popular water-based activities that may occur in the EMBA include fishing, swimming, snorkelling, diving, surfing, windsurfing, kiting, and boating. Within the EMBA these activities are concentrated in the vicinity of the population centres such as Coral Bay and Exmouth.

3.2.7.6 Oil and Gas Industry

The Exmouth region has a long history of oil and gas industry since oil was first discovered in the Rough Range field in 1953, 65 km south of Exmouth. Subsequently, the Exmouth Sub-Basin and surrounding basins have been subject to exploration activity due to their highly prospective hydrocarbon fields. The operational area and surrounding waters are predominantly used for petroleum exploration and development as shown in Figure 3-18. The nearest petroleum activities are two Woodside operated FPSOs:

- Ngujima-Yin FPSO – Enfield Development in WA-28-L, approximately 4 km south of the operational area currently in the decommissioning phase
- Pyrenees Venture FPSO - Pyrenees Development in WA-42-L, approximately 13 km south east of the operational area.

3.2.7.7 Commercial Shipping

Shipping occurs in the vicinity of the operational area. Shipping using North West Shelf waters includes 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. Shipping occurs within the EMBA, however there is no designated shipping route within the operational area with the nearest located approximately 40 km northwest. Other vessels may wish to transit the area although shipping traffic is excluded from the 500 m PSZ around the DTM location. Shipping routes are shown in **Figure 3-19**.

3.2.7.8 Defence

A Defence practice area and a training Area (RAAF Base Learmonth) overlaps with operational area. Designated military exercise areas occur over waters and airspace of the operational area and may be activated following the required notifications. The defence training area is shown in **Figure 3-20.**

3.2.8 Windows of Sensitivity

Timing of peak activity for threatened and migratory species and other relevant, significant sensitivities is given in **Table 3-11.**

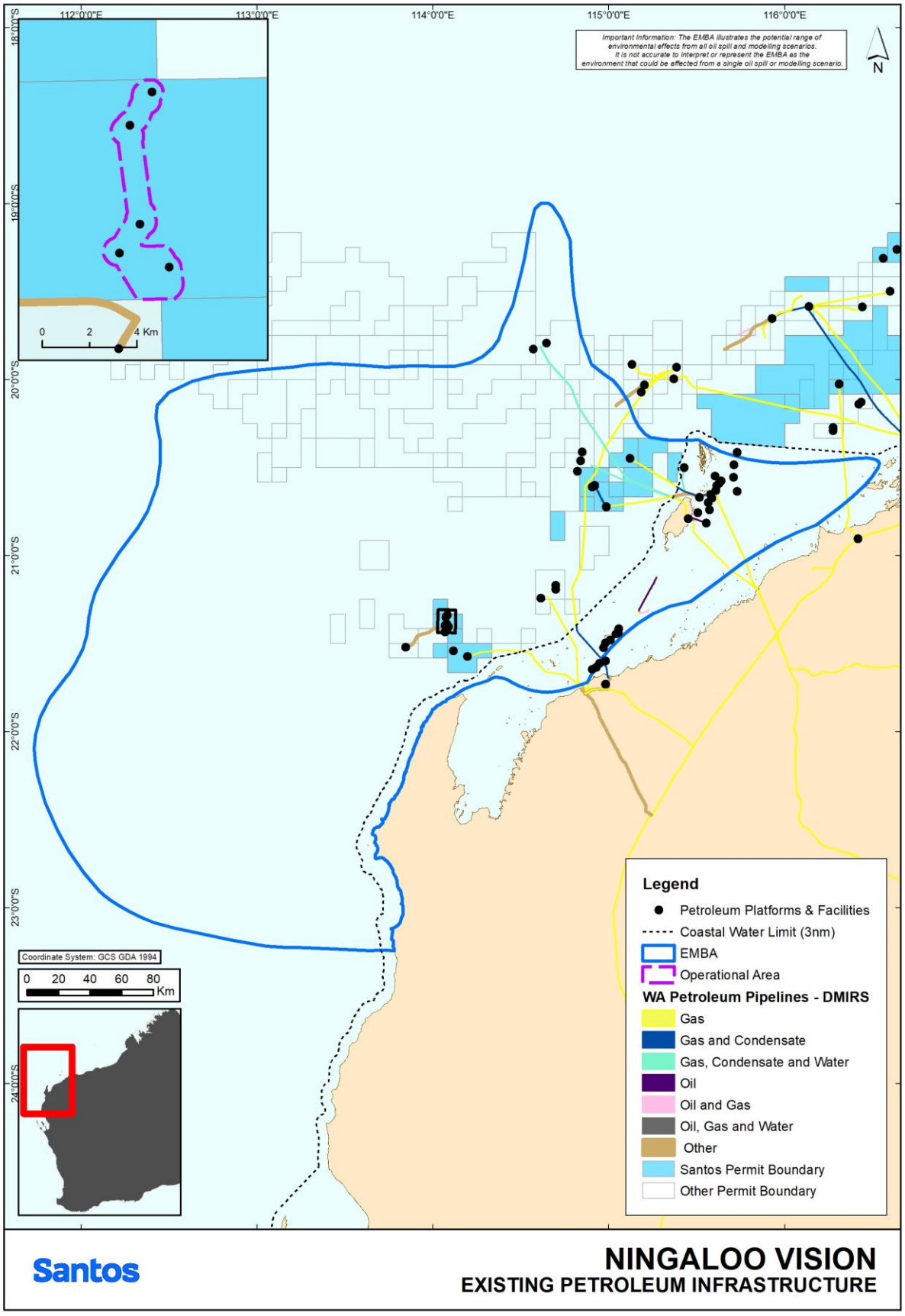


Figure 3-18*:* Existing oil and gas equipment within the environment that may be affected

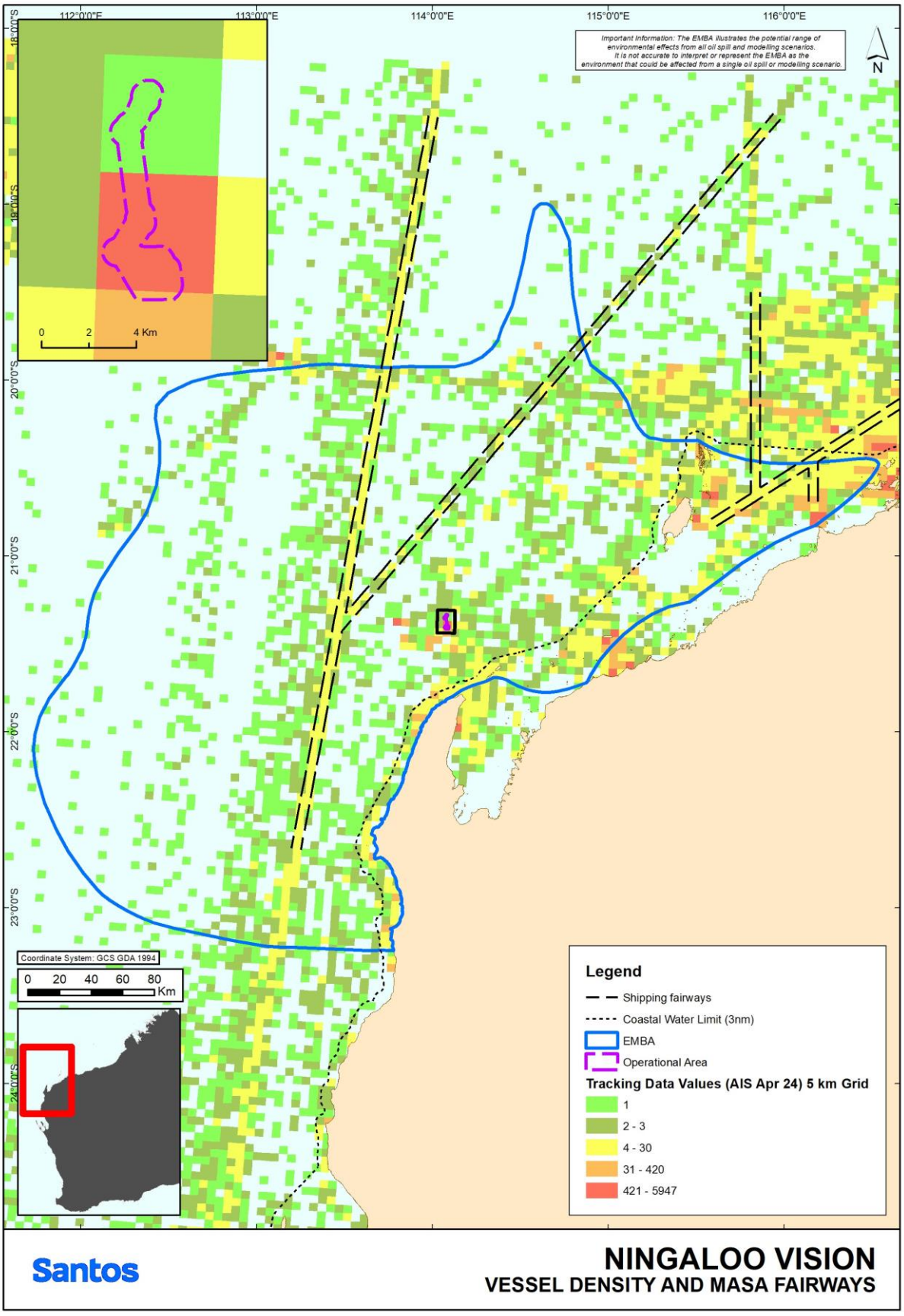


Figure 3-19*:* Vessel density and shipping fairways within the environment that may be affected

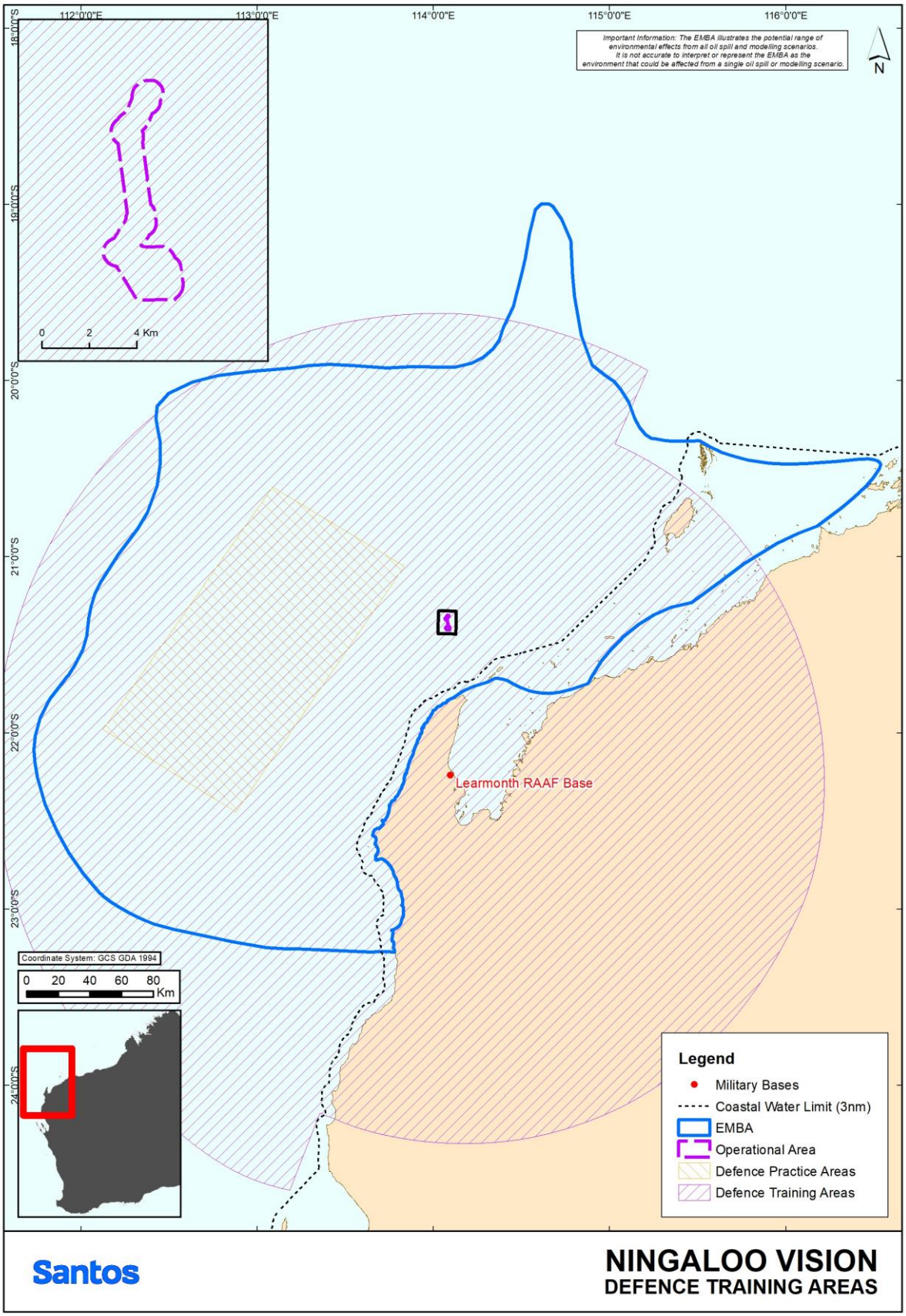


Figure 3-20: Existing defence equipment within the environment that may be affected

Table 3-11: Windows of Sensitivity in the Vicinity of the EMBA

Categories	Receptors (critical life cycle stages)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Physical environment and habitats	Non-coral benthic invertebrates												
	Coral (spawning periods)												
	Macroalgae	growing				shedding fronds				growing			
	Other benthic habitats												
Marine Fauna (incl. threatened/ migratory species)	**Fish/ Sharks and fisheries species**												
	Whale sharks			Aggregations at Ningaloo Coast									
	Fisheries species spawning/aggregation times [1]												
	Baldchin groper												
	Blacktip shark												
	Crystal crab												
	Goldband snapper												
	King George whiting												
	Pink snapper												
	Rankin cod												
	Red Emperor												
	Spangled Emperor												
	Sandbar shark												
	Spanish mackerel												
	Marine Mammals												
	Dugong (breeding)	breeding								breeding			

Categories	Receptors (critical life cycle stages)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	Humpback whale (migration)						northern			southern			
	Blue whale (migration)					northern						southern	
	Marine Reptiles												
	Hawksbill turtle's resident adult and juveniles[2]	Widespread throughout NW Shelf waters, highest density of adults and juveniles over hard bottom habitat (coral reef, rocky reef, pipelines etc.)											
	Hawksbill turtle (mating aggregations[2])												
	Hawksbill turtle (nesting and internesting[2])												
	Hawksbill turtle (hatching[1])												
	Flatback turtles (resident adult and juveniles[2])	Widespread throughout NW Shelf waters, increased density over soft bottom habitat 10 – 60m deep, post hatchling age classes and juveniles spread across shelf waters											
	Flatback turtle (mating aggregations[2])												
	Flatback turtle (nesting and internesting[2])												
	Flatback turtle (hatching[2])												
	Flatback turtle (nesting[2])												
	Green turtles (resident adult and juveniles[2])	Widespread throughout the NW Shelf waters, highest density associated with seagrass beds and macro algae communities, high density juveniles in shallow waters off beaches, amongst mangroves and in creeks											
	Green turtle (mating aggregations[2])												
	Green turtle nesting and internesting[2])												
	Green turtle (hatching[2])												
	Loggerhead turtles (resident adult and juveniles[2])	Widespread throughout the NW Shelf waters, increased density associated with soft bottom habitat supporting their bivalve food source, juveniles associated with nearshore reef habitat											
	Loggerhead turtle (mating aggregations[2])												
	Loggerhead turtle (nesting and internesting[2])												

Categories	Receptors (critical life cycle stages)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	Loggerhead turtle (hatching[2])												
	Olive Ridley turtle (nesting)												
	Leatherback turtles	Can occur at low density across the NWS year-round											
	Short-nosed Sea snake	Can occur at low density across the NWS year-round											
	Seabirds												
	Terns, shearwaters, petrels (nesting)												
	Commercial Managed Fisheries												
	Oil and gas												
	Shipping												
	Tourism/ recreational	None applicable											

KEY / NOTES		
	Peak activity, presence reliable and predictable	[1] Information provided from Department of Fisheries consultation
	Lower level of abundance/activity/presence	[2] Information provided by K. Pendoley
	Very low activity/ presence	
	Activity can occur throughout year	
	Proposed timing of activity	

4. Stakeholder Consultation

4.1 Consultation Background

Santos has undertaken consultation with relevant persons for this EP in compliance with OPGGS(E)R consultation requirements, applicable case law and applicable guidance (e.g. NOPSEMA guidance issued in May 2023 and subsequent guidance in May 2024).

Consultation with relevant persons under section 25 of the OPGGS(E)R commenced in April 2024, building on Santos' long history of consultation in the region to support ongoing production from the Ningaloo Vision FPSO, which commenced operations in 2010.

Santos has also provided information on a regular basis to an energy industry Exmouth Community Liaison Group (Exmouth CLG), which represents the interests of a range of local government, industry and community organisations in relation to oil and gas matters in the Exmouth region. The Exmouth CLG has been in operation since the early 2000s, with a key responsibility being the dissemination of information and seeking community input on issues of relevance and concern relating to energy industry operational, development and planning activities within the Exmouth Sub-basin.

Santos' consultation methodology for this EP is outlined in **Section 4.5**, with consultation activities undertaken in two phases:

- Preliminary consultation (15 April – 15 May 2024) – this included:
  - activities to allow authorities, persons and organisations opportunities to self-identify as relevant persons; and
  - engagement with potential relevant persons to confirm consultation expectations. Potential relevant persons that did not provide any feedback during preliminary consultation were carried into the consultation phase.
- Consultation (15 May – 28 June 2024 and 8 October –22 October 2024) – activity-based consultation activities seeking feedback from relevant persons to inform development of this EP.

Santos undertook consultation with some authorities, persons and organisations outside of these consultation phases given existing relationships, consultation preferences and standing meeting and consultation arrangements.

A summary report of the consultation carried out under section 25 OPGGS(E)R is included at **Table 4-9.**

Section 8.13 includes Santos' post EP acceptance consultation implementation strategy for activities covered by this EP in accordance with Regulation 22(15) of the OPGGS(E)R.

4.2 OPGGS(E) R Consultation Requirements

Table 4-1 outlines the applicable OPGGS(E)R requirements for consultation with relevant persons for this EP.

Table 4-1: Consultation requirements under the OPGGS(E)R

OPGGS(E)R 2023 Requirements
Section 24. Other information in the environment plan
The environment plan must contain the following: b. a report on all consultations under section 25 of any relevant person by the titleholder, that contains: i. a summary of each response made by a relevant person; and ii. an assessment of the merits of any objection or claim about the adverse impact of each activity to which the environment plan relates; and iii. a statement of the titleholder's response, or proposed response, if any, to each objection or claim; and iv. a copy of the full text of any response by a relevant person.
Section 25. Consultation with relevant authorities, persons and organisations, etc
(1) In the course of preparing an environment plan (including a revised environment plan referred to in Division 5) a titleholder must consult each of the following (a ***relevant person***): a. each Commonwealth, State or Northern Territory agency or authority to which the activities to be carried out under the environment plan may be relevant; b. if the plan relates to activities in the offshore area of a State—the Department of the responsible State Minister; c. if the plan relates to activities in the Principal Northern Territory offshore area—the Department of the responsible Northern Territory Minister;

d. a person or organisation whose functions, interests or activities may be affected by the activities to be carried out under the environment plan; e. any other person or organisation that the titleholder considers relevant. (2) For the purpose of the consultation, the titleholder must give each relevant person sufficient information to allow the relevant person to make an informed assessment of the possible consequences of the activity on the functions, interests or activities of the relevant person. (3) The titleholder must allow a relevant person a reasonable period for the consultation. (4) The titleholder must tell each relevant person the titleholder consults that: a. the relevant person may request that particular information the relevant person provides in the consultation not be published; and b. information subject to such a request is not to be published under this Part.
Section 26. Submission of environment plan
Form of environment plan (8) All sensitive information (if any) in an environment plan, and the full text of any response by a relevant person to consultation under section 25 in the course of preparation of the plan, must be contained in the sensitive information part of the plan and not anywhere else in the plan. Note: Subparagraph 24(b)(iv) requires the plan to contain a copy of the full text of any response by a Relevant person to consultation under section 25 in the course of preparation of the plan.
Section 28. Publishing environment plan and associated information
(1) If NOPSMEA's provisional decision under section 27 is that the environment plan includes material apparently addressing all the provisions of Division 2 (Contents of an environment plan), NOPSEMA must publish on NOPSEMA's website as soon as practicable: a. the plan with the sensitive information part removed; and b. the name of the titleholder who submitted the plan; and c. a description of the activity or stage of the activity to which the plan relates; and d. the location of the activity; and e. a link or other reference to the place where the accepted offshore project proposal (if any) is published; and f. details of the titleholder's nominated liaison person for the activity.

4.3 Government and Industry Guidance

Santos has considered the following NOPSEMA guidance in developing its consultation activities and approach:

- GL2086 – Consultation in the course of preparing an environment plan (EP Consultation Guideline) (NOPSEMA, 2023; 2024)
- GN1847 – Responding to public comment on Environment Plans (NOPSEMA, 2022a)
- GL1887 – Consultation with Commonwealth agencies with responsibilities in the marine area (NOPSEMA, 2024)
- GL1721 – Environment plan decision making (NOPSEMA, 2024c)
- GN1344 – Environment plan content requirement (NOPSEMA, 2024b)
- GN1488 – Oil Pollution Risk Management (NOPSEMA, 2021)
- *Supporting cooperative coexistence of seismic surveys and commercial fisheries in Australia's Commonwealth marine area* (Australian Government, 2022) jointly released by NOPSEMA, the Commonwealth Department of Agriculture, Fisheries and Forestry (DAFF), the Commonwealth Department of Industry, Science and Resources (DISR), and the Commonwealth Australian Fisheries Management Authority (AFMA).
- Petroleum activities and Australian Marine Parks: A guidance note to support environmental protection and effective consultation (Australian Government, 2023) jointly released by NOPSEMA and Parks Australia.

Santos has also considered other government and industry guidance, including:

- International Standards Organisation
  - ISO14001:2015 Environmental Management Systems
- 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
- Commonwealth Department of Agriculture, Fisheries and Forestry
  - Fisheries and the Environment – Offshore Petroleum and Greenhouse Gas Act 2006
  - Offshore Installations Biosecurity Guide
- Commonwealth Department of Climate Change, Energy, the Environment and Water
  - Interim Engaging with First Nations People and Communities on Assessments and Approvals under the Environment Protection and Biodiversity Conservation Act 1999
- Commonwealth Ministerial Council on Mineral and Petroleum Resources
  - Principles for Engagement with Communities and Stakeholders
- International Association for Public Participation
  - Quality Assurance Standard for Community and Stakeholder Engagement
- WA Department of Primary Industries and Regional Development
  - Guidance statement for oil and gas industry consultation with the Department of Fisheries
- WA Department of Transport
  - Offshore Petroleum Industry Guidance Note - Marine Oil Pollution: Response and Consultation Arrangements
  - 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
  - Consultation Approach for Unplanned Events

4.4 Applicable Case Law and Guidance

In addition to considering the regulatory requirements and guidance set out above, in conducting relevant person consultation for the activities covered by this EP, Santos has considered the judgments of:

- Justice Bromberg in Tipakalippa v National Offshore Petroleum Safety and Environmental Management Authority (No. 2) [2022] FCA 1121;
- the Full Federal Court in Santos NA Barossa Pty Ltd v Tipakalippa [2022] FCAFC 193 (Appeal Judgement); and
- Justice Calvin in Cooper v National Offshore Petroleum Safety and Environmental Management Authority (No 2) [2023] FCA 1158.

The EP Consultation Guideline (NOPSEMA, 2023; 2024) provides a summary of the Full Federal Court's interpretation of “functions”, “activities” and “interests” referenced in section 25(1)(d) of the OPGGS(E)R, adopted by NOPSEMA to assist in informing who may be a relevant person and how relevant persons may be identified, as defined in **Table 4-2.**

Table 4-2: Relevant person terms and definitions

Term	Interpretation
Functions	Refers to “a power or duty to do something”
Activities	To be read broadly and is broader than the definition of “activity” in section 5 of the OPGGS(E)R and is likely directed to what the relevant person is already doing
Interests	To be construed as conforming with the accepted concept of “interest” in other areas of public administrative law. Includes “any interest possessed by an individual whether or not the interest amounts to a legal right or is a proprietary or financial interest or relates to reputation”

Santos has also had regard to the purpose of consultation as outlined in the Appeal Judgment and EP Consultation Guideline (NOPSEMA, 2024), the emphasis that superficial or tokenistic consultation is not sufficient and that:

- consultation must be appropriate and adapted to the nature of each relevant person;

- for each relevant person, the appropriate manner and method of consultation (including the nature of information, time periods for consultation and mode of communication) may differ; and
- there is good reason to adopt pragmatic and practical approaches to consultation conducted in accordance with section 25 of the OPGGS(E)R.

4.5 Santos' Consultation Methodology

4.5.1 Overview

Santos consults to ensure that any activity it is proposing under an EP is carried out in a manner:

- consistent with the principles of ecologically sustainable development set out in section 3A of the EPBC Act; and
- by which the environmental impacts and risks of the Activity will be reduced to ALARP and to an acceptable level.

The consultation process is designed to assist Santos to further ascertain, understand and assess values and sensitivities of the environment (including ecosystems, people and communities, natural and physical resources, the qualities and characteristics of locations, places and areas and the heritage value of places) that may be affected by a proposed activity, and the potential environmental impacts and risks, through information obtained during consultations.

Santos may then refine or change its proposed control measures to address potential environmental impacts and risks of the activity based on that information or any claims or objections raised through consultation.

Santos' consultation methodology and process adopted in developing this EP comprised the following key steps:

- identifying potential relevant person categories;
- identifying relevant persons;
- providing opportunities for relevant persons to identify themselves if they wished to be consulted (e.g. through advertising, encouraging identified relevant persons to identify other potential relevant persons);
- consultation planning and preliminary consultation activities;
- consulting relevant persons;
- assessing the merits of objections or claims made by relevant persons about the adverse impact of each activity to which the EP relates;
- providing responses to queries, requests and feedback.

As described in **Section 4.5.2**, Santos considered the spatial extent of the EMBA and the particular aspects of the relevant environment outlined in **Section 3** as part of its process for identifying relevant persons.

However, the EMBA includes large areas where only unplanned activities such as a spill event with an unlikely probability of occurrence, could have any impact on the environment.

There is also significant conservatism associated with the EMBA based on low exposure values (as described in **Section 3.1.1**) which Santos has used in identifying the EMBA, and especially given the modelling process (**Section 3.1.1**) which combines a large number of individual unmitigated spill simulations.

The modelling at low exposure values is primarily used to inform Santos preparedness for potential spill response, and does not take into account any spill response mitigation activities which would be implemented and reduce the EMBA extent in the unlikely event of a spill.

Santos' methodology outlined in the Section demonstrates a very broad capture of potential relevant persons, providing ample opportunities, as outlined in **Section 4.5.3** and **Section 4.5.4**, for relevant persons to self identify and provide input to the development of the EP if they feel they may be impacted by the activities.

Santos notes that there is a very low likelihood of impacts from planned activities or unplanned events to the respective functions, interests and activities of those relevant persons identified at the extremities of the EMBA. In recognition this, our direct consultation effort has focused on those relevant persons most proximate to the Operational Area.

4.5.2 Identifying Relevant Persons

Santos considered the nature and location of the activity (and key component activities) (described in **Section 2**), the impacts of planned events and the risks of unplanned events (described in **Section 6** and **Section 7**).

Santos also considered the spatial extent of the EMBA by the activity (refer to **Section 3.1.1**) and the particular aspects of the relevant environment (refer to **Section 3.2**) as part of its process for identifying relevant persons.

The identification of relevant persons was an iterative process. **Table 4-3** summarises the preliminary steps adopted by Santos to identify relevant persons.

Table 4-3: Preliminary identification methodology

Process steps
1. Identify the impacts of the planned activities and the risks and impacts of unplanned events.
2. Consider the spatial extent of the EMBA by the Activity for assessment of impacts and risks.
3. Consider and identify aspects of the environment that may be affected, having regard to: (a) ecosystems and their constituent parts, including people and communities (b) natural and physical resources (c) the qualities and characteristics of locations, places and areas (d) the heritage value of places (e) the social, economic and cultural features of the matters mentioned in paragraphs (a), (b), (c) and (d).
4. Identify relevant person categories, having regard to: (a) aspects of the environment identified at Item 3 (b) the departments or agencies of Commonwealth, State and Territory governments that could therefore be relevant (c) the kinds of functions, interests or activities of people or organisations that could therefore be affected (d) submissions received in response to Santos' advertisements asking relevant persons to identify themselves if they wished to be consulted (e) any other person or organisation that the titleholder considers relevant. Update during consultation based on new information, if appropriate.
5. Identify relevant persons within relevant person categories, having regard to Items 1–4 above.

Table 4-4 outlines the environmental aspects within the EMBA (described in detail in **Section 3**). Santos considered these aspects for the purpose of identifying relevant person categories.

Table 4-4: Environmental aspects considered for relevant person category identification

Aspects of the environment	EP Reference
Physical environment	3.2.2
Provincial bioregions	3.2.3
Benthic habitats	3.2.4
National heritage place and world heritage property	3.2.5.3
Marine parks	3.2.5.1
Wetlands of international and national importance	3.2.5.4
Key ecological features	3.2.5.2
Threatened and migratory fauna	3.2.6
Biologically important areas and critical habitat	3.2.6.1
Conservation advice, recovery plans and management plans	3.2.6.3
Commercial fisheries	3.2.7.3
Energy industry	3.2.7.6
Defence activities	3.2.7.8
Shipping	3.2.7.7
Recreation and tourism	3.2.7.5
Underwater cultural heritage	3.2.7.2

Aspects of the environment	EP Reference
Cultural features	3.2.7.1

The consideration of the environmental aspects resulted in identification of the following relevant person categories:

- Section 25(1)(a)(b)(c) of the OPGGS(E)R:
  - Commonwealth Government agency or authority; and
  - WA Government agency or authority.
- Section 25(1)(d)(e) of the OPGGS(E)R:
  - academic and research organisations;
  - commercial fishing (Commonwealth-managed);
  - commercial fishing (WA–managed);
  - energy industry titleholders/operators;
  - environmental conservation organisations;
  - First Nations people and groups;
  - infrastructure operators;
  - industry associations;
  - local government and recognised community reference/liaison groups;
  - recreational fishing; and
  - tourism operators.

Santos then undertook the actions outlined in **Table 4-5** to identify relevant persons within those categories. No action was required for the identification of international relevant persons for this EP as the EMBA does not enter international waters.

Table 4-5: Actions for identifying relevant persons by category

Relevant person Category	Actions to identify relevant persons
All relevant person categories	• Review of relevant regional historical consultation by Santos in the region • Review of identified relevant persons in publicly available EPs submitted by other Titleholders that may be relevant to proposed activities to be managed under this EP • Advertising as outlined in Table 4-8 • Review of information provided by or claims made by or on behalf of organisations who claimed to be relevant persons
Section 25(1)(a) of the OPGGS(E)R	
Commonwealth agency or authority to which the activities to be carried out under the environment plan may be relevant	• Review of government agency websites and directories to understand agency roles, functions and responsibilities • Review of NOPSEMA and government agency guidance on consultation expectations
Section 25(1)(b) and (c) of the OPGGS(E)R	
State and Territory Departments/Agencies	• Review of government agency websites and directories to understand agency roles, functions and responsibilities • Review of NOPSEMA and government agency guidance on consultation expectations
Section 25(1)(d) and (e) of the OPGGS(E)R	
Academic and research organisations	• Conducting key-word searches of publicly available online search engines, review media coverage and review organisation websites to identify organisations with reasonably ascertainable functions, interests or activities that may be affected, having regard to the region, activities or risks/impacts under this EP
Commercial fishing	• Review of Commonwealth and WA Government commercial fishing catch and effort data in the Operational Area • Review of fisheries entitled to fish in the EMBA

Relevant person Category	Actions to identify relevant persons
Energy industry	• Review of EMBA overlap with petroleum, greenhouse gas and any other NOPTA issued titles
Environmental conservation organisations	• Conducting key-word searches of publicly available online search engines, review media coverage and review organisation websites to identify organisations with reasonably ascertainable functions, interests or activities that may be affected, having regard to the region, activities or risks/impacts under this EP • Review of other publicly available information, e.g. websites of conservation organisations whose functions, interests or activities within the EMBA may be affected
First Nations people and groups	• Review of the Judgment and the Appeal Judgment • Review of EMBA overlap with Native Title determined areas and claims, ILUAs, registered / protected sacred sites, land rights and IPAs • Review of Representative Aboriginal/Torres Strait Island Bodies (RATSIBs) on Native Title website • Review of prescribed bodies corporate on Native Title website, where relevant • Conducting searches of public cultural heritage databases relevant to the EMBA • Review of marine park management plans relevant to the EMBA • Review of additional publicly available information sources, where relevant • Engagement with government departments/agencies with relevant knowledge or relevant responsibilities
Infrastructure operators	• Review of EMBA overlap with offshore and onshore infrastructure, such as submarine telecommunications cables or ports
Industry associations	• Review of industry representation of the following relevant person groups: – commercial fishing – local government authorities – local industry – recreational fishing – shipping – tourism operators
Local government and recognised community reference/liaison groups	• Review of EMBA overlap with boundaries of local government areas
Recreational fishing	• Review of EMBA overlap with areas of interest to recreational fishing • Review of potential presence of recreational fishing club members in the EMBA • Review of website information of relevant agencies/organisations that represent recreational fishing interests
Shipping	• Review of EMBA overlap with shipping fairways or areas of high marine traffic
Tourism operators	• Review of EMBA overlap with areas of interest to charter and tourism operators • Review of potential presence in the EMBA • Review of website information of relevant operators/organisations that represent commercial tourism interests with reasonably ascertainable functions, interests or activities that may be affected, having regard to the region, activities or risks/impacts under this EP

4.5.3 Public Awareness Campaign and Self-Identification Opportunities

In addition to undertaking the process for identification of potential relevant persons, as described above, Santos undertakes a range of activities to promote opportunities for other organisations or individuals to self-identify as potential relevant persons if they feel that their functions, interests or activities may be affected.

These promotional activities include public information campaigns using a range of delivery methods, including, radio, print media, targeted social media with links (where appropriate) to information about the proposed activities, risk and impacts.

Details of the public information campaign for this EP, including targeted efforts to ensure First Nations organisations and individuals are provided the same opportunities, are described in **Section 4.5.4** and a schedule of advertising is included in Table 4-8. Santos also has an online self-nomination form on its Consultation Hub website where fact sheets and other consultation materials are published and available for download.

Such activities and information provide a more than reasonable opportunity for organisations and individuals to self-identify as a relevant person for the purpose of OPGGS(E)R section 25 consultation, where they consider themselves to have interests, functions or activities that may be affected by the planned activities and for relevant persons to provide their input.

Santos' process involves the provision of reasonable timeframes for the self-identification or nomination of others as relevant persons, for relevant persons to consider consultation information, ask questions and give their input and for Santos' consideration and assessment of the merits of objections and claims.

4.5.4 Identification and Consultation with First Nations People and Groups

In addition to the public awareness campaign and self-identification opportunities outlined above, Santos has developed a comprehensive process for identifying and undertaking effective consultation with First Nations relevant persons.

As with Santos' process for identifying relevant persons generally, this is an iterative process with multiple avenues of enquiry including, but not limited to, the following actions:

- Active steps to identify First Nations people and groups as per actions outlined in **Table 4-5**, including advertising broadly to ensure that relevant persons that are not otherwise identified by Santos' examination of the EMBA are given the opportunity to self-identify.
- Providing opportunities for relevant persons to provide input in EP development, including:
    - Registered Native Title Prescribed Bodies Corporate (PBCs), groups associated with Native Title Determinations and groups in active Native Title Claims; Native Title Representative Bodies;
    - Groups who may be parties to Indigenous Protected Areas, or named in Indigenous Land Use Agreements;
    - Existing liaison committees or reference groups, where these committees or groups have been established between Native Title Parties, Native Title Representative Bodies and industry/government;
    - Supporting the establishment of liaison committees or groups that are intended to be representative and able to speak on behalf communities where formal structures do not exist, and consulting such committees or groups;
    - Individual First Nations people who self-identify as relevant (if any) and
    - Asking identified persons and organisations (including relevant land councils) if there are other persons or organisations who may be a relevant person.

For this EP, Santos has provided consultation opportunities and supporting information to First Nations representative organisations listed in **Table 4-7**, acknowledging the use of a highly conservative EMBA (as described in **Section 3**) for the purpose of assisting to identify potentially relevant persons.

Santos acknowledges the tradition of First Nations people of Australia includes a cultural and spiritual connection to their land and waters and that communal cultural interests, including sea country, could extend into the EMBA. When considering the remote possibility of any major unplanned spill event, and the inherent conservatism of the EMBA, the likelihood of First Nations people having an interest that may be affected by the proposed activities (if such groups do have sea country or other interests) becomes increasingly unlikely with increasing distance from the operational area, where planned activities will occur.

This conservative approach (further described in **Section 4.5.7**) has ensured a very broad capture of potential interested relevant persons and provided them an opportunity to provide input if they feel they may be impacted.

Santos has provided consultation opportunities to PBCs given their responsibilities under the *Native Title Act 1993* (Cth) for representing Native Title holders who have been recognised by Australian law of their rights and interests to traditional land and waters.[2]

[2] https://nativetitle.org.au/learn/role-and-function-pbc/about-pbcs

Santos recognises that PBCs are bound by the traditional laws and customs of the native title group they represent. This includes, among other things, management and protection of cultural values.

Santos has since mid-2023 actively been working with PBCs to establish consultation agreements to support ongoing, regular and effective consultation and engagement activities. For this EP, Santos has arrangements in place with Buurabalayji Thalanyji Aboriginal Corporation and Wirrawandi Aboriginal Corporation.

4.5.5 Relevant Persons

A list of potentially relevant persons was developed through application of the above methodology for the purposes of undertaking preliminary consultation to confirm consultation expectations.

This consultation phase was supported by an advertising campaigned outlined in Table 4-8 to raise public awareness about proposed activities and provide opportunities for authorities, persons or organisations to identify themselves as relevant persons.

Relevant persons consulted for this EP are listed in **Table 4-6.**

Table 4-6: List of relevant persons

Relevant person category	Summary of relevance
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	
Australian Border Force (ABF) (Maritime Border Command)	ABF is Australia's border law enforcement agency and customs service. ABF's vessels undertake patrols as part of its surveillance and response activities.
Australian Fisheries Management Authority (AFMA)	AFMA is responsible for managing Commonwealth fisheries and is a relevant agency because the Activity has the potential to impact on fisheries resources in AFMA managed fisheries. AFMA expects petroleum operators to consult directly with fishing operators about all activities and projects which may affect day to day fishing activities. AFMA also provides industry association contacts for petroleum operators to use when consultation with fishing operators is required.
Australian Hydrographic Office (AHO)	AHO is responsible for maintaining and disseminating nautical charts, including the distribution of Notices to Mariners.
Australian Institute of Marine Science (AIMS)	AIMS is Australia's tropical marine research agency and is established under the *Australian Institute of Marine Science Act 1972* (AIMS Act).
Australian Maritime Safety Authority (AMSA) – maritime safety	AMSA is the statutory and control agency for maritime safety and vessel emergencies in Commonwealth Waters. AMSA is a relevant agency because the proposed offshore activities may impact on the safe navigation of commercial shipping in Australian waters.
Australian Maritime Safety Authority (AMSA) – marine pollution	AMSA is the statutory and control agency for maritime safety and vessel emergencies in Commonwealth Waters. AMSA is a relevant agency as one of its functions is to prevent and combat ship-sourced pollution in the marine environment.
Department of Agriculture, Forestry and Fisheries (DAFF) – Biosecurity (marine pests) (vessels, aircraft and personnel)	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.
Department of Agriculture, Forestry and Fisheries (DAFF) – Fisheries	DAFF has primary policy responsibility for promoting the biological, economic and social sustainability of Australian fisheries. DAFF is a relevant agency for consultation because the Activity has the potential to impact on fishing operations and/or fishing habitats in Commonwealth waters.
Department of Climate Change, Energy, the Environment and Water (DCCEEW) – Underwater Cultural Heritage (UCH)	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.
Department of Climate Change, Energy, the Environment and Water (DCCEEW) – Post Approvals Branch	DCCEEW protects Australia's natural environment and heritage sites, helps Australia respond to climate change and carefully manages water and energy resources. The Post Approvals Branch of DCCEEW is responsible for overseeing the ongoing compliance and management of environmental and regulatory approvals once a project has been granted permission to proceed. The branch plays a crucial role in ensuring that projects continue to meet environmental standards and operate in line with the conditions set out during the approvals process. The Post Approvals Branch is Santos' first point of contact regarding engagement with DCCEEW on approvals matters.
Department of Defence (DoD)	DoD is a relevant agency for consultation because:

Relevant person category	Summary of relevance
	• the proposed Activity may impact DoD training and operational requirements, in that the EMBA overlaps DoD training areas. • the proposed Activity encroaches on known training areas and/or restricted airspace. • there is a risk of unexploded ordnance in the area where the Activity is taking place.
Department of Industry, Science and Resources (DISR)	DISR is a relevant agency for consultation because its responsibilities include offshore oil and gas development and safety and GHG storage.
Director of National Parks (DNP)	DNP is the statutory authority responsible for administration, management and control of Commonwealth marine reserves. The DNP is a Relevant Person for consultation where: • the Activity or part of the Activity is within the boundaries of a proclaimed Australian Marine Park; • activities proposed to occur outside a reserve may impact on the values within a Australian Marine Park; and / or • an environmental incident occurs in Commonwealth waters surrounding a Australian Marine Park and may impact on the values within the Australian Marine Park.
Section 25(1)(a) 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.	
Department of Biodiversity, Conservation and Attractions (DBCA)	DBCA is a relevant State agency responsible for the management of State marine parks and reserves and protected marine fauna and flora.
Department of Planning, Lands and Heritage (DPLH)	DPLH is responsible for WA state level land use planning and management, and oversight of Aboriginal cultural heritage and built heritage matters.
Department of Primary Industries and Regional Development (DPIRD) – Fisheries	DPIRD is responsible for managing West Australian fisheries.
Department of Transport (DoT) – marine pollution	DoT has functions in relation to commercial vessel movements in the navigable waters of the State and seas adjacent to WA. Its interests extend to response to an unplanned spill event through its Maritime Environmental Emergency Response unit.
Department of Water and Environmental Regulation (DWER)	DWER is responsible for environment and water regulation.
Department of Jobs, Tourism, Science and Innovation (JTSI)	JTSI is a Western Australian Government statutory authority responsible for promoting Western Australia as a holiday destination.
Gascoyne Development Commission (GDC)	GDC is a Western Australian Government statutory authority dedicated to the economic and social development of the Gascoyne region.
Ningaloo Coast World Heritage Advisory Committee (NCWHAC)	The NCWHAC provides advice to the Commonwealth and State Environment Ministers on the protection, conservation and management of the Outstanding Universal Value of the World Heritage area.
Pilbara Development Commission (PDC)	PDC is a Western Australian Government statutory authority dedicated to the economic and social development of the Pilbara region.
Pilbara Ports Authority (PPA)	PPA manages port land and waters for the Ports of Dampier, Port Hedland, Ashburton, Varanus Island and Cape Preston West.
Western Australian Museum (WAM)	WAM maintains a database of shipwrecks off the Western Australian coast.
Section 25(1)(b) of the OPGGS(E)R: Department of the responsible Western Australian Minister	

Relevant person category	Summary of relevance
Department of Energy, Mines, Industry Regulation and Safety (DEMIRS)	DEMIRS is the department of the relevant State Minister and is required to be consulted under subregulation 11A (1) of the Environment Regulations.
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	
Academic and Research Organisations	
Western Australian Marine Science Institution (WAMSI)	Marine research organisation.
Commonwealth Scientific and Industrial Research Organisation (CSIRO)	Marine research organisation.
Curtin University (Centre for Marine Science and Technology) (CU-CMST)	Marine research organisation.
University of Western Australia (UWA)	Marine research organisation.
Minderoo Foundation research (MF)	Marine research organisation.
Commercial fishing – Commonwealth managed	
Commonwealth-managed fisheries that overlap the EMBA: • North West Slope Trawl Fishery • Southern Bluefin Tuna Fishery • Western Deepwater Trawl Fishery • Western Skipjack Tuna Fishery • Western Tuna and Billfish Fishery	Santos has engaged with representative organisations and Government agencies, on behalf of relevant fisheries, including providing information on those fisheries active in the operational area and those that are licenced to fish in the EMBA. No Commonwealth fisheries are active in the Operational Area.

Relevant person category	Summary of relevance
Energy Industry – Petroleum titleholders and GHG permit holders	
Operators: • AGI Tubridgi • Carnarvon Energy • Chevron Australia • Coastal Oil & Gas • Energy Resources • Eni Australia • KATO Energy • KUFPEC • Mobil Australia Resources Company • Western Gas • Woodside Energy	Titleholders within the EMBA.
Environmental conservation organisations	
Australian Conservation Foundation (ACF)	According to its website, ACF is a peak conservation body with an interest in activities that may affect the marine environment.
Cape Conservation Group (CCG)	According to its website, CCG is a volunteer, not-for-profit organisation that is involved in protecting the terrestrial and marine environment of the North West Cape.
Conservation Council of WA (CCWA)	According to its website and correspondence dated June 2024, CCWA[3] promotes an interest in the protection and restoration of the WA natural environment.
Greenpeace Australia Pacific (GAP)	According to its website, GAP stated goals include the protection of ocean biodiversity and marine life, including campaigning for protection of whales[4] (fauna identified in this EP as potentially affected by the Activity impacts or risks) and sea turtles[5] (also fauna identified in this EP as potentially affected by the Activity impacts or risks).
International Fund for Animal Welfare (IFAW)	According to its website, IFAW is a peak conservation body with an interest in activities that may affect the marine environment.
Protect Ningaloo	According to its website, the Protect Ningaloo campaign aims to protect Exmouth Gulf from the threat of industrialisation, and conserve its outstanding natural, cultural and social values.
The Wilderness Society (TWS)	According to its website, TWS is a peak conservation body with an interest in activities that may affect the marine environment.
World Wildlife Fund (WWF)	According to its website, WWF is a peak conservation body with an interest in activities that may affect the marine environment.
First Nations People and groups	

[3] *https://www.ccwa.org.au/about*

[4] *https://www.greenpeace.org.au/what-we-do/protecting-oceans/whales/*

[5] *https://www.greenpeace.org/international/story/28229/turtle-journey-urgent-protect-the-oceans/; https://www.greenpeace.org/international/publication/28181/turtles-under-threat/*

Relevant person category	Summary of relevance
The following groups may have interests that intersect the EMBA. Information was also provided to these organisations to help identify and consult groups or individuals whose spiritual or cultural connections to land and sea country in accordance with Indigenous tradition may be affected by proposed activities. In addition, targeted regional advertising was conducted to provide opportunity for individuals whose functions, interests and activities may be affected by the proposed activity to self-identify as relevant persons.	
First Nations Peoples and Groups – Native Title Representative Bodies	
Yamatji Marlpa Aboriginal Corporation (YMAC)	YMAC is the Native Title Representative Body (NTRB) that facilitates native claims on behalf of First Nations people and groups, as well as acting in the interests of Native Title Prescribed Body Corporates where directed by Corporation Directors. YMAC is the NTRB for the Pilbara region. The EMBA intersects the Ningaloo, Gascoyne and Montebello Marine Parks, the management plan for which references YMAC.
First Nations Peoples and Groups – Native Title Prescribed Body Corporates	
Buurabalayji Thalanyji Aboriginal Corporation (BTAC)	The EMBA intersects the Thalanyji Native Title determined area. BTAC are the Registered Native Title Body Corporates holding native title on behalf of the Thalanyji people. Santos has consulted with BTAC.
Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC)	The EMBA intersects the Gnulli, Gnulli #2 and Gnulli #3 Native Title determined area, which is jointly managed by Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC) and Yinggarda Aboriginal Corporation (YAC) The EMBA intersects the Ningaloo Marine Park, the management plan for which references sea country values held by people associated with the Gnulli determined area. NTGAC is the Registered Native Title Body Corporates holding native title that corresponds to the northern part of the Gnulli, Gnulli #2 and Gnulli #3 Native Title determination. NTGAC's nominated representative is YMAC. Santos has consulted with YMAC.
Wirrawandi Aboriginal Corporation (WAC)	The EMBA intersects the Yaburara and Mardudhunera Native Title determined area. WAC is the Registered Native Title Body Corporates holding native title on behalf of the Yaburara and Mardudhunera people. Santos has consulted with WAC.
Industry associations - Petroleum Industry	
Australian Energy Producers (AEP)	AEP represents the interests of oil and gas explorers and producers in Australia.
Centre of Decommissioning Australia (CODA)	According to its web site CODA is an independent initiative working with industry, government and the community to create a collaborative and sustainable approach to decommissioning Australia's aging oil and gas infrastructure.
Industry Associations – Commercial Fishing	
Australian Southern Bluefin Tuna Industry Association (ASBTIA)	ASBTIA represents the interests of commercial fishers in the Southern Bluefin Tuna Fishery and Western Skipjack Fishery.
Commonwealth Fisheries Association (CFA)	CFA represents the interests of commercial fishers with licences in Commonwealth waters.
Tuna Australia (TA)	TA represents the interests of the Western Tuna and Billfish Fishery
Western Australian Fishing Industry Council (WAFIC)	WAFIC represents the interests of the WA commercial fishing, pearling and aquaculture sector.

Relevant person category	Summary of relevance
Industry associations - Community	
Exmouth CLG	The Exmouth CLG convenes three times a year in Exmouth, in collaboration with neighbouring oil and gas operators. The membership of this group is diverse and currently includes about 40 community representatives. Santos consults with the CLG as part of informing good environmental management practices.
Industry associations - Local industry	
Carnarvon Chamber of Commerce and Industry	Regional representative organisation representing the interests of local business.
Exmouth Chamber of Commerce and Industry	Regional representative organisation representing the interests of local business.
Karratha and Districts Chamber of Commerce and Industry	Regional representative organisation representing the interests of local business.
Onslow Chamber of Commerce and Industry	Regional representative organisation representing the interests of local business.
Industry Associations – Recreational Fishing	
Recfishwest	Recfishwest represents the interests of Western Australia's recreational fishing sector.
Industry Associations – Tourism	
Marine Tourism WA (MTWA)	The MTWA is an association made up of charter industry owners and operators.
WA Game Fishing Association (WAGFA)	WAGFA co-ordinates the activities of game fishing throughout Western Australia, maintains State game fishing records and data concerning open game fishing tournaments of its member clubs. WAGFA members are: • Broome Fishing Club • Cockburn Power Boats • Exmouth Game Fishing Club • Fremantle Sailing Club • Geraldton and District Offshore Fishing Club • King Bay Gamefishing Club • Marmion Angling and Aquatic Club • Naturaliste Game and Sports Fishing Club • Nor-West Game Fishing Club • Perth Game Fishing Club
Western Australian Indigenous Tourism Operators Council (WAITOC)	WAITOC is the peak representative for Aboriginal tours and experiences in Western Australia.
Local Government Authorities	
City of Karratha	The City of Karratha is a local government area in the Pilbara region of Western Australia.
Shire of Ashburton	The Shire of Ashburton is a local government area in the Pilbara region of Western Australia.

Relevant person category	Summary of relevance
Shire of Carnarvon	The Shire of Carnarvon is a local government area in the Gascoyne region of Western Australia.
Shire of Exmouth	The Shire of Exmouth is a local government area in the Gascoyne region of Western Australia.
Tourism Operators – Dive	
3 Islands Whale Shark Dive (Exmouth)	Marine tourism operator active within the EMBA.
Aussie Marine Adventures (Exmouth & Coral Bay)	Marine tourism operator active within the EMBA.
Coral Bay Eco Tours (Coral Bay)	Marine tourism operator active within the EMBA.
Dive Ningaloo (Exmouth)	Marine tourism operator active within the EMBA.
Exmouth Dive & Whalesharks (Exmouth)	Marine tourism operator active within the EMBA.
Exmouth Diving Centre (Exmouth)	Marine tourism operator active within the EMBA.
Kings Ningaloo Reef tours (Exmouth)	Marine tourism operator active within the EMBA.
Mackerel Islands (Onslow)	Marine tourism operator active within the EMBA.
Montebello Island Safaries (Exmouth)	Marine tourism operator active within the EMBA.
Ningaloo Blue Dive (Exmouth)	Marine tourism operator active within the EMBA.
Ningaloo Discovery (Exmouth)	Marine tourism operator active within the EMBA.
Ningaloo Reef Dive (Exmouth)	Marine tourism operator active within the EMBA.
Ningaloo Whaleshark-n-Dive (Exmouth)	Marine tourism operator active within the EMBA.
Ningaloo Whalesharks (Exmouth)	Marine tourism operator active within the EMBA
Ocean Eco Adventures (Exmouth)	Marine tourism operator active within the EMBA.
View Ningaloo (Exmouth)	Marine tourism operator active within the EMBA.
Tourism Operators – Charter operators	
Aquatic Adventures	Marine tourism operator active within the EMBA.
Blue Horizon Charters	Marine tourism operator active within the EMBA.
Elite Charters	Marine tourism operator active within the EMBA.
Evolution Charters Exmouth	Marine tourism operator active within the EMBA.
Exmouth Boat Hire	Marine tourism operator active within the EMBA.
Exmouth Fishing Adventures	Marine tourism operator active within the EMBA.
Fawesome Expeditions Exmouth	Marine tourism operator active within the EMBA.
Mackerel Islands Fishing Charters	Marine tourism operator active within the EMBA.

Relevant person category	Summary of relevance
Mahi Mahi Fishing Charters	Marine tourism operator active within the EMBA.
Ningaloo Sportfishing Charters	Marine tourism operator active within the EMBA.
Onslow Bay Boatworks	Marine tourism operator active within the EMBA.
Onstrike Charters Exmouth	Marine tourism operator active within the EMBA.
Peak Sportfishing Adventures	Marine tourism operator active within the EMBA.
Seaestar Boat Charters	Marine tourism operator active within the EMBA.
Seaforce Charters	Marine tourism operator active within the EMBA.
Top Gun Charters	Marine tourism operator active within the EMBA.
Unions	
Maritime Union of Australia	The MuA is a trade union in Australia that represents workers employed in the maritime industry.

4.5.6 Provision of Sufficient Information

Santos provided relevant persons with sufficient information so they can make an informed assessment about the possible consequences of the Activity on their functions, interests or activities. Santos provided relevant persons with information regarding:

- The Activity proposed under this EP;
- The environment that may be affected by the Activity, including depictions of the modelled EMBA and explaining how the EMBA is determined;
- The potential environmental impacts and risks of the Activity and proposed control measures;
- The environmental approval process;
- The purpose of consultation, who may be a relevant person and how to self-nominate as a potential relevant person;
- The titleholder's obligations during consultation in the course of preparing an environment plan, including the obligation of the titleholder not to publish particular information if so requested by the relevant person; and
- How to provide feedback.

Relevant persons were provided access to information using different mediums and platforms, including by telephone, email, website (https://www.santos.com/wp-content/uploads/2024/04/Santos-NV-CoPFAR-fact-sheet.pdf) hard copy and electronic materials and social media.

At a minimum, this information was available on the Santos website and also included in the fact sheets which Santos sent to relevant persons by email or made available during consultation sessions and activity updates.

Santos also disseminated and promoted the NOPSEMA community information brochure, *Consultation on offshore petroleum environment plans*. This brochure contains information for community members to better understand the responsibilities of titleholders to consult relevant persons in the development of environment plans, the purpose of consultation and how relevant persons can provide feedback.

4.5.7 Consultation Approach

In developing this EP Santos has made itself available to work with authorities, persons and organisations on pragmatic and practical approaches to OPGGS(E)R section 25 consultation.

In its preliminary consultation emails, Santos invited feedback on appropriate consultation methods and information needs. Santos also sought information as to functions, interests or activities that may be affected by the activity.

This approach has included:

- Providing relevant persons access to information using different mediums and platforms, including by telephone, email, website, electronic materials, in person and virtual meetings.
- Making information about the proposed activities to be managed under this EP available on the Santos website at www.santos.com/offshoreconsultation. Provision of hyperlinks to this website were included in consultation emails.

Santos' activity-centric approach has been applied to consultation with respect to commercial and recreational fishing, given the significant geographic extent of some of commercial fisheries and the location of historical catch and effort by commercial and recreational fishers relative to the proposed petroleum activity. This approach considers:

- Developing a fact sheet specific to the information needs of the commercial fishing sector.
- Recognising WAFIC's published guidance that petroleum titleholders consult directly with those Western Australian fishery licence holders that have been historically active in Operational Areas, while providing a list of all entitled fisheries that overlap the EMBA. This approach acknowledges previous feedback from WAFIC regarding consultation fatigue among WA's estimated 1500 fishing boat licence holders.

- Using a WAFIC fee-for-service arrangement to circulate Santos' consultation information via email to licence holders and making information available to potentially affected commercial fishing licence holders.
- Recognising previous feedback from Recfishwest that petroleum titleholders consult directly with those fishing clubs with regional proximity to Operational Areas, while providing information on activity EMBAs that may have broader implications for recreational fishers. This approach acknowledges DPIRD's estimated 620,000 recreational fishers in WA.

All authorities, persons and organisations engaged during the preliminary consultation and consultation phases were provided a link to the NOPSEMA brochure: Consultation on offshore petroleum environment plans.

Additional detail on Santos' consultation approach with First Nations people is set out in **Section 4.5.4.**

A schedule of consultation activities is included at **Table 4-7** and a schedule of advertising is included at **Table 4-8**.

4.5.8 Reasonable Period for Consultation

Santos is required to allow a relevant person a reasonable period for consultation.

Santos provided approximately 70 days for feedback to be provided from the start of preliminary consultation information being provided, to review and respond with feedback about the proposed activities (unless there was a reason for understanding sooner that the person or organisation did not require further consultation), plus a further 14 day extension to provide relevant persons with the opportunity to provide any further feedback following the activity update.

Santos directly contacted relevant persons notifying them of the consultation process and consultation period, confirming the date by which feedback was sought and outlining how feedback may be provided. Santos also issued a final notification, allowing for relevant persons to submit their feedback before the end of the consultation period.

4.5.9 Consultation Opportunities

Santos offered multiple avenues and mediums for consultation, including:

- Response by return email;
- Provision of a toll free 1800 number; and
- In-person or virtual meetings, as appropriate.

Following initial correspondence and/or in person conversations, attempts were made to follow up where no response was received.

Table 4-7: Summary of Consultation Activities

Activity	Purpose	Timing
Preliminary Consultation – 15 April to 15 May		
Website Website content and activity fact sheets developed and made available at https://www.santos.com/offshoreconsultation/carnarvon/	**Provide:** • Information about Santos' consultation obligations and approach. • Descriptions of proposed activities, including potential activity impacts and risks, and proposed management measures. • Contact information to enable relevant persons to provide feedback. • Information about how to self-identify as a relevant person, including an online nomination form. • Details about how feedback will be managed, including provision of Santos' offshore Western Australia	From 15 April 2024

Advertising Advertisements in the following publications: • The West Australian • Midwest Times • North West Telegraph • Pilbara News Guardian Advertisements on the following radio stations: • Karratha HIT 106.5 • WA Remote HIT WA FM • Pilbara and Kimberley Aboriginal Media Radio	Promote awareness of proposed activities to create opportunities for relevant persons to self-identify and seek feedback from relevant persons in addition to those identified by Santos as part of its initial public review process.	From 15 April 2024
Consultation materials • Email to identified relevant persons with a link to the fact sheet for this EP		From 15 April 2024
Consultation 14 May to 28 June 2024		
Consultation materials Email to identified relevant persons advising the commencement of consultation	Reminder to Santos identified relevant persons of the commencement and closing dates for consultation.	From 28 May 2024
Advertising Advertisements in the following publications: • The West Australian • Midwest Times • North West Telegraph • Pilbara News Guardian Advertisements on the following radio stations: • Karratha HIT 106.5 • WA Remote HIT WA FM • Pilbara and Kimberley Aboriginal Media Radio	Promote awareness of proposed activities and seek feedback from relevant persons	From 15 April 2024
Consultation email • Reminder email to identified relevant persons advising pending closure of consultation period	Reminder to Santos identified relevant persons of the closing dates for consultation	From 21 June 2024
Consultation 08 October to 22 October 2024		
Consultation materials Email to identified relevant persons to provide them with an activity update.	To provide an activity update, clarifying the infield vessel based flushing scope and advising that the updated information did not give rise to any material new or increased risks or impacts to those already notified. To advise all Santos identified relevant persons of the commencement and closing dates for consultation relating to activity update.	From 08 October 2024
Consultation materials Email to identified relevant persons advising pending closure of consultation period.	Reminder to Santos identified relevant persons of the closing dates of consultation.	From 15 October 2024

Table 4-8: Consultation advertising (15th April – 15th June 2024)

Publication date	Advertising type	Towns / Communities	Reach
Preliminary consultation 15 April to 11 May			
15 April to 15 May 2024	Social Media notice	Facebook, Instagram and Messenger	Geotargeted PPL18+ Pilbara and Exmouth
15 April to 15 May 2024	Radio Ad - Karratha HIT 106.5	Karratha towns and communities, focusing on remote communities	N/A
15 April to 15 May 2024	Radio Ad - WA Remote HIT WA FM	WA remote towns and communities	N/A
15 April to 15 May 2024	Radio Ad - Pilbara and Kimberley Aboriginal Media Radio	Pilbara and Kimberley towns and communities, focusing on remote communities	N/A
18 April 2024	Press Ad Western Australian	Half page, page 15	Targeted WA with reach of 359,000
1 May 2024	Press Ad North West Telegraph	Half page, page 9	Targeted WA with reach of 8,154
1 May 2024	Press Ad Midwest Times	Half page, page 13	Targeted WA with reach of 50,534
1 May 2024	Press ad Pilbara News Guardian	Half page, page 11	Targeted WA with reach of 17,611
Consultation 12 May to 28 June 2024			
15 May to 14 June 2024	Social Media notice	Facebook, Instagram and Messenger	Geotargeted PPL18+ Pilbara and Exmouth
15 May to 14 June 2024	Radio Ad - Karratha HIT 106.5	Karratha towns and communities, focusing on remote communities	N/A
15 May to 14 June 2024	Radio Ad - WA Remote HIT WA FM	WA remote towns and communities	N/A
15 May to 14 June 2024	Radio Ad - Pilbara and Kimberley Aboriginal Media Radio	Pilbara and Kimberley towns and communities, focusing on remote communities	N/A
16 May 2024	Press Ad Western Australian	Half page, page 17	Targeted WA with reach of 359,000
29 May 2024	Press Ad North West Telegraph	Half page, page 4	Targeted WA with reach of 8,154
29 May 2024	Press Ad Midwest Times	Half page, page 2	Targeted WA with reach of 50,534
29 May 2024	Press ad Pilbara News Guardian	Half page, page 3	Targeted WA with reach of 17,611

4.6 Consultation Report

A summary report including the outcomes of consultation with relevant persons, including any objections or claims and Santos' assessment of them, satisfying the requirements of section 24(b)(i)-(iii) of the OPGGS(E)R, is provided in **Table 4-9**. The full records of relevant persons consultation, as required by section 24(b)(iv) of the OPGGS(E)R, is provided in the Sensitive Information Report.

Where objections or claims made during consultation were considered relevant to this EP, sections within this EP and the OPEP have been referenced within the consultation report (**Table 4-9**) for each objection or claim, showing where existing information relevant to that objection or claim is located.

Where additional information or measures have been added to this EP or the OPEP (BAS-210 0131), resulting from the consultation process, references to relevant sections have also been made.

Where no response has been received from relevant persons and standing arrangements are in place Santos included these arrangements in the consultation report (**Table 4-9**) under “assessment of merits” with references to relevant sections of this EP.

Santos is committed to appropriate consultation post-acceptance of this EP with relevant government authorities and other relevant interested persons and organisations.

Having regard to the nature of relevant interested persons and organisations, Santos' post acceptance consultation implementation strategy has been tailored to provide for effective consultation with different groups, based on Santos’ experience consulting with these groups previously.

Section 8.13 describes the Santos’ post-acceptance consultation implementation strategy.

Table 4-9: Consultation Summary Report

Australian Border Force (ABF) (Maritime Border Command)			
On 15 April 2024 Santos emailed ABF regarding consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3775] The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed ABF to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4435] On 21 June 2024 Santos emailed ABF by way of reminder that the consultation period was closing on 28 June 2024. [Con-4546] On 8 October 2024, Santos emailed ABF an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5674] On 15 October 2024 Santos emailed ABF a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5906] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from ABF.			
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from ABF.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required	Not applicable.
Australian Fisheries Management Authority (AFMA)			
On 28 May 2024 Santos emailed AFMA and Department of Agriculture, Fisheries, and Forestry (DAFF) regarding consultation on the proposed activities to be managed under this EP, advising that consultation would close on 26 June 2024. [Con-4577]			

The email included an activity summary with a link to a general fact sheet and a fisher-specific fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked general fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

The linked fisher-specific fact sheet included an assessment of fisheries active in the operational area and those entitled to fish in the EMBA.

On 29 May 2024 DAFF responded to Santos on behalf of AFMA noting Santos' advice that there has been no recent fishing effort within the area of Commonwealth-managed waters impacted by EP activities, and neither DAFF nor AFMA have any comments in relation to the proposed activities. [Con-4579]

On 30 June 2024 Santos acknowledged the response of 29 May. [Con-4836]

On 8 October 2024, Santos emailed AFMA an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5675]

On 15 October 2024 Santos emailed AFMA a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5905]

No further correspondence or feedback was received from AFMA.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
DAFF confirmed on behalf of AFMA that AFMA did not have any comments in relation to the proposed activities.	This response does not raise an objection or claim about the adverse impact of each activity to which this EP relates. Santos also notes standard advice previously provided by AFMA with respect to activity notifications.	No response required.	Section 3.2.7.3. Notifications to AFMA are included in Table 8-4.

Australian Hydrographic Office (AHO)

On 15 April 2024 Santos emailed AHO regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3781]

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 16 April 2024 AHO emailed Santos to advise the email had been received and the data supplied will now be registered, assessed, prioritised, and validated in preparation for updating Navigational Charting products. [Con-3916]

On 29 May 2024 Santos emailed AHO to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4434]

On 21 June 2024 Santos emailed AHO by way of reminder that the consultation period was closing on 28 June 2024. [Con-4547]

On 8 October 2024, Santos emailed AHO an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5676]

On 15 October 2024 Santos emailed AHO a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5904]

No further correspondence or feedback was received from AHO. In the absence of any specific response, Santos has reverted to standard advice provided by AHO and AMSA with respect to maritime safety matters. Santos has considered and applied this standard advice to this EP, including activity notifications.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from AHO.	Santos will include all formal notification requirements in the relevant sections of this EP, specifically the following: Requirement to notify the AHO through datacentre@hydro.gov.au no less than 4 working weeks before operations commence for the promulgation of related notices to mariners. Requirement to notify AMSA and AHO on any changes to the intended operations.	No response required.	Notifications to AHO are included in Table 8-4.

Australian Institute of Marine Science (AIMS)

On 15 April 2024 Santos emailed AIMS regarding consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3776]

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed AIMS to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4433]

On 21 June 2024 Santos emailed AIMS by way of reminder that the consultation period was closing on 28 June 2024. [Con-4548]

On 8 October 2024, Santos emailed AIMS an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5677]

On 15 October 2024 Santos emailed AIMS a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5903]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from AIMS.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from AIMS.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required	Not applicable.

Australian Maritime Safety Authority (AMSA) – Maritime Safety

On 15 April 2024 Santos emailed AMSA – Maritime Safety regarding consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3780]

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed AMSA – Maritime Safety to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4432]

On 21 June 2024 Santos emailed AMSA– Maritime Safety by way of reminder that the consultation period was closing on 28 June 2024. [Con-4549]

On 27 June 2024. AMSA - Maritime Safety emailed Santos requesting the AMSA Joint Rescue Coordination Centre (JRCC) to be notified for promulgation of radio-navigation warnings 24-48 hours before operations commence. AMSA requested that the AHO should also be contacted no less than four working weeks before operations commence for the promulgation of related notices to mariners. AMSA also requested Santos to evaluate and implement adequate anti-collision measures. [Con-5076]

On 8 October 2024, Santos emailed AMSA– Maritime Safety an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5678]

On 15 October 2024 Santos emailed AMSA – Maritime Safety a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5902]

On 29 October 2024, AMSA emailed Santos advising it had no further feedback for the Ningaloo Vision Cessation of Operations and Floating Asset Removal Environment Plan. AMSA attached a copy of their correspondence from 27 June 2024, noting heavy vessel traffic will be encountered in the area of operation during these activities,

and included further details on maritime safety considerations, guidance on vessel notification protocols, AIS status, and anti-collision measures, as well as recommendations for contact with AMSA's Response Centre and the Australian Hydrographic Office. [Con-5959] On 5 November 2024 Santos emailed AMSA to acknowledge they had no further feedback. Additionally, Santos noted AMSA's previous feedback received on 27 June 2024 and confirmed Santos' compliance with its requests. [Con-5966] No further correspondence or feedback was received from AMSA – Maritime safety.			
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
AMSA requested Santos to notify AMSA's Rescue Centre (ARC) for promulgation of radio-navigation warnings 24-48 hours before operations commence and provided AMSA JRCC's communications expectations.	Santos notes feedback from AMSA.	Santos will notify AMSA's JRCC through rccaus@amsa.gov.au (Phone: 1800 641 792 or +61 2 6230 6811) for promulgation of radio-navigation warnings 24-48 hours before operations commence. Requirement to notify AMSA and AHO on any changes to the intended operations.	Notifications to AHO and AMSA JRCC are included in Table 8-4.
AMSA requested Santos to contact the Australian Hydrographic Office no less than four working weeks before operations commence for related notices to mariners.	Santos notes feedback from AMSA.	Santos will contact the Australian Hydrographic Office through datacentre@hydro.gov.au no less than 4 working weeks before operations commence for the promulgation of related notices to mariners.	AHO notifications are included in Table 8-4.
AMSA advised that vessels should exhibit appropriate lights and shapes to reflect the nature of operations, noting Santos' obligation to comply with the International Rules for Preventing Collisions at Sea (COLREGs), in particular, the use of appropriate lights and shapes. AMSA requested that vessels also ensure their navigation status was set correctly in the ship's AIS unit.	Santos notes feedback from AMSA.	Santos will ensure vessels exhibit appropriate lights and shapes to reflect the nature of operations – we are aware of the obligation to comply with the International Rules for Preventing Collisions at Sea (COLREGs), in particular, the use of appropriate lights and shapes to reflect the nature of operations (e.g. restricted in the ability to manoeuvre). Vessels should also	Table 8-2 contains a control measure that requires vessel navigation lighting and equipment is compliant with COLREGS/Marine Orders 30: Prevention of Collisions, and with Marine Orders 21: Safety of Navigation and Emergency Procedures

		ensure their navigation status is set correctly in the ship's AIS unit.	
AMSA advised that Santos should evaluate and implement adequate anti-collision measures, noting that collision risk mitigation measures may include: • additional warnings and/or lights, • offshore guard vessel/s, • installation of Automatic Identification System (AIS) units.	Santos notes feedback from AMSA.	Santos will evaluate and implement adequate anti-collision measures, including the collision risk mitigation measures cited by AMSA, being additional warnings and/or lights to attract attention, offshore guard vessel/s that can monitor traffic and take early action to alert a vessel approaching the area of operations and installation of AIS units.	Table 8-2 contains a control measure that requires vessel navigation lighting and equipment is compliant with COLREGS/Marine Orders 30: Prevention of Collisions, and with Marine Orders 21: Safety of Navigation and Emergency Procedures

Australian Maritime Safety Authority (AMSA) – Marine Pollution

On 15 April 2024 Santos emailed AMSA – Marine Pollution regarding consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3778]

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed AMSA – Marine Pollution to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4431]

On 21 June 2024 Santos emailed AMSA – Marine Pollution by way of reminder that the consultation period was closing on 28 June 2024. [Con-4550]

On 8 October 2024, Santos emailed AMSA – Marine Pollution an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5679]

On 15 October 2024 Santos emailed AMSA – Marine Pollution a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5901]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from AMSA – Marine Pollution.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from AMSA – Marine Pollution.	Santos considers it has provided sufficient information and a reasonable period of time for consultation.	No response required.	Not applicable.

	Santos considers Section 25 consultation requirements to have been met.		
Department of Agriculture, Forestry and Fisheries (DAFF) – Biosecurity (marine pests)			
On 15 April 2024 Santos emailed DAFF - Biosecurity regarding consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3782] The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 16 April 2024 DAFF - Biosecurity responded, noting the email of 15 April 2024. [Con-4598] On 29 May 2024 Santos emailed DAFF - Biosecurity to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4430] On 29 May 2024 an auto response was received from DAFF - Biosecurity advising they would respond to the enquiry as soon as possible. [Con-4587] On 21 June 2024 Santos emailed DAFF - Biosecurity by way of reminder that the consultation period was closing on 28 June 2024. [Con-4553] On 8 October 2024, Santos emailed DAFF - Biosecurity an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5680] On 15 October 2024 Santos emailed DAFF – Biosecurity a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5900] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from DAFF - Biosecurity.			
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from DAFF - Biosecurity.	In the absence of any specific response, Santos has reverted to standard advice provided by DAFF with respect to biosecurity matters. Santos has considered and applied this standard advice to this EP, including activity notifications. Santos considers it has provided sufficient information and a reasonable period of time for consultation.	No response required.	Santos' environmental management framework relevant to biosecurity risk is outlined in Section 7.2 and Table 8-2 and is consistent with DAFF requirements. Notifications to DAFF are included in Table 8-4.

	Santos considers Section 25 consultation requirements to have been met.		
Department of Agriculture, Forestry and Fisheries (DAFF) – Fisheries			
On 28 May 2024 Santos emailed DAFF - Fisheries regarding consultation on the proposed activities to be managed under this EP, advising that consultation would close on 26 June 2024. [Con-4578] The email included an activity summary with a link to a general fact sheet and a fisher-specific fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked general fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. The linked fisher-specific fact sheet included an assessment of fisheries active in the operational area and those entitled to fish in the EMBA. On 29 May DAFF - Fisheries responded to Santos noting Santos' advice that there has been no recent fishing effort within the area of Commonwealth-managed waters impacted by EP activities, and neither DAFF - Fisheries nor AFMA have any comments in relation to the proposed activities. [Con-4580] On 30 June 2024 Santos emailed DAFF – Fisheries thanking it for its response. [Con-4837] On 8 October 2024, Santos emailed DAFF - Fisheries an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. Santos received an out of office messa. [Con-5685] On 8 October 2024, Santos received an auto-response email from one respondent at the Department of Agriculture, Fisheries and Forestry (DAFF) indicating they were out of the office. [Con-5785] On 15 October 2024 Santos emailed DAFF - Fisheries a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5897] No further correspondence or feedback was received from DAFF – Fisheries.			
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
DAFF - Fisheries confirmed that it did not have any comments in relation to the proposed activities.	This response does not raise an objection or claim about the adverse impact of each activity to which this EP relates. Santos also notes standard advice previously provided by DAFF - Fisheries with respect to activity notifications.	Santos thanked DAFF – fisheries for its response.	Notifications to DAFF – Fisheries are included in Table 8-4. Section 3.2.7.3 (Commercial fisheries).

Department of Climate Change, Energy, the Environment and Water (DCCEEW) – Underwater Cultural Heritage (UCH)			
On 30 June 2024 Santos emailed DCCEEW (UCH) regarding consultation on the proposed activities to be managed under this EP, advising that this EP would be submitted on 1 August 2024 to NOPSEMA for assessment. [Con-4838] The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked general fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 19 July 2024 Santos emailed DCCEEW (UCH) by way of reminder that the EP would be submitted on 1 August 2024 to NOPSEMA for assessment.[Con-5142] On 8 October 2024, Santos emailed DCCEEW (UCH) an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5686] On 15 October 2024 Santos emailed DCCEEW (UCH) a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5895] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from DCCEEW (UCH).			
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from DCCEEW (UCH).	In the absence of any specific response, Santos has reverted to standard advice provided by DCCEEW with respect to underwater cultural heritage matters. Santos has considered and applied this standard advice to this EP, including activity notifications. Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Section 3.2.7.1 (cultural features) Notifications to DCCEEW (UCH) are included in Table 8-4.
Department of Climate Change, Energy, the Environment and Water (DCCEEW) – Post Approvals Branch			

On 19 August 2024 Santos met with DCCEEW - Post Approvals Branch. Santos provided DCCEEW an overview of the Ningaloo Vision decommissioning plan, confirming existing EPBC approvals and ongoing work for waste disposal and inventory. Santos noted that the project will involve NOPSEMA and DCCEEW, with a focus on safety, environmental approvals, and offshore regulations. [Con-5973]

On 22 October 2024, Santos emailed DCCEEW - Post Approvals Branch to introduce Santos' new General Manager of Decommissioning and to arrange a meeting to discuss Ningaloo Vision Decommissioning Project and in particular the Hazardous Waste Permit. Suggested meeting dates and times were also included in the email. [Con-5977]

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
DCCEEW asked if the NV has EPBC approval.	Santos acknowledges the enquiry from DCCEEW regarding the EPBC Act Approvals and notes its role in post approval compliance.	Santos confirms has two EPBC approvals that apply to the field.	Section 1.8.2.2
DCCEEW noted the activity would require NOPSEMA involvement.	Santos notes feedback from DCCEEW.	Santos confirmed it had been engaging with NOPSEMA and had submitted the EP for assessment. Santos confirmed it was updating the Safety Case and Well Operations Management Plan (WOMP).	The EP submitted for assessment was this EP.
DCCEEW enquired if NV has fire-fighting foams onboard and noted that could provide hazardous waste branch contacts if needed.	Santos acknowledges the enquiry on fire fighting foams from DCCEEW and will include details in an export permit, if a permit is required; and Santos has sought (email 22 October 2024) the opportunity to meet and obtain hazardous waste branch contacts. Whilst Santos doesn't consider the DCCEEW Hazardous Waste Branch a Relevant Person for the purposes of Section 25 EP consultation. Santos will continue to assess compliance with the Hazardous Waste Act and engage the Hazardous Waste branch, in so far as it	Santos will include details on fire fighting foams in the assessment of requirements for an export permit, insofar as the Hazard Waste Act is applicable to the FPSO. Santos emailed DCCEEW Post Approvals branch seeking a contact in the Hazardous Waste Branch.	Section 2.9.1 Section 8.7

	is a Regulator of Hazardous Waste Permits. Santos considers Section 25 consultation requirements to have been met.		

Department of Defence (DoD)

On 30 June 2024 Santos emailed DoD regarding consultation on the proposed activities to be managed under this EP, advising that this EP would be submitted on 1 August 2024 to NOPSEMA for assessment. [Con-4840]

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, a defence map, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked general fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 19 July 2024 Santos emailed Department of Defence by way of reminder that the consultation input is requested by 30 July 2024 ahead of EP submission on 1 August 2024. [Con-5140]

On 8 October 2024, Santos emailed DoD an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5687]

On 8 October 2024, Santos received an auto-response email from DoD advising that one intended recipient no longer works in the Offshore Petroleum area and requesting that Santos continues to send all emails to the Offshore Petroleum Enquiry inbox (note that the Offshore Petroleum Enquiry inbox had already been included as the other recipient). [Con-5786]

On 15 October 2024 Santos emailed DoD a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5894]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from DoD.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from DoD.	In the absence of any specific response, Santos has reverted to standard advice provided by DoD with respect to defence matters. Santos has considered and applied this standard advice to this EP, including activity notifications.	No response required.	Section 3.2.7.8 (defence) Notifications to DoD are included in Table 8-4

	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.		
Department of Industry, Science and Resources (DISR)			
On 15 April 2024 Santos emailed DISR regarding consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3783] The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed DISR to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4429] On 21 June 2024 Santos emailed DISR by way of reminder that the consultation period was closing on 28 June 2024. [Con-4557] On 8 October 2024, Santos emailed DISR an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5707] On 15 October 2024 Santos emailed DISR a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5893] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from DISR.			
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from DISR.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Director of National Parks (DNP)			

On 15 April 2024 Santos emailed DNP regarding consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3774]

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed DNP to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4427]

On 21 June 2024 Santos emailed DNP by way of reminder that the consultation period was closing on 28 June 2024. [Con-4558]

On 8 October 2024, Santos emailed DNP an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5708]

On 15 October 2024 Santos emailed DNP a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5982]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from DNP.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from DNP.	In the absence of any specific response, Santos has reverted to standard advice provided by DNP with respect to Australian Marine Parks, State Marine Parks Management Areas and Reserves. Santos has considered and applied this standard advice to this EP, including activity notifications. Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Section 3.2.5.1 (Australian Marine Parks and State Marine Parks, Management Areas and Reserves). Notifications to DNP are included in Table 8-4.

Regulation 25A(1)(a): Departments or agencies of Western Australia to which the activities to be carried out under the environment plan may be relevant

Department of Biodiversity, Conservation and Attractions (DBCA)

On 15 April 2024 Santos emailed DBCA regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3773].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed DBCA to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4446]

On 4 June 2024 DBCA responded to Santos in relation to petroleum production activities in proximity to ecologically sensitive receptors, with specific reference to baseline monitoring and oil spill preparedness. [Con-4591]

On 24 June 2024 DBCA further responded to Santos confirm its correspondence of 4 June 2024. [Con-5077]

On 1 July 2024, Santos responded to DBCA, providing feedback on their response on ecological important areas located in the vicinity of the proposed activity and within the wider EMBA. In addition, Santos responded to DBCA's recommendation that Santos undertake early consultation with DBCA should any activities require access to reserves managed by DBCA or requiring the taking / disturbance of threatened fauna listed under the BC Act in State waters. [Con-4830]

On 8 October 2024, Santos emailed DBCA an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5776]

On 15 October 2024 Santos emailed DBCA a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5890]

No further correspondence or feedback was received from DBCA.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
DBCA noted the need for baseline monitoring of receptors given the proximity of activities to the Ningaloo Marine Park (M2), the Muiron Islands Marine Management Area (M 12) and Muiron Islands Nature Reserve (R 31775).	Santos acknowledges that there are ecologically important areas located in the vicinity of the proposed activities, and within the wider EMBA.	Santos responded that: Values and sensitivities of marine parks would be documented in Section 3 (Existing Environment Description) of the EP which provides the state of environment to inform the risk and impacts of the proposed activities. Santos baseline data was reviewed every two years. In areas where limited baseline data was available, post spill pre-impact monitoring for the relevant	Section 3.2.5.1 (Australian Marine Parks and State Marine Parks, Management Areas and Reserves). Sections 7.6 (Hydrocarbon spill, Marine Diesel) and 7.7 (Hydrocarbon Spill - Loss of Well control

		receptors would be carried out in line with Santos' Operational and Scientific Monitoring Plan (OSMP). The potential area that could be affected by an unplanned hydrocarbon release were risk and impact assessed and would be documented in Sections 7.6 (Hydrocarbon spill, Marine Diesel) and 7.7 (Hydrocarbon Spill - Loss of Well control) of the EP, with appropriate measures applied to reduce the potential risk and impacts to ALARP and acceptable levels.	
DBCA welcomed additional information in relation to its monitoring of receptors or oil spill response preparedness for proposed activities.	Santos acknowledges DBCA's request for further information.	Santos responded that there was no further information to provide in relation to monitoring of receptors or oil spill responses preparedness for proposed activities.	NA
DBCA recommended that Santos undertake early consultation with DBCA should any activities require access to reserves managed by DBCA or requiring the taking / disturbance of threatened fauna listed under the BC Act in State waters.	Santos notes feedback provided by DBCA.	Santos responded that it would engage with DBCA to obtain appropriate permissions should any activities require access to reserves managed by DBCA or requiring the taking / disturbance of threatened fauna listed under the BC Act in State waters.	NV CoPFAR OPEP Sections 7.6 (Hydrocarbon spill, Marine Diesel) and 7.7 (Hydrocarbon Spill - Loss of Well control)
Department of Planning, Lands and Heritage (DPLH)			
On 15 April 2024 Santos emailed DPLH regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3769]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed DPLH to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4447] On 21 June 2024 Santos emailed DPLH by way of reminder that the consultation period was closing on 28 June 2024. [Con-4568]			

On 8 October 2024, Santos emailed DLPH an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5774]

On 15 October 2024 Santos emailed DLPH a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5888]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from DPLH.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from DPLH.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Section 3.2.7.1 (cultural features)

Department of Primary Industries and Regional Development (DPIRD) – Fisheries

On 15 April 2024 Santos emailed DPIRD regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3768].

The email included an activity summary with a link to a general fact sheet and a fisher-specific fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked general fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

The linked fisher-specific fact sheet included an assessment of fisheries active in the operational area and those entitled to fish in the EMBA.

On 28 May 2024 Santos emailed DPIRD to share information Santos had sent to relevant fishing industry associations and attached a fisher fact sheet with information about the proposed activities for the progressive decommissioning of the Ningaloo Vision facility and associated facilities offshore North West Cape, Western Australia. [Con-4599]

On 8 October 2024, Santos emailed DPIRD an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5773]

On 15 October 2024 Santos emailed DPIRD a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5887]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from DPIRD.

Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
No response was received from DPIRD.	In the absence of any specific response, Santos has reverted to standard advice provided by DPIRD with respect to commercial fishing matters. Santos has considered and applied this standard advice to this EP, including activity notifications. Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements have been met.	No response required.	Section 3.2.7.3 (commercial fisheries). Notifications to DPIRD are included in Table 8-4
Department of Transport (DoT) – marine pollution			
On 31 May 2024 Santos emailed DoT to advise that it had commenced consultation for this EP, which would run until 1 July 2024. [Con-4600] On 11 June 2024 DoT responded to Santos asking to be consulted if there is a risk of spill impacting state waters from the proposed activities as outlined in its Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements (July 2020). [Con 4590] On 22 July 2024 Santos emailed Department of Transport, referring to the DoT Offshore Petroleum Industry Guidance Note – Marine Oil Pollution: Response and Consultation Arrangements (July 2020). In this correspondence, Santos also emailed the draft Ningaloo Vision Cessation of Production and Floating Asset Removal (CoPFAR) OPEP for DoT's review. Santos also informed DoT that the NV CoPFAR OPEP will be submitted with the EP in due course. [Con-5168] On 3 September 2024 DoT emailed Santos, informing Santos that they had completed their review of the EP and provided comments. [Con-5671] On 4 September 2024 Santos emailed DoT and advised it would address their comments in the next revision. [Con-5672] On 8 October 2024, Santos emailed DoT an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5790] On 8 October 2024, Santos received an auto-generated email response from DoT. [Con-5788] On 15 October 2024 Santos emailed DoT a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5886] No further correspondence or feedback was received from DoT.			
Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*

DoT responded by requesting consultation if there is a risk of spill impacting State water from the proposed activities.	Santos notes feedback provided by DoT.	Santos responded by sending DoT a copy of the draft Ningaloo Vision Cessation of Production and Floating Asset Removal (CoPFAR) OPEP for review. Santos also informed DoT that the NV CoPFAR OPEP will be submitted with the EP in due course.	Not applicable.
After reviewing the OPEP DoT asked Santos to reference the WA DoT Incident Management Plan – Marine Oil Pollution in the OPEP which supersedes the WA DoT Oil Spill Contingency Plan, and to confirm that there are references to a specific DoT number for reporting il spills.	Santos notes feedback provided by DoT. These comments have now been addressed in the latest revision.	These comments have now been addressed in the latest revision of the .	Not applicable.
Department of Water and Environmental Regulation (DWER)			
On 15 April 2024 Santos emailed DWER regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3770] The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 15 April 2024 DWER sent an automatic reply in response. [Con-4593] On 29 May 2024 Santos emailed DWER to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4449] On 29 May 2024 DWER sent an automatic reply in response. [Con-4592] On 21 June 2024 Santos emailed DWER by way of reminder that the consultation period was closing on 28 June 2024. [Con-4569] On 26 June 2024 DWER responded to Santos noting it had no comments to make in regard to the activity as it is located in Commonwealth waters. [Con-5044] On 8 October 2024, Santos emailed DWER an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5775] On 8 October 2024 Santos received an auto-generated response from DWER. [Con-5787] On 15 October 2024 Santos emailed DWER a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5889] On 15 October 2024 Santos received an auto-generated response from DWER. [Con-5934]			

No further correspondence or feedback was received from DWER.

Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
DWER responded that it did not have any comments in relation to the proposed activities.	This response does not raise an objection or claim about the adverse impact of each activity to which this EP relates.	No response required.	Not applicable.

Department of Jobs, Tourism, Science and Innovation (JTSI)

On 15 April 2024 Santos emailed JTSI regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3772].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed JTSI to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4450]

On 21 June 2024 Santos emailed JTSI by way of reminder that the consultation period was closing on 28 June 2024. [Con-4570]

On 8 October 2024, Santos emailed JTSI an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5777]

On 15 October 2024 Santos emailed JTSI a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5891]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from JTSI.

Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
No response was received from JTSI.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Gascoyne Development Commission (GDC)

On 15 April 2024 Santos emailed GDC regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3765].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed GDC to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4439]

On 21 June 2024 Santos emailed GDC by way of reminder that the consultation period was closing on 28 June 2024. [Con-4565]

On 28 June 2024 GDC sent an automatic reply in response. [Con-5079]

On 8 October 2024, Santos emailed GDC an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5770]On 15 October 2024 Santos emailed GDC a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5882]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from GDC.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from GDC.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Ningaloo Coast World Heritage Advisory Committee (NCWHAC)

On 15 April 2024 Santos emailed NCWHAC regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3766].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed NCWHAC to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4601]

On 21 June 2024 Santos emailed NCWHAC by way of reminder that the consultation period was closing on 28 June 2024. [Con-4567]

On 8 October 2024, Santos emailed NCWHAC an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5772]

On 8 October 2024, Santos received an auto-reply email from NCWHAC requesting an update to its contact details, providing new recipient information. [Con-5789]

On 8 October 2024, Santos emailed NCWHAC, noting the change of contact details and have updated their contact database. [Con-5884]

On 15 October 2024 Santos emailed NCWHAC a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5885]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from NCWHAC.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from NCWHAC.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Pilbara Development Commission (PDC)

On 15 April 2024 Santos emailed PDC regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3763].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed PDC to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4438].

On 30 May 2024 PDC emailed Santos to advise that this activity is not relevant to the PDC. [Con-4589]

On 1 July 2024, Santos emailed the PDC to acknowledge their email of 30 May advising Santos the activity described in the EP was not relevant to the PDC. [Con-4827]

On 8 October 2024, Santos emailed PDC an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5769]

On 15 October 2024 Santos emailed PDC a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5881]

No further correspondence or feedback was received from PDC.

Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
PDC responded that it did not have any comments in relation to the proposed activities.	This response does not raise an objection or claim about the adverse impact of each activity to which this EP relates.	No response required.	Not applicable.

Pilbara Ports Authority (PPA)

On 15 April 2024 Santos emailed PPA regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3761].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed PPA to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4437]

On 21 June 2024 Santos emailed PPA by way of reminder that the consultation period was closing on 28 June 2024. [Con-4564]

On 8 October 2024, Santos emailed PPA an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5768]

On 15 October 2024 Santos emailed DoT a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5880]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from PPA.

Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
No response was received from PPA.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Western Australian Museum (WAM)

On 15 April 2024 Santos emailed WAM regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3764].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed WAM to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4440]

On 21 June 2024 Santos emailed WAM by way of reminder that the consultation period was closing on 28 June 2024. [Con-4566]

On 8 October 2024, Santos emailed WAM an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5771]

On 15 October 2024 Santos emailed WAM a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5883]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from WAM.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from NCWHAC.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Regulation 25(1)(b): Department of the responsible Western Australian Minister

Department of Energy, Mines, Industry Regulation and Safety (DEMIRS)

On 15 April 2024 Santos emailed DEMIRS regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3760].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed DEMIRS to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4436]

On 21 June 2024 Santos emailed DEMIRS by way of reminder that the consultation period was closing on 28 June 2024. [Con-4563]

On 14 October 2024, Santos emailed DEMIRS an activity update relating to vessel-based flushing and requested any comments or feedback by 28 October 2024. [Con-5801]

On 21 October 2024 Santos emailed DEMIRS a reminder that the comment period for the activity update was closing on 28 October 2024. [Con-5935]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from DEMIRS. In the absence of any specific response, Santos has reverted to standard advice provided by DEMIRS with respect to activities that have implications for WA managed lands and waters. Santos has considered and applied this standard advice to this EP, including activity notifications.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from DEMIRS.	Santos will include all formal notification requirements in the relevant sections of this EP, specifically the following: Santos will notify DEMIRS four weeks prior to the start and upon activity completion. Santos will notify DEMIRS in the event an unplanned spill has the potential to impact WA State managed lands and waters.	No response required.	Notifications to DEMIRS are included in Table 8-4.

Regulation 25(1)(d): Persons or organisations whose functions, interests or activities may be affected by the activities to be carried out under the environment plan, or the revision of the environment plan

Academic and research organisations

Western Australian Marine Science Institution (WAMSI)

On 15 April 2024 Santos emailed WAMSI regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3759].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed WAMSI to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4403]

On 21 June 2024 Santos emailed WAMSI by way of reminder that the consultation period was closing on 28 June 2024. [Con-4525]

On 8 October 2024, Santos emailed WAMSI an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5767]

On 15 October 2024 Santos emailed WAMSI a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5879]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from WAMSI.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from NCWHAC.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Commonwealth Scientific and Industrial Research Organisation (CSIRO)

On 15 April 2024 Santos emailed CSIRO regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3756].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed CSIRO to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4402]

On 29 May 2024 CSIRO sent an automatic reply in response. [Con-5075]

On 10 June 2024 CSIRO sent an automatic reply requesting if any follow up was needed. [Con 5074]

On 21 June 2024 Santos emailed CSIRO by way of reminder that the consultation period was closing on 28 June 2024. [Con-4526]

On 8 October 2024, Santos emailed CSIRO an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5766]

On 8 October 2024 Santos received an auto-generated response from CSIRO. [Con-5791]

On 15 October 2024 Santos emailed CSIRO a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5878]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from CSIRO.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from CSIRO.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Curtin University (Centre for Marine Science and Technology – CU-CMST)

On 15 April 2024 Santos emailed CU-CMST regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3758].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed CU-CMST to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4401]

On 21 June 2024 Santos emailed CU-CMST by way of reminder that the consultation period was closing on 28 June 2024. [Con-4527]

On 8 October 2024, Santos emailed CU-CMST an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5765]

On 15 October 2024 Santos emailed CU-CMST a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5877]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from CU-CMST.

Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
No response was received from CU-CMST.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
University of Western Australia (UWA)			
On 15 April 2024 Santos emailed UWA regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3755]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed UWA to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4400] On 21 June 2024 Santos emailed UWA by way of reminder that the consultation period was closing on 28 June 2024. [Con-4528] On 8 October 2024, Santos emailed UWA an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5764] On 8 October 2024 Santos received an auto-generated response from UWA. [Con-5792] On 15 October 2024 Santos emailed UWA a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5876] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from UWA.			
Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
No response was received from UWA.	Santos considers it has provided sufficient information and a reasonable period of time for consultation.	No response required.	Not applicable.

	Santos considers Section 25 consultation requirements to have been met.		
Minderoo Foundation research (MF)			
On 15 April 2024 Santos emailed MF regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3754]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed MF to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4597] On 21 June 2024 Santos emailed MF by way of reminder that the consultation period was closing on 28 June 2024. [Con-4529] On 8 October 2024, Santos emailed MF an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024 [Con-5763] On 15 October 2024 Santos emailed MF a reminder that the comment period for the activity update was closing on 22 October 2024 [Con-5875] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from MF.			
Summary of response by relevant person	***Assessment of merits***		***EP reference***
No response was received from MF.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Commercial fishing – Commonwealth managed			
North West Slope Trawl Fishery			
Consulted via AFMA nominated contact organisation - Commonwealth Fisheries Association.			
Southern Bluefin Tuna Fishery			

Consulted via AFMA nominated contact organisation - Australian Southern Bluefin Tuna Industry Association, Commonwealth Fisheries Association.
Western Deepwater Trawl Fishery
Consulted via AFMA nominated contact organisation - Commonwealth Fisheries Association.
Western Skipjack Fishery
Consulted via AFMA nominated contact organisation - Australian Southern Bluefin Tuna Industry Association, Commonwealth Fisheries Association.
Western Tuna and Billfish Fishery
Consulted via AFMA nominated contact organisation – Tuna Australia
Energy industry – Petroleum titleholders and GHG permit holders
AGI Tubridgi (AGI)
On 15 April 2024 Santos emailed AGI regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3752]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed AGI to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4418] On 21 June 2024 Santos emailed AGI by way of reminder that the consultation period was closing on 28 June 2024. [Con-4530] On 8 October 2024, Santos emailed AGI an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5762] On 15 October 2024 Santos emailed AGI a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5874]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from AGI.			
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from AGI Tubrigi.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Carnarvon Energy			
On 15 April 2024 Santos emailed Carnarvon Energy regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3753]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed Carnarvon Energy to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4417] On 30 May 2024, Carnarvon Energy emailed Santos to advise that there were no comments to add to the proposal. [Con-4583] On 1July 2024, Santos emailed Carnarvon Energy to acknowledge their email of 30 May advising Santos they had no comments on the activity described in the EP. [Con-4828] On 8 October 2024, Santos emailed Carnarvon Energy an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5761] On 15 October 2024 Santos emailed Carnarvon Energy a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5873]			
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
Carnarvon Energy responded that it did not have any comments in relation to the proposed activities.	This response does not raise an objection or claim about the adverse impact of each activity to which this EP relates.	No response required.	Not applicable.

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Chevron Australia			
On 15 April 2024 Santos emailed Chevron Australia regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3748]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed Chevron Australia to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4416] On 21 June 2024 Santos emailed Chevron Australia by way of reminder that the consultation period was closing on 28 June 2024. [Con-4531] On 8 October 2024, Santos emailed Chevron an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5760] On 15 October 2024 Santos emailed Chevron a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5872] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Chevron Australia.			
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received by Chevron Australia.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Coastal Oil & Gas (COG)			
On 23 April 2024 Santos emailed COG regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3747]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.			

On 29 May 2024 Santos emailed COG to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4415]

On 21 June 2024 Santos emailed COG by way of reminder that the consultation period was closing on 28 June 2024. [Con-4532]

On 8 October 2024, Santos emailed COG an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5759]

On 15 October 2024 Santos emailed COG a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5871]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from COG.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Coastal Oil and Gas.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Energy Resources

On 15 April 2024 Santos emailed Energy Resources regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3750].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Energy Resources to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4412]

On 21 June 2024 Santos emailed Energy Resources by way of reminder that the consultation period was closing on 28 June 2024. [Con-4533]

On 8 October 2024, Santos emailed Energy Resources an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5758]

On 15 October 2024 Santos emailed Energy Resources a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5870]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Energy Resources.

Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
No response was received from Energy Resources.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Eni Australia			
On 15 April 2024 Santos emailed Eni Australia regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3710]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed Eni Australia to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4409] On 6 June 2024, Eni Australia responded to Santos with no concerns regarding this activity. [Con-4582] On 1 July 2024, Santos emailed Eni Australia to acknowledge their email of 6 June advising Santos they had no comments about the activity described in the EP. [Con-4829] On 8 October 2024, Santos emailed Eni Australia an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5757] On 15 October 2024 Santos emailed ENI a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5869]		
Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
Eni Australia responded that it did not have any comments in relation to the proposed activities.	This response does not raise an objection or claim about the adverse impact of each activity to which this EP relates.	No response required.	Not applicable.

KATO Energy

On 15 April 2024 Santos emailed KATO regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3708].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed KATO to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4408]

On 21 June 2024 Santos emailed KATO by way of reminder that the consultation period was closing on 28 June 2024. [Con-4534]

On 8 October 2024, Santos emailed KATO an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024 [Con-5756]

On 15 October 2024 Santos emailed KATO a reminder that the comment period for the activity update was closing on 22 October 2024 [Con-5868]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from KATO.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from KATO Energy.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

KUFPEC

On 15 April 2024 Santos emailed KUFPEC regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3709].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed KUFPEC to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4407]

On 21 June 2024 Santos emailed KUFPEC by way of reminder that the consultation period was closing on 28 June 2024. [Con-4535]

On 8 October 2024, Santos emailed KUFPEC an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5755]

On 15 October 2024 Santos emailed KUFPEC a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5867]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from KUFPEC.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from KUFPEC.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Mobil Australia Resources Company (Mobil)

On 15 April 2024 Santos emailed Mobil regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3707].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Mobil to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4406]

On 21 June 2024 Santos emailed Mobil by way of reminder that the consultation period was closing on 28 June 2024. [Con-4536]

On 8 October 2024, Santos emailed Mobil an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5754]

On 15 October 2024 Santos emailed Mobil a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5866]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Mobil.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***

No response was received from Mobil Australia Resources Company.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Western Gas			
On 15 April 2024 Santos emailed Western Gas regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3704]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed Western Gas to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4405] On 21 June 2024 Santos emailed Western Gas by way of reminder that the consultation period was closing on 28 June 2024. [Con-4537] On 8 October 2024, Santos emailed Western Gas an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5753] On 15 October 2024 Santos emailed Western Gas a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5865] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Western Gas.			
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Western Gas.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Woodside Energy			

On 15 April 2024 Santos emailed Woodside Energy regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3703].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Woodside Energy to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4404]

On 21 June 2024 Santos emailed Woodside Energy by way of reminder that the consultation period was closing on 28 June 2024. [Con-4538]

On 8 October 2024, Santos emailed Woodside Energy an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5752]

On 15 October 2024 Santos emailed Woodside Energy a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5864]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Woodside Energy.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Woodside Energy.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Environmental conservation organisations

Australian Conservation Foundation (ACF)

On 15 April 2024 Santos emailed ACF regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3706].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed ACF to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4426]

On 21 June 2024 Santos emailed ACF by way of reminder that the consultation period was closing on 28 June 2024. [Con-4539]

On 8 October 2024, Santos emailed ACF an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5751]

On 15 October 2024 Santos emailed ACF a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5863]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from ACF.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from ACF.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Cape Conservation Group (CCG)

On 15 April 2024 Santos emailed CCG regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3702].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed CCG to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4425]

On 21 June 2024 Santos emailed CCG by way of reminder that the consultation period was closing on 28 June 2024. [Con-4541]

On 8 October 2024, Santos emailed CCG an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5750]

On 15 October 2024 Santos emailed CCG a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5862]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from CCG.

Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
No response was received from CCG.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Conservation Council of WA (CCWA)			
On 15 April 2024 Santos emailed CCWA regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3701]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed CCWA to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4424] On 21 June 2024 Santos emailed CCWA by way of reminder that the consultation period was closing on 28 June 2024. [Con-4540] On 8 October 2024, Santos emailed CCWA an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5749] On 15 October 2024 Santos emailed CCWA a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5861] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from CCWA.			
Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
No response was received from CCWA.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Greenpeace Australia Pacific (GAP)

On 15 April 2024 Santos emailed GAP regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3700].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed GAP to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4423]

On 21 June 2024 Santos emailed GAP by way of reminder that the consultation period was closing on 28 June 2024. [Con-4542]

On 8 October 2024, Santos emailed GAP an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5748]

On 15 October 2024 Santos emailed GAP a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5860]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from GAP.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from GAP.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

International Fund for Animal Welfare (IFAW)

On 15 April 2024 Santos emailed IFAW regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3699].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed IFAW to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4422]

On 21 June 2024 Santos emailed IFAW by way of reminder that the consultation period was closing on 28 June 2024. [Con-4543]

On 8 October 2024, Santos emailed IFAW an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5747]

On 15 October 2024 Santos emailed IFAW a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5859]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from IFAW.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from IFAW.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Protect Ningaloo

On 15 April 2024 Santos emailed Protect Ningaloo regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3698].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Protect Ningaloo to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4421]

On 21 June 2024 Santos emailed Protect Ningaloo by way of reminder that the consultation period was closing on 28 June 2024. [Con-4544]

On 8 October 2024, Santos emailed Project Ningaloo an activity update relating to vessel-based flushing and requested any comments or feedback by 22 October 2024. [Con-5746]

On 15 October 2024 Santos emailed Project Ningaloo a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5858]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Protect Ningaloo.

Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
No response was received from Protect Ningaloo.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
The Wilderness Society (TWS)			
On 15 April 2024 Santos emailed TWS regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3697]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed TWS to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4420] On 6 June 2024 TWS responded to Santos requesting an online to discuss the proposed activity. [Con-4581] On 1 July 2024 Santos emailed and called TWS to hold a meeting to discuss proposed activities. [Con-4846] Between 4 and 10 July 2024 Santos and TWS corresponded by email to arrange an online meeting. [Con-5051]. On 15 July 2024 an online meeting was held between Santos and TWS that discussed the proposed activity. The meeting focused on increasing TWS knowledge of the Ningaloo Vision assets, potential impacts from planned activities and potential risks from unplanned events. No objection or claim about the adverse impact of each activity to which this EP relates was raised at this time. [Con-5132] On 17 July 2023 Santos emailed TWS thanking TWS for the meeting. [Con-5118] On 5 August TWS emailed Santos and requested a draft copy of the EP. [Con-5912] On 8 October 2024, Santos emailed TWS an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024 [Con-5745] On 15 October 2024 Santos emailed TWS to remind them that the comment period for the activity update regarding the Ningaloo Vision Cessation of Operations and Floating Asset Removal Environment Plan (NV CoPFAR EP) closes on 22 October 2024. [Con-5857] On 18 October 2024 TWS emailed Santos and:			

- TWS raised concerns about the decommissioning timeframes outlined in this environment plan, citing an increased risk of leaks and contamination to the marine environment. They also expressed doubts about Santos' future financial capacity to carry out necessary cleanup operations.
- TWS objected to the practice of leaving mooring lines on the seabed, asserting that they should be included in the Cessation of Operations and Floating Asset Removal Environmental Plan.
- TWS emphasised its preference for vessel decommissioning to occur in Australia, highlighting the significant opportunities it would create for local jobs and its positive impact on the country's economy. [Con-5921]

On 5 November 2024 Santos emailed TWS in response to questions and concerns raised in their correspondence of 18 October 2024. [Con-5965]

Summary of response of relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
TWS asked questions about decommissioning timelines, mooring lines and FPSO dismantling. TWS raised concerns about the decommissioning timeframes. TWS objected to the practice of leaving mooring lines on the seabed, TWS emphasised its preference for vessel decommissioning to occur in Australia.	Santos acknowledges TWS feedback with concerns on timeframes, objection to leaving mooring lines on the seabed and its preference for Australian based vessel decommissioning.	Information was provided in relation to the activity in the meeting. Section 1.5.3 outlines further detail to support Santos' proposed decommissioning strategy and how activities are planned to be undertaken in timeframes to allow for decommissioning to be undertaken safely and efficiently and in accordance with the OPGGS (E) Regs. Section 1.3 describes how if deemed safe and practicable to do so, the unburied section of the DTM mooring lines may be removed as part of the FAR activities. Wet parking on seabed is only a contingency if they cannot be safely and practicably removed. Santos acknowledges TWS preference for Australian based vessel decommissioning and notes that the FPSO will transit to either an Australian or international port for cleaning and / or final dismantling, recycling with a final decision to be made post tender assessment.	Section 1.5.3 Section 1.3 Section 2.9.1 Section 2.12.2 Section 2.5 Section 1.8.1

World Wildlife Fund (WWF)			
On 15 April 2024 Santos emailed WWF regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3696]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 15 April 2024 WWF responded with an automatic reply and enquiry/ticket number: 190118 [Con-4585] On 29 May 2024 Santos emailed WWF to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4419]. On 29 May 2024 WWF responded with an automatic reply and enquiry/ticket number: 194310. [Con-4584] On 21 June 2024 Santos emailed WWF by way of reminder that the consultation period was closing on 28 June 2024. [Con-4545]. On 8 October 2024, Santos emailed WWF an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024 [Con-5744] On 8 October 2024 Santos received an automatic reply and enquiry/ticket number: 208695. [Con-5793] On 15 October 2024 Santos emailed WWF a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5855] On 15 October 2024 Santos received an automatic reply and enquiry/ticket number: 209350. [Con-5856] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from WWF.			
Summary of response of relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from WWF.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
First Nations peoples and groups			
Native Title Representative Bodies (NTRB)			

Yamatji Marlpa Aboriginal Council (YMAC) – Pilbara, Murchison and Gascoyne Region

On 07 March 2024 Santos emailed YMAC in its capacity as the Native Title Representative Body for the Pilbara Region, advising of a number of activities it sees as being of importance to NTGAC people and offering consultation. Santos offered to fly to Exmouth or Carnarvon to meet with the Board, or Elders or Working Group if requested. A General Report (prepared for NTGAC as per YMAC Guidelines) was attached to this correspondence that included details of this and other general activities. [Con-3954]

On 28 June 2024 Santos emailed YMAC in its capacity as the Native Title Representative Body for the Pilbara Region, advising that Santos had sought to consult with all relevant First Nations groups including Buurabalayji Thalanyji Aboriginal Corporation (BTAC), Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC) and Wirrawandi Aboriginal Corporation (WAC). Santos further advised that there would be opportunity for YMAC to provide input on this EP prior to EP submission to NOPSEMA on 1 August 2024 for assessment. [Con-4847]

On 17 July 2024 Santos emailed YMAC in its capacity as the Native Title Representative Body for the Pilbara Region by way of reminder that the EP would be submitted on 1 August 2024 to NOPSEMA for assessment. [Con-5128]

On 8 October 2024, Santos emailed YMAC an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5743]

On 15 October 2024 Santos emailed YMAC a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5854]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from YMAC.

Summary of response or relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from YMAC.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements have been met.	No response required.	Not applicable.

Native Title Prescribed Bodies Corporate – Pilbara region

Buurabalayji Thalanyji Aboriginal Corporation (BTAC)

On 20 February 2024 Santos emailed BTAC and requested a meeting to discuss upcoming Santos activities, including Ningaloo Vision. On the same day, BTAC emailed Santos offering a meeting on 12 March 2024 [Con-4848]

On 12 March 2024 Santos met with BTAC in its offices in South Perth and provided BTAC with a General Report, including details about Ninglaloo Vision decommissioning activities. [Con-5156]

On 12 March 2024 Santos emailed BTAC further to its meeting of the same day and requested BTAC feedback if further consultation was required. [Con-3920]

On 13 March 2024 BTAC emailed Santos to thank it for the presentation and noted the most immediate event to occur would be the decision regarding Ningaloo Vision and requested to be kept informed. [Con-3921]

On 27 June 2024 Santos emailed BTAC with an updated General Report, including Santos activities proximate to BTAC's interests. [Con-5045]

On 28 June 2024 Santos emailed BTAC advising that the consultation period for Ningaloo Vision was concluding on 28 June 2024. [Con-5031]

On 8 October 2024, Santos emailed BTAC an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024 [Con-5739]. Santos resent to BTAC the previously sent factsheet containing information about the EP on the same day. [Con-5800]

On 15 October 2024 Santos emailed BTAC a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5805]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from BTAC.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from BTAC.	Santos has made considerable and significant efforts since February 2024 to try and engage and consult with BTAC, including the development of a consultation agreement. Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC) via YMAC as the nominated contact organisation

On 10 November 2023 Santos emailed NTGAC and requested a meeting. Santos provided NTGAC with a General Report, including details about Ninglaloo Vision decommissioning activities. [Con-2649]

On 27 November 2023 Santos contacted NTGAC, reiterating its request for a meeting [Con-2784]

On 29 January 2024 Santos contacted NTGAC following up on previous emails, and provided an updated General Report and further requested a meeting. [Con-3090].

On 21 February 2024 NTGAC emailed Santos, noting it would be in touch in a week to restart discussions with NTGAC on a consultation agreement. Santos responded, acknowledging the email the same day [Con-3848]

On 26 February 2024 Santos emailed NTGACand advised that the consultation period for Ningaloo Vision was starting and that Santos was willing to travel as appropriate in order to meet with NTGAC persons. [Con-5057].On the same day, NTGAC responded asking for information on the date of submission of the EP [Con-5057]. Santos responded the same day and provided advice on timing. [Con-5058] On 07 March 2024 Santos emailed NTGAC following a telephone call and restated there were upcoming consultation of potential interest to NTGAC and included a copy of the General Report sent in November 2023. [Con-3954] On 17 April 2024 Santos emailed NTGAC with information on Ningaloo Vision decommissioning activities, including a fact sheet and map, and advice that consultation started on 15 April and will conclude on approximately 14 June 2024. Santos advised it considered it important to ensure NTGAC people hear about the closure of Ningaloo Vision operations, and requested a meeting with the board or executive. The email included the General Report. [Con-3785] On 13 May 2024 Santos emailed NTGAC with general information about planned and proposed Santos projects and requested a meeting. [Con-3969] On 12 June 2024 Santos emailed NTGAC again requesting a meeting and offered to meet directly with NTGAC personnel in Exmouth in July. [Con-5059]. On 13 June 2024 NTGAC emailed Santos and advised that a meeting in Exmouth was not possible, but that the possibility of other dates for meeting would be discussed and NTGAC would get back to Santos. [Con-5060] On 28 June 2024, Santos emailed NTGAC advising that the consultation period was concluding as of 28 June 2024. [Con-5032] On 31 July 2024, a representative of NTGAC emailed Santos by way of introduction as the Coordinator for NTGAC and proposed a meeting on 12 September 2024. Santos replied the same day and confirmed that meeting date.[Con-5941] On 20 August 2024 Santos emailed NTGAC and provided a draft agenda for the meeting on 12 September 2024. NTGAC responded the same day and indicated who would be in attendance at the meeting and Santos further acknowledged that email. [Con-5938] On 21 August 2024 NTGAC advised Santos of an increase in budget for the Scheduled meeting. [Con-5940] On 27 August 2024 Santos acknowledged the email of 21 August 2024 and confirmed acceptance of the budget. [Con-5939] On 12 September Santos met with NTGAC. Among other topics, information was provided on this EP. [Con-5943] On 8 October 2024, Santos emailed NTGAC an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024 [Con-5741]. Santos resent to NTGAC the previously sent factsheet containing information about the EP on the same day. [Con-5797] On 8 October 2024, Santos received an out-of-office reply from NTGAC, requesting the email be forwarded to a nominated person. [Con-5799] On October 8 2024 NTGAC emailed Santos and requested a copy of the presentation made by Santos at the 12 September 2024 meeting. [Con-5937] Santos sent a copy of the presentation the same day. [Con-5976] On 9 October 2024, Santos sent a further email to NTGAC after receiving the out of office reply. [Con-5798] On 15 October 2024 Santos emailed NTGAC a reminder that the comment period for the activity update was closing on 22 October 2024 [Con-5804] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from NTGAC

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***

No claims or objections have been received from NTGAC.	Santos has engaged and consulted with NTGAC but has not received any claims or objections in relation to the activities. Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met. Santos will continue to engage with NTGAC to conclude a holisitic consultation agreement to support engagement and consultation on future EPs.	No response required.	Not applicable.
Wirrawandi Aboriginal Corporation (WAC)			
On 30 November 2023 Santos emailed WAC and proposed the establishment of an Engagement Protocol and requested a meeting with the WAC CEO and Board to discuss upcoming activities of relevance to WAC, including Ningaloo Vision decommissioning activities. [Con-2808]. On the same day, WAC emailed Santos requesting that meetings be delayed until the New Year. [Con-2809] On 21 December 2023 Santos emailed WAC providing them with a General Report as a precursor reading to a meeting, which included information on Ningaloo Vision decommissioning activities. [Con-3075] On 2 January 2024 WAC emailed Santos offering a meeting in the coming weeks. [Con-3081] Santos responded the same day to confirm. [Con-3082] On 15 January 2024 Santos emailed WAC and accepted the offer of a meeting and clarified that this would be a high level meeting to share information and ascertain whether WAC wished to be consulted on Santos' proposed activities. [Con-3084] WAC responded to confirm understanding on 18 January 2024. [Con-3086] On 23 January 2024 Santos met with WAC and discussed the projects referred to in the General Report, including Ningaloo Vision decommissioning activities. On 29 January 2024 Santos emailed WAC and thanked them for the meeting and offered to meet again. On the same day, WAC responded and agreed to meet at a mutually acceptable time later in February 2024. [Con-3092] On 26 February 2024 Santos emailed WAC and enquired about the progress of the Resourcing Protocol and indicated that there were upcoming project consultations of potential interest. [Con-5931] On 26 February 2024, Santos called WAC and WAC responded to Santos by email and asked for the proposed final version to be resent. Santos resent this the same day and reiterated the request to meet with the WAC Board as consultation for the EP would soon commence. [Con-5932] On 11 March 2024 Santos emailed WAC regarding Santos' proposed activities, including Ningaloo Vision decommissioning activities. [Con-3481] On 20 March 2024 Santos emailed WAC to follow up on the status of the Resourcing Protocol and restated the earlier request to meet to discuss upcoming activities. [Con-5129]		

On 22 March 2024 WAC responded to the email and asked for amendments to the Resourcing Protocol. Santos made the requested amendments and returned the Protocol the same day. [Con-5933]

On 22 March 2024 WAC emailed Santos and advised that meetings would be able take place once the WAC-Santos Resourcing Protocol had been finalised [Con-5131]

On 30 April 2024 Santos emailed WAC and requested the signing of the Resourcing Protocol be expedited. On the same day, WAC emailed Santos and requested amendments to the Resourcing Protocol. [Con-5133]

On 13 May 2024 WAC emailed Santos and requested return of the amended protocol. [Con-5134]

On 14 May 2024 Santos emailed WAC with the amended Resourcing Protocol for signing. [Con-5135]

On 19 June 2024 Santos emailed WAC to follow up on the countersigned Resourcing Protocol. On the same day, WAC acknowledged Santos' email and advised it was following up the matter up with the WAC Board. [Con-5136]

On 20 June 2024 WAC emailed Santos the signed Resourcing Protocol. [Con-5137]

On 27 June 2024 Santos returned the countersigned Resourcing Protocol to WAC along with a current factsheet on Santos activities of potential relevance to WAC, and a reminder that the consultation for Ningaloo Vision would be closing. [Con-5139]

On 28 June 2024 Santos emailed WAC and advised that the consultation period was concluding as of 28 June 2024. [Con-5034]

On 8 October 2024, Santos emailed WAC an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5742].

On 8 October 2024 Santos resent to WAC the previously sent factsheet containing information about the EP. [Con-5740]

On 8 October 2024, WAC responded by inviting Santos to present at their next board meeting later in October providing an opportunity for Santos to share information on its future activities, and helping WAC understand the projects and how they may impact the community. [Con-5796]

On 15 October 2024 Santos emailed WAC a reminder that the comment period for the activity update was closing on 22 October 2024 however WAC would have an opportunity to comment on the EP at the meeting later in October 2024. [Con-5803]

On 29 October 2024 Santos attended a meeting with WAC and provided a general information update about WA project activity including the EP.[Con-5980]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from WAC.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No feedback was received from WAC in regard to this EP. General information was sought about Oil Spill Response Training and the potential for involvement with sea mapping for broader Santos project activity.	Santos has made considerable and significant efforts since November 2023 to engage and consult with WAC about the EP, including the development of a consultation agreement. Santos considers it has provided sufficient information and a reasonable period of time for consultation.	No response required.	Not applicable.

	Santos considers Section 25 consultation requirements to have been met.		

Industry Associations – Petroleum Industry

Australian Energy Producers (AEP)

On 15 April 2024 Santos emailed AEP regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3694].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed AEP to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4454]

On 21 June 2024 Santos emailed AEP by way of reminder that the consultation period was closing on 28 June 2024. [Con-4571]

On 8 October 2024, Santos emailed AEP an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5737].

On 15 October 2024 Santos emailed AEP a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5807]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from AEP.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from AEP.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Centre of Decommissioning Australia (CODA)

On 15 April 2024 Santos emailed CODA regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3690].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed CODA to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4451]

On 21 June 2024 Santos emailed CODA by way of reminder that the consultation period was closing on 28 June 2024. [Con-4572]

On 8 October 2024, Santos emailed CODA an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5736].

On 15 October 2024 Santos emailed CODA a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5853]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from CODA.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from CODA.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Industry Associations – Commercial Fishing

Australian Southern Bluefin Tuna Industry Association (ASBTIA)

On 28 May 2024 Santos emailed ASBTIA to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 26 June 2024. [Con-4849]

The email included an activity summary with a link to a general fact sheet and a fisher-specific fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked general fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

The linked fisher-specific fact sheet included an assessment of fisheries active in the operational area and those entitled to fish in the EMBA.

On 30 June 2024 Santos emailed ASBTIA by way of reminder that consultation period had closed and sought any input on this EP by 5 July 2024 prior to EP submission to NOPSEMA on 1 August 2024 for assessment. [Con-4850]

On 8 October 2024, Santos emailed ASBTIA an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5735].

On 15 October 2024 Santos emailed ASBTIA a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5852]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from ASBTIA.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from ASBTIA.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Commonwealth Fisheries Association (CFA)

On 28 May 2024 Santos emailed Commonwealth Fisheries Association (CFA) to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 26 June 2024. [Con-4851]

The email included an activity summary with a link to a general fact sheet and a fisher-specific fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked general fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

The linked fisher-specific fact sheet included an assessment of fisheries active in the operational area and those entitled to fish in the EMBA.

On 30 June 2024 Santos emailed Commonwealth Fisheries Association (CFA) by way of reminder that consultation period had closed and sought any input on this EP by 5 July 2024 prior to EP submission to NOPSEMA on 1 August 2024 for assessment. [Con-4852]

On 8 October 2024, Santos emailed CFA an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024 [Con-5734]. Santos received an auto-generated message the same day to say the message sent was in a delivery queue. [Con-5794]

On 15 October 2024 Santos emailed CFA a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5851]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Commonwealth Fisheries Association (CFA).

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from CFA.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Tuna Australia (TA)

On 28 May 2024 Santos emailed Tuna Australia (TA) to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 26 June 2024. [Con-4853]

The email included an activity summary with a link to a general fact sheet and a fisher-specific fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked general fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

The linked fisher-specific fact sheet included an assessment of fisheries active in the operational area and those entitled to fish in the EMBA.

On 30 June 2024 Santos emailed TA by way of reminder that consultation period had closed and sought any input on this EP by 5 July 2024 prior to EP submission to NOPSEMA on 1 August 2024 for assessment. [Con-4854]

On 2 July 2024 TA emailed Santos and confirmed that the Western Tuna and Billfish Fishery (WTBF) may be affected by virtue of being within the EMBA, but the only risk is of a diesel oil spill from a vessel collision. Given the small area of operation, licence holders did not have concerns of adverse impacts on the fishery from the proposed activity. TA requested to be included to the Activity Notification table for commencement, 48hr look ahead and cessation of activity notifications. [Con-4943]

On 3 July 2024 Santos emailed TA and acknowledged that TA has no concerns of adverse impacts on the fishery from the proposed activity. Santos confirmed that TA would be included in the activity notification table. [Con-4944]

On 8 October 2024, Santos emailed TA an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5733].

On 15 October 2024 Santos emailed TA a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5850]

No further correspondence has been received from TA.

Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
TA responded that licence holders did not have any concerns in relation to the proposed activities.	This response does not raise an objection or claim about the adverse impact of each activity to which this EP relates.	Santos acknowledged feedback from Tuna Australia.	Notifications to Tuna Australia are included in Table 8-4.
Western Australian Fishing Industry Council (WAFIC)			
On 28 May 2024 Santos emailed WAFIC to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 26 June 2024. [Con-4205] The email included an activity summary with a link to a general fact sheet and a fisher-specific fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The email also noted that under WAFIC's preferred consultation approach, engagement would not be required as no WA fisheries are active in the operational area. The linked general fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. The linked fisher-specific fact sheet included an assessment of fisheries active in the operational area and those entitled to fish in the EMBA. On 4 June 2024 WAFIC responded to Santos acknowledging the absence of recent fishing effort in the vicinity of proposed activities and requested additional information about the decommissioning of the Ningaloo Vision facilities. [Con-4594] On 28 June 2024 Santos emailed WAFIC and provided responses as outlined in the summary below. [Con-4855] On 18 July 2024 WAFIC emailed Santos and confirmed that commercial fishing will not be impacted. [Con-5169] On 8 October 2024 Santos emailed WAFIC an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024 [Con-5732]. On 11 October 2024 WAFIC emailed Santos to confirm that based on the assessment indicating no recent fishing activity by WA managed fisheries near the operating area defined in the EP, it is not necessary to send out an activity update regarding this EP to the fisheries listed in the email on 8 October 2024. [Con-5780] On 14 October 2024 Santos emailed WAFIC and confirmed receipt of this advice. [Con-5781] No further feedback has been received from WAFIC.			
Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*

WAFIC acknowledged that WA DPIRD FishCube data indicated there has been no recent fishing effort by fishers in WA Managed fisheries in the vicinity of the proposed activity.	Santos notes WAFIC's feedback on the absence of recent fishing effort in the vicinity of the proposed activity.	No response required.	Section 3.2.7.3 (commercial fisheries)
WAFIC sought clarification on potential for increased vessel movements in and around the operational area that could potentially impact commercial fishers and thus warrant consultation.	Santos notes WAFIC's request for additional information.	No increase in vessel movements in and around the operational area during preparation for FPSO removal are expected. Santos does not foresee any potential impacts on commercial fishers, given the proposed activities are infrequent, of short duration, and in an area with no recent historical fishing effort (as defined by DPIRD FishCube data.	Section 2.6 (Vessels)
WAFIC sought clarification on activities associated with the decommissioning the Ningaloo Vision FPSO and the preparation of remaining subsea infrastructure for final decommissioning.	Santos notes WAFIC's request for additional information.	Santos responded that: The CoPFAR EP will cover the cessation of production phase of the Ningaloo Vision facilities, the removal of floating assets and a section of production flowline B, and the ongoing presence and maintenance of wells and infrastructure on title until future EPs are obtained for well plug and abandonment, and decommissioning. Vessels associated with the CoPFAR EP (e.g. during floating asset removal) will typically be one primary vessel with a support vessel. However, if required two further support vessels could be used bringing the total to four within the operational area, which around the floating asset removal is a petroleum safety zone.	Section 2.6 (Vessels)
Industry associations – Community			
Exmouth Community Liaison Group (CLG)			

On 15 April 2024 Santos emailed Exmouth CLG regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3656].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 April 2024 a member of the Exmouth CLG requested by email a list of infrastructure that Santos proposed to leave in the field. [Con-4856]

On 28 June 2024 Santos responded to an Exmouth CLG member that this EP covered the disconnection and permanent sail away of the Ningaloo Vision FPSO, as well as preparation activities ahead other progressive decommissioning of remaining assets which would be subject to future EPs, such as a well plug and abandonment EP, and a decommissioning EP. [Con-4857]

On 28 June 2024 Santos emailed the Exmouth CLG noting that while the consultation period had closed, CLG members had an opportunity to provide any final feedback at the CLG meeting on 17 July 2024 in Exmouth prior to EP submission to NOPSEMA on 1 August 2024 for assessment. [Con-5073]

On 17 July 2024 Santos presented at an Exmouth CLG meeting, including activities to be managed under this EP. [Con-4859] The majority of the engagement with attendees involved discussion to increase their understanding of the proposed activities and the associated risks and impacts, without any objections or claims being raised about the adverse impact of each activity to which this EP relates. Refer below “Summary of response by relevant persons” below for further detail of general topics/themes discussed.

On 8 October 2024 Santos emailed Exmouth CLG an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024 [Con-5731].

On 8 October 2024, Santos received auto-response emails from three members of the Exmouth CLG, indicating they were out of the office or no longer affiliated with the email address. [Con-5783]

On 15 October 2024 Santos emailed Exmouth CLG a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5848]

On 15 October a member of the Exmouth CLG emailed Santos and asked if a specific matter relating to flowlines could be included on the agenda for the Exmouth CLG meeting in November 2024. [Con-5945]

On 23 October 2024 Santos emailed the member of the Exmouth CLG following their 15 October 2024 email, regarding the Ningaloo Vision Cessation of Operations and Floating Asset Removal Environment Plan (NV CoPFAR EP). Santos confirmed it would address their questions about flowline B at the upcoming Exmouth CLG meeting on 12 November 2024. [Con-5942]

On 12 November Santos attended the Exmouth CLG meeting in Exmouth and presented information relating to the questions raised by email on 23 October 2024. Santos described the circumstances around the collapse of production flowline B and confirmed no release of hydrocarbons to the environment occurred. [Con-5974]

No further feedback has been received from Exmouth CLG.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***

In response to Santos emails, a community member of the Exmouth CLG asked about end state decommissioning.	End state decommissioning is outside of the scope of this EP.	End state decommissioning activities will be subject to future EPs and separate consultation. Santos will continue to inform the Exmouth CLG about current and proposed activities.	No reference for this EP.
Following discussion on consultation material, there were questions on the following themes/topics: Disposal overboard of treated water Prevention of the DTM sinking	These responses do not raise an objection or claim about the adverse impact of each activity to which this EP relates.	During a meeting on 17 July 2024, Santos noted it was undertaking additional assessments to ensure DTM sinking did not occur.	Not applicable.
Industry associations – Local industry			
Carnarvon Chamber of Commerce and Industry (CCI)			
On 31 May 2024 Santos emailed Carnarvon CCI to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 1 July 2024. [Con-4487] The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 28 June 2024 Santos emailed Carnarvon CCI by way of reminder that consultation period was closing on 1 July 2024. [Con-4903] On 8 October 2024 Santos emailed Carnarvon CCI an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5727]. On 15 October 2024 Santos emailed Carnarvon CCI a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5846] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Carnarvon Chamber of Commerce and Industry.			
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***

No response was received from Carnarvon Chamber of Commerce and Industry.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Exmouth Chamber of Commerce and Industry (Exmouth CCI)			
The Exmouth CCI have been consulted via the Exmouth CLG. See separate entry in the table for the Exmouth CLG. On 15 April 2024 Santos emailed the Exmouth CCI via the Exmouth CLG regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3656]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 28 June 2024 Santos emailed the Exmouth CCI via the Exmouth CLG noting that while the consultation period had closed, CLG members (including the CCI) had an opportunity to provide any final feedback at the CLG meeting on 17 July 2024 in Exmouth prior to EP submission to NOPSEMA on 1 August 2024 for assessment. [Con-5073] On 17 July 2024 Santos presented at an Exmouth CLG meeting [with members of the CCI present], including activities to be managed under this EP. [Con-4859] On 8 October 2024 Santos emailed Exmouth CCI via the Exmouth CLG an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5731]. On 15 October 2024 Santos emailed Exmouth CCI via the Exmouth CLG a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5848] No further feedback has been received from Exmouth CCI.		
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from CCI.	Santos considers it has provided sufficient information and a reasonable period of time for consultation.	No response required.	Not applicable.

	Santos considers Section 25 consultation requirements to have been met.		

Karratha and Districts Chamber of Commerce and Industry (Karratha and Districts CCI)

On 31 May 2024 Santos emailed Karratha and Districts CCI to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 1 July 2024. [Con-4490]

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 28 June 2024 Santos emailed Karratha and Districts CCI by way of reminder that consultation period was closing on 1 July 2024. [Con-4914]

On 8 October 2024 Santos emailed Karratha and Districts CCI an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5729].

On 15 October 2024 Santos emailed Karratha and Districts CCI a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5922]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Karratha and Districts CCI.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Karratha and Districts CCI members.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Onslow Chamber of Commerce and Industry (Onslow CCI)

On 31 May 2024 Santos emailed Onslow CCI to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 1 July 2024. [Con-4492]

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 21 June 2024, Santos emailed Onslow Chamber of Commerce and Industry by way of reminder that the consultation is closing on the 28th of June. [Con-4573]

On 28 June 2024 Santos emailed Onslow CCI by way of reminder that consultation period was closing on 1 July 2024. [Con-4916]

On 8 October 2024 Santos emailed Onslow CCI an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5730].

On 15 October 2024 Santos emailed Onslow CCI a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5847]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Onslow CCI.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Onslow CCI members.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Industry Associations – Recreational Fishing

Recfishwest

On 15 April 2024 Santos emailed Recfishwest regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3685].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 24 April 2024, Recfishwest responded to Santos requesting to be kept informed as activities progress as they will occur approximately 53 km north-northwest of Exmouth, noting that the general area is accessed by recreational fishers. Recfishwest also provided feedback that some petroleum industry structures may be suitable as artificial reefs if they deliver equal or better environmental outcomes compared to complete removal. [Con-4596]

On 1 July 2024, Santos responded to Recfishwest regarding recreational fishing activities in the operational area and that Santos is not considering the repurposing of equipment to be removed as part of activities to be managed under this EP for the purpose of creating an artificial reef. [Con-4831]

On 1 July 2024, Recfishwest responded to Santos clarifying that the general area is accessed by recreational fishers, however they do not consider there is a high impact on them in terms of exclusion zones. With regards to notifications, Recfishwest would also like to be kept informed of the activities so they can provide the information to

the fishing clubs and communities. Recfishwest acknowledges that recreational fishing data can be anecdotal in nature and finds that information in EPs can be outdated or incorrect at times. It is therefore recommended that information is updated where possible. [Con-4832]

On 2 July 2024, Santos phoned Recfishwest to thank them for their input and to seek clarification relating to the fishing data in EPs being incorrect or out of date. Information that Recfishwest have on recreational activity/effort is largely word of mouth and not really recorded. It is considered that Santos has a long history in the NV area, with a good understanding of recreational activity. Recfishwest informed Santos that they do not have any further information to provide on this.

In addition, Santos clarified that Recfishwest requests that they would like to receive commencement and cessation notifications so they can pass on information as and when it arises to their communities. [Con-4833]

On 2 July 2024 Santos emailed Recfishwest thanking them for the further clarification of their comments. Santos acknowledges that Recfishwest do not consider there will be a high impact on recreational fishers in terms of the exclusion zones and have updated the activity notification table, so Recfishwest is kept informed of these activities. [Con-4835]

On 8 October 2024 Santos emailed Recfishwest an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5726].

On 15 October 2024 Santos emailed Recfishwest a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5845]

On 11 November 2024 Recfishwest emailed Santos in response to the activity update notification. Recfishwest noted this activity includes removal of a damaged section of a subsea flowline. Recfishwest acknowledged consultation had closed but was still keen to understand more, and asked about the calculated volume of release,, dispersal modelling, impact on fish and other marine organisms, cumulative impacts of potential contaminant releases. [Con-5979]

On 13 November 2024 Santos emailed Recfishwest in response to the questions in their previous email. [Con-5981]

No further feedback has been received from Recfishwest.

Summary of response by relevant person	Assessment of merits	Santos' response statement	EP reference
Recfishwest requested to be kept informed about proposed activities.	This response does not raise an objection or claim about the adverse impact of each activity to which this EP relates.	Santos acknowledges feedback from Recfishwest.	Notifications to Recfishwest are included in Table 8-4.
Following the activity update, Recfishwest requested further understanding around the following questions: • Whether the actual released amount was measured – or was the estimated maximum of 4m^3 within acceptable limits for NOPSEMA? • Had any dispersal modelling been undertaken (was the need to do this	Santos acknowledges Recfishwest's request for additional information. The Recfishwest questions do not raise an objection or claim about the activity to which this EP relates.	The release amount of 4m^3 was estimated conservatively assuming the hydrocarbon could flow at ambient seabed water temperatures. In addition, the volume assumed was based on an undamaged round section of flowline, (i.e. not a flat like the section proposed for removal). Santos noted that cutting is an industry standard technique to allow removal of equipment, with no feasible alternatives. The NV CoPFAR	Section 6.7 Planned Chemical and Hydrocarbon Discharge. Section 6.7.2 Nature and Scale of the Environmental Impacts.

based on NOPSEMA's level of acceptance?). • If the release of oil could impact fish and other marine organisms in a worst-case scenario (i.e. was the release of hydrocarbons quicker than expected). • How the cumulative impact of all potential contaminant releases is considered.		EP demonstrates that the potential release of approximately 4m^3 when cutting of the flowline is unavoidable, a short duration and one-off activity, and with controls in place, is ALARP and acceptable. Santos has not undertaken any dispersion modelling. It is expected that this scenario would not trigger any environmental thresholds of concern. In such deep, open-water settings, natural dispersion and dilution would be significant, minimizing any localized impact. Consequently, detailed modelling for this minor discharge volume would not be necessary. Santos noted that the estimated volume is not able to be released in a single event at the first cut because seawater will ingress and push fluids away from the cut location. Discharge will occur incrementally over days as the damaged section is cut into more safely manageable lengths on the seabed and recovered to vessel. The EP acknowledges that this may result in a highly localised and small area of smothering of sediment and benthic habitat. Cumulative impacts are considered in the EP (Section 6.7.2).	
Industry associations – Tourism			

Marine Tourism WA (MTWA)

On 15 April 2024 Santos emailed MTWA regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3684].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed MTWA to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4452]

On 21 June 2024 Santos emailed MTWA by way of reminder that the consultation period was closing on 28 June 2024. [Con-4574]

On 8 October 2024 Santos emailed MTWA an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5725].

On 15 October 2024 Santos emailed MTWA a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5844]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from MTWA.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from MTWA.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

WA Game Fishing Association (WAGFA)

On 15 April 2024 Santos emailed WAGFA regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3693].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed WAGFA to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4453]

On 21 June 2024 Santos emailed WAGFA by way of reminder that the consultation period was closing on 28 June 2024. [Con-4575]

On 8 October 2024 Santos emailed WAGFA an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5724].

On 15 October 2024 Santos emailed WAGFA a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5843]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from WAGFA.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from WAGFA.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Western Australian Indigenous Tourism Operators Council (WAITOC)

On 15 April 2024 Santos emailed WAITOC regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3695].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed WAITOC to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4448]

On 21 June 2024 Santos emailed WAITOC by way of reminder that the consultation period was closing on 28 June 2024. [Con-4576]

On 8 October 2024 Santos emailed WAITOC an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5723].

On 15 October 2024 Santos emailed WAITOC a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5842]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from WAITOC.			
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from WAITOC.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Local Government			
City of Karratha			
On 31 May 2024 Santos emailed City of Karratha to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 1 July 2024. [Con-4488] The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 21 June 2024 Santos emailed City of Karratha by way of reminder that the consultation period was closing on 28 June 2024. [Con-4561] On 26 June 2024 City of Karratha responded to Santos with no comments regarding the proposed EP. [Con-5078] On 28 June 2024 Santos emailed City of Karratha by way of reminder that consultation period was closing on 1 July 2024. [Con-4919] On 8 October 2024 Santos emailed City of Karratha an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5721]. On 15 October 2024 Santos emailed City of Karratha a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5839] On 18 October the City of Karratha emailed Santos and advised that it had reviewed the EP and had no concerns with the proposal. [Con-5944] On 23 October 2024, Santos emailed City of Karratha and acknowledged it had no concerns with the proposal. [Con-5975]			
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***

No objections or claims were raised by the City of Karratha.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Shire of Ashburton			
On 31 May 2024 Santos emailed Shire of Ashburton to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on I July 2024. [Con-4489] The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 4 June 2024, Shire of Ashburton responded to Santos saying the email has been forwarded to the relevant department. [Con-4588] On 21 June 2024 Santos emailed Shire of Ashburton by way of reminder that the consultation period was closing on 28 June 2024. [Con-4560] On 28 June 2024 Santos emailed Shire of Ashburton by way of reminder that consultation period was closing on 1 July 2024. [Con-4920] On 8 October 2024 Santos emailed Shire of Ashburton an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5923]. On 15 October 2024 Santos emailed Shire of Ashburton a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5840]			
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No objections or claims were received from Shire of Ashburton.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Shire of Carnarvon			

On 31 May 2024 Santos emailed Shire of Carnarvon to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 1 July 2024. [Con-4491]

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 21 June 2024 Santos emailed Shire of Carnarvon by way of reminder that the consultation period was closing on 28 June 2024. [Con-4562]

On 28 June 2024 Santos emailed Shire of Carnarvon by way of reminder that consultation period was closing on 1 July 2024. [Con-4939]

On 8 October 2024 Santos emailed Shire of Carnarvon an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5270].

On 15 October 2024 Santos emailed Shire of Carnarvon a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5838]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Shire of Carnarvon.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Shire of Carnarvon.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Shire of Exmouth

On 15 April 2024 Santos emailed Shire of Exmouth regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3691].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Shire of Exmouth to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4445]

On 21 June 2024 Santos emailed Shire of Exmouth by way of reminder that the consultation period was closing on 28 June 2024. [Con-4559]

On 8 October 2024 Santos emailed Shire of Exmouth an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024 [Con-5722].

On 15 October 2024 Santos emailed Shire of Exmouth a reminder that the comment period for the activity update was closing on 22 October 2024 [Con-5841]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Shire of Exmouth.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Shire of Exmouth.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Tourism Operators - Dive			
3 Islands Whale Shark Dive (Exmouth)			

On 15 April 2024 Santos emailed 3 Islands Whale Shark Dive regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3678].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed 3 Islands Whale Shark Dive to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4478]

On 21 June 2024 Santos emailed 3 Islands Whale Shark Dive by way of reminder that the consultation period was closing on 28 June 2024. [Con-4517]

On 8 October 2024 Santos emailed 3 Islands Whale Shark Dive an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5711].

On 15 October 2024 Santos emailed 3 Islands Whale Shark Dive a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5828]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from 3 Islands Whale Shark Dive.

Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
No response was received from 3 Islands Whale Shark Dive.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Aussie Marine Adventures (Exmouth & Coral Bay)			
On 15 April 2024 Santos emailed Aussie Marine Adventures regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3675]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed Aussie Marine Adventures to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4475] On 21 June 2024 Santos emailed Aussie Marine Adventures by way of reminder that the consultation period was closing on 28 June 2024. [Con-4514] On 8 October 2024 Santos emailed Aussie Marine Adventures an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024 [Con-5706]. On 15 October 2024 Santos emailed Aussie Marine Adventures a reminder that the comment period for the activity update was closing on 22 October 2024 [Con-5825] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Aussie Marine Adventures.			
Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
No response was received from Aussie Marine Adventures.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Coral Bay Eco Tours (Coral Bay)

On 15 April 2024 Santos emailed Coral Bay Eco Tours regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3674].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Coral Bay Eco Tours to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4474]

On 21 June 2024 Santos emailed Coral Bay Eco Tours by way of reminder that the consultation period was closing on 28 June 2024. [Con-4512]

On 8 October 2024 Santos emailed Coral Bay Eco Tours an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5704].

On 15 October 2024 Santos emailed Coral Bay Eco Tours a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5823]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Coral Bay Eco Tours.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Coral Bay Eco Tours.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Dive Ningaloo (Exmouth)

On 15 April 2024 Santos emailed Dive Ningaloo regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3688].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Dive Ningaloo to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4486]

On 21 June 2024 Santos emailed Dive Ningaloo by way of reminder that the consultation period was closing on 28 June 2024. [Con-4524]

On 8 October 2024 Santos emailed Dive Ningaloo an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5719].

On 15 October 2024 Santos emailed Dive Ningaloo a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5837]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Dive Ningaloo.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Dive Ningaloo.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Exmouth Dive & Whalesharks (Exmouth)

On 15 April 2024 Santos emailed Exmouth Dive & Whalesharks regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3687].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Exmouth Dive & Whalesharks to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4485]

On 21 June 2024 Santos emailed Exmouth Dive & Whalesharks by way of reminder that the consultation period was closing on 28 June 2024. [Con-4523]

On 8 October 2024 Santos emailed Exmouth Dive & Whalesharks an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5718].

On 15 October 2024 Santos emailed Exmouth Dice & Whalesharks a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5836]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Exmouth Dive & Whalesharks.			
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Exmouth Dive and Whalesharks.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Exmouth Diving Centre (Exmouth)			
On 15 April 2024 Santos emailed Exmouth Diving Centre regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3681]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed Exmouth Diving Centre to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4483] On 21 June 2024 Santos emailed Exmouth Diving Centre by way of reminder that the consultation period was closing on 28 June 2024. [Con-4522] On 8 October 2024 Santos emailed Exmouth Diving Centre an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5833]. On 15 October 2024 Santos emailed Exmouth Diving Centre a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5834] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Exmouth Diving Centre.			
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Exmouth Diving Centre.	Santos considers it has provided sufficient information and a reasonable period of time for consultation.	No response required.	Not applicable.

	Santos considers Section 25 consultation requirements to have been met.		
Kings Ningaloo Reef tours (Exmouth)			
On 15 April 2024 Santos emailed Kings Ningaloo Reef Tours regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3670]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed Kings Ningaloo Reef Tours to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4472] On 21 June 2024 Santos emailed Kings Ningaloo Reef Tours by way of reminder that the consultation period was closing on 28 June 2024. [Con-4510] On 8 October 2024 Santos emailed Kings Ningaloo Reef Tours an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5703]. On 15 October 2024 Santos emailed Kings Ningaloo Reef Tours a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5822] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Kings Ningaloo Reef Tours.			
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Kings Ningaloo Reef Tours.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Montebello Island Safaris (Exmouth)			
On 15 April 2024 Santos emailed Montebello Islands Safaris regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3673].			

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Montebello Islands Safaris to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4473]

On 21 June 2024 Santos emailed Montebello Islands Safaris by way of reminder that the consultation period was closing on 28 June 2024. [Con-4513]

On 8 October 2024 Santos emailed Montebello Islands Safaris an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5705].

On 15 October 2024 Santos emailed Montebello Islands Safaris a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5824]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Montebello Islands Safaris.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Montebello Island Safaris.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Ningaloo Blue Dive (Exmouth)

On 15 April 2024 Santos emailed Ningaloo Blue Dive regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3683].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Ningaloo Blue Dive to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4482]

On 21 June 2024 Santos emailed Ningaloo Blue Dive by way of reminder that the consultation period was closing on 28 June 2024. [Con-4520]

On 8 October 2024 Santos emailed Ningaloo Blue Dive an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5714].

On 15 October 2024 Santos emailed Ningaloo Blue Dive a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5831]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Ningaloo Blue Dive.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Ningaloo Blue Dive.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Ningaloo Discovery (Exmouth)

On 15 April 2024 Santos emailed Ningaloo Discovery regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3677].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Ningaloo Discovery to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4477]

On 21 June 2024 Santos emailed Ningaloo Discovery by way of reminder that the consultation period was closing on 28 June 2024. [Con-4516]

On 8 October 2024 Santos emailed Ningaloo Discovery an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5710].

On 15 October 2024 Santos emailed Ningaloo Discovery a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5827]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Ningaloo Discovery.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***

No response was received from Ningaloo Discovery.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Ningaloo Reef Dive (Exmouth)			
On 15 April 2024 Santos emailed Ningaloo Reef Dive regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3679]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed Ningaloo Reef Dive to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4480] On 21 June 2024 Santos emailed Ningaloo Reef Dive by way of reminder that the consultation period was closing on 28 June 2024. [Con-4518] On 8 October 2024 Santos emailed Ningaloo Reef Dive an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5712]. On 15 October 2024 Santos emailed Ningaloo Reef Dive a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5829] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Ningaloo Reef Dive.		
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Ningaloo Reef Dive.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Ningaloo Whaleshark-n-Dive (Exmouth)			

On 15 April 2024 Santos emailed Ningaloo Whaleshark n Dive regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3680].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Ningaloo Whaleshark n Dive to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4481]

On 21 June 2024 Santos emailed Ningaloo Whaleshark n Dive by way of reminder that the consultation period was closing on 28 June 2024. [Con-4521]

On 8 October 2024 Santos emailed Ningaloo Whaleshark n Dive an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5715].

On 15 October 2024 Santos emailed Ningaloo Whaleshark n Dive a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5832]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Ningaloo Whaleshark n Dive.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Ningaloo Whale Shark n Dive.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Ningaloo Whalesharks (Exmouth)

On 15 April 2024 Santos emailed Ningaloo Whalesharks (Exmouth) regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3692].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Ningaloo Whalesharks (Exmouth) to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4484]

On 8 July 2024 Santos phoned Ningaloo Whalesharks (Exmouth) advising consultation was now closed, and seeking any comments. [Con-4996]

On 8 October 2024 Santos emailed Ningaloo Whalesharks (Exmouth) an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5717].

On 15 October 2024 Santos emailed Ningaloo Whalesharks (Exmouth) a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5835]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Ningaloo Whalesharks (Exmouth).

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Ningaloo WhaleSharks (Exmouth)	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Ocean Eco Adventures (Exmouth)

On 15 April 2024 Santos emailed Ocean Eco Adventures regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3676].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Ocean Eco Adventures to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4476]

On 21 June 2024 Santos emailed Ocean Eco Adventures by way of reminder that the consultation period was closing on 28 June 2024. [Con-4515]

On 8 October 2024 Santos emailed Ocean Eco Adventures an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5709].

On 15 October 2024 Santos emailed Ocean Eco Adventures a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5826]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Ocean Eco Adventures.

Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
No response was received from Ocean Eco Adventures.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
View Ningaloo (Exmouth)			
On 15 April 2024 Santos emailed View Ningaloo regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3682]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 15 April 2024 View Ningaloo emailed Santos and advised it would read the information provided. [Con-3919] On 29 May 2024 Santos emailed View Ningaloo to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4479] On 21 June 2024 Santos emailed View Ningaloo by way of reminder that the consultation period was closing on 28 June 2024. [Con-4519] On 8 October 2024 Santos emailed View Ningaloo an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5713]. On 15 October 2024 Santos emailed View Ningaloo a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5830] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from View Ningaloo.			
Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
No objections or claims were raised by View Ningaloo.	Santos considers it has provided sufficient information and a reasonable period of time for consultation.	No response required.	Not applicable.

	Santos considers Section 25 consultation requirements to have been met.		
Tourism Operators - Charter operators			
Aquatic Adventures			
On 15 April 2024 Santos emailed Aquatic Adventures regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3660]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed Aquatic Adventures to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4459] On 21 June 2024 Santos emailed Aquatic Adventures by way of reminder that the consultation period was closing on 28 June 2024. [Con-4497] On 8 October 2024 Santos emailed Aquatic Adventures an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5691]. On 15 October 2024 Santos emailed Aquatic Adventures a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5811] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Aquatic Adventures.			
Summary of response by relevant persons	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Aquatic Adventures.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Blue Horizon Charters			
On 15 April 2024 Santos emailed Blue Horizon Charters regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3668].			

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Blue Horizon Charters to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4469]

On 21 June 2024 Santos emailed Blue Horizon Charters by way of reminder that the consultation period was closing on 28 June 2024. [Con-4508]

On 8 October 2024 Santos emailed Blue Horizon Charters an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5701].

On 15 October 2024 Santos emailed Blue horizon Charters a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5820]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Blue Horizon Charters.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Blue Horizon Charters.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Elite Charters

On 15 April 2024 Santos emailed Elite Charters regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3665].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Elite Charters to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4465]

On 21 June 2024 Santos emailed Elite Charters by way of reminder that the consultation period was closing on 28 June 2024. [Con-4505]

On 8 October 2024 Santos emailed Elite Charters an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5698].

On 15 October 2024 Santos emailed Elite Charters a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5817]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Elite Charters.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Elite Charters.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Evolution Charters Exmouth

On 15 April 2024 Santos emailed Evolution Charters regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3671].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Evolution Charters to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4471]

On 21 June 2024 Santos emailed Evolution Charters by way of reminder that the consultation period was closing on 28 June 2024. [Con-4509]

On 8 October 2024 Santos emailed Evolution Charters an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5702].

On 15 October 2024 Santos emailed Evolution Charters a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5821]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Evolution Charters.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***

No response was received from Evolution Charters Exmouth.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Exmouth Boat Hire			
On 15 April 2024 Santos emailed Exmouth Boat Hire regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3662]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed Exmouth Boat Hire to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4463] On 21 June 2024 Santos emailed Exmouth Boat Hire by way of reminder that the consultation period was closing on 28 June 2024. [Con-4501] On 8 October 2024 Santos emailed Exmouth Boat Hire an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5694]. On 15 October 2024 Santos emailed Exmouth Boat Hire a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5813] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Exmouth Boat Hire.		
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Exmouth Boat Hire.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Exmouth Fishing Adventures			

On 15 April 2024 Santos emailed Exmouth Fishing Adventures regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3659].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Exmouth Fishing Adventures to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4460]

On 21 June 2024 Santos emailed Exmouth Fishing Adventures by way of reminder that the consultation period was closing on 28 June 2024. [Con-4499]

On 8 October 2024 Santos emailed Exmouth Fishing Adventures an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5692].

On 15 October 2024 Santos emailed Exmouth Fishing Adventures a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5907]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Exmouth Fishing Adventures.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Exmouth Fishing Adventures.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Fawesome Expeditions Exmouth

On 15 April 2024 Santos emailed Fawesome Expeditions regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3669].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Fawesome Expeditions to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4467]

On 21 June 2024 Santos emailed Fawesome Expeditions by way of reminder that the consultation period was closing on 28 June 2024. [Con-4507]

On 8 October 2024 Santos emailed Fawesome Expeditions an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5700].

On 15 October 2024 Santos emailed Fawesome Expeditions a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5819]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Fawesome Expeditions.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Fawesome Expeditions Exmouth.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Mackerel Islands Fishing Charters

On 15 April 2024 Santos emailed Mackerel Islands Fishing Charters regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-4941]

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Mackerel Islands Fishing Charters to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4456]

On 21 June 2024 Santos emailed Mackerel Islands Fishing Charters by way of reminder that the consultation period was closing on 28 June 2024. [Con-4495]

On 8 October 2024 Santos emailed Mackerel Islands Fishing Charters an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5689].

On 15 October 2024 Santos emailed Mackerel Islands Fishing Charters a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5809]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Mackerel Islands Fishing Charters.

Summary of response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
No response was received from Mackeral Island Fishing Charters.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Mahi Mahi Fishing Charters			
On 15 April 2024 Santos emailed Mahi Mahi Fishing Charters regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3661]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed Mahi Mahi Fishing Charters to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4461] On 21 June 2024 Santos emailed Mahi Mahi Fishing Charters by way of reminder that the consultation period was closing on 28 June 2024. [Con-4500] On 8 October 2024 Santos emailed Mahi Mahi Fishing Charters an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5693]. On 15 October 2024 Santos emailed Mahi Mahi Fishing Charters a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5812] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Mahi Mahi Fishing Charters.			
Summary response by relevant person	*Assessment of merits*	*Santos' response statement*	*EP reference*
No response was received from Mahi Mahi Fishing Charters.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Ningaloo Sportfishing Charters

On 15 April 2024 Santos emailed Ningaloo Sportfishing Charters regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3666].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Ningaloo Sportfishing Charters to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4466]

On 21 June 2024 Santos emailed Ningaloo Sportfishing Charters by way of reminder that the consultation period was closing on 28 June 2024. [Con-4504]

On 8 October 2024 Santos emailed Ningaloo Sportfishing Charters an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5697].

On 15 October 2024 Santos emailed Ningaloo Sportfishing Charters a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5816]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Ningaloo Sportfishing Charters.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Ningaloo Sportfishing Charters.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Onslow Bay Boatworks

On 15 April 2024 Santos emailed Onslow Bay Boatworks regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-4942].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Onslow Bay Boatworks to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4455]

On 21 June 2024 Santos emailed Onslow Bay Boatworks by way of reminder that the consultation period was closing on 28 June 2024. [Con-4494]

On 8 October 2024 Santos emailed Onslow Bay Boatworks an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5688].

On 15 October 2024 Santos emailed Onslow Bay Boatworks a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5808]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Onslow Bay Boatworks.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Onslow Bay Boatworks.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Onstrike Charters Exmouth

On 15 April 2024 Santos emailed Onstrike Charters regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3667].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Onstrike Charters to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4468]

On 21 June 2024 Santos emailed Onstrike Charters by way of reminder that the consultation period was closing on 28 June 2024. [Con-4506]

On 8 October 2024 Santos emailed Onstrike Charters an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5699].

On 15 October 2024 Santos emailed Onstrike Charters a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5818]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Onstrike Charters.

Summary of response by relevant persons	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Onstrike Charters Exmouth.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Peak Sportfishing Adventures

On 15 April 2024 Santos emailed Peak Sportfishing Adventures regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3664].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Peak Sportfishing Adventures to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4464]

On 21 June 2024 Santos emailed Peak Sportfishing Adventures by way of reminder that the consultation period was closing on 28 June 2024. [Con-4503]

On 8 October 2024 Santos emailed Peak Sportfishing Adventures an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5696].

On 15 October 2024 Santos emailed Peak Sportfishing Adventures a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5815]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Peak Sportfishing Adventures.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***

No correspondence was received from Peak Sportfishing Adventures.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Seaestar Boat Charters			
On 15 April 2024 Santos emailed Seaestar Boat Charters regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3657]. The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation. The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information. On 29 May 2024 Santos emailed Seaestar Boat Charters to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4457] On 21 June 2024 Santos emailed Seaestar Boat Charters by way of reminder that the consultation period was closing on 28 June 2024. [Con-4496] On 8 October 2024 Santos emailed Seaestar Boat Charters an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5690]. On 8 October 2024 Santos received an auto-generated response from Seaestar Boat Charters. [Con-5795] On 15 October 2024 Santos emailed Seaestar Boat Charters a reminder that the comment period for the activity update was closing on 22 October 2024 [Con-5810] Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Seaestar Boat Charters.			
Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Seaester Boat Charters.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.
Seaforce Charters			

On 15 April 2024 Santos emailed Seaforce Charters regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3658].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Seaforce Charters to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4458]

On 21 June 2024 Santos emailed Seaforce Charters by way of reminder that the consultation period was closing on 28 June 2024. [Con-4498]

On 14 October 2024 Santos emailed Seaforce Charters an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 28 October 2024. [Con-5802].

On 21 October 2024 Santos emailed Seaforce Charters a reminder that the comment period for the activity update was closing on 28 October 2024. [Con-5936]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Seaforce Charters.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Seaforce Charters.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Top Gun Charters

On 15 April 2024 Santos emailed Top Gun Charters regarding preliminary consultation on the proposed activities to be managed under this EP, advising that consultation would commence on 15 May 2024 and close on 14 June 2024. [Con-3663].

The email included an activity summary with a link to a general fact sheet published on the Santos Consultation Hub web site, consultation requirements under relevant Environmental Regulations, directions on how to provide input into EP development and a link to additional NOPSEMA resources on consultation.

The linked fact 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 Environment That May Be Affected (EMBA) based on a review of publicly available information.

On 29 May 2024 Santos emailed Top Gun Charters to advise that Santos was now consulting on the proposed activities, advising that the consultation period would close on 28 June 2024. [Con-4462]

On 21 June 2024 Santos emailed Top Gun Charters by way of reminder that the consultation period was closing on 28 June 2024. [Con-4502]

On 8 October 2024 Santos emailed Top Gun Charters an activity update relating to vessel-based flushing, including a link to the draft EP and requested any comments or feedback by 22 October 2024. [Con-5695].

On 15 October 2024 Santos emailed Top Gun Charters a reminder that the comment period for the activity update was closing on 22 October 2024. [Con-5814]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Top Gun Charters.

Summary of response by relevant person	***Assessment of merits***	***Santos' response statement***	***EP reference***
No response was received from Top Gun Charters.	Santos considers it has provided sufficient information and a reasonable period of time for consultation. Santos considers Section 25 consultation requirements to have been met.	No response required.	Not applicable.

Unions

Maritime Union of Australia

On 29 August 2024 Santos emailed the Maritime Union of Australia (MuA) to keep them informed of Santos' future decommissioning activities. Santos advised this EP does not deal with end-state decommissioning activities but does provide an overview of upcoming decommissioning activities relevant to NV that will be the subject of future EP's. Santos advised MuA will be notified on future consultation activity commencement in relation to these future EPs relevant to the decommissioning of the Ningaloo Vision. [Con-5607]

On 17 October 2024, Santos emailed MuA advising it will soon resubmit the Ningaloo Vision Cessation of Production and Floating Asset Removal Environment Plan (NV CoPFAR EP) and invited feedback from MuA. Santos acknowledged MuA's prior comments on decommissioning and its position advocating for full asset removal. [Con-5910]

Notwithstanding the consultation information provided and the steps described above, no comments or input were received on this EP from Maritime Union of Australia.

Summary of response by relevant persons	***Assessment of merits***	***Santos' response statement***	***EP reference***
No input was received from the MuA in regard to this EP.	Santos acknowledges previous feedback from MuA in relation to decommissioning activities and its position advocating full asset removal, based on feedback received in relation	Santos acknowledges the MuA's position seeking to be consulted for all future decommissioning activity.	**Sections 2.9 – 2.11** addresses the removal activities under the scope of this EP.

	to Santos' MEFF Cessation of Production and Decommissioning Environment Plan.	Santos acknowledges MuA's position advocating for full asset removal.	

5. Environmental Impact and Risk Assessment

OPGGS(E)R 2023 Requirements
Section21. Environmental Assessment
Evaluation of environmental impacts and risks 21(5) The environment plan must include: (a) details of the environmental impacts and risks for the activity; and (b) an evaluation of all the impacts and risks, appropriate to the nature and scale of each impact or risk; and (c) details of the control measures that will be used to reduce the impacts and risks of the activity to as low as reasonably practicable and an acceptable level. 21(6) To avoid doubt, the evaluation mentioned in paragraph (5)(b) must evaluate all the environmental impacts and risks arising directly or indirectly from: (a) all operations of the activity; and (b) potential emergency conditions, whether resulting from accident or any other reason.

Environmental impact and risk assessment refers to a process whereby planned and unplanned events that will or may occur during an activity are quantitatively and/or qualitatively assessed for their impacts on the environment (physical, biological, and socio-economic) at a defined location and specified period of time. In addition, unplanned events are assessed on the basis of their likelihood of occurrence which contributes to their level of risk.

Santos has undertaken environmental impact and risk assessments for the planned events (including any routine, non-routine, and contingency activities) and unplanned events in accordance with the OPGGS(E)R 2023.

Provided in this section of the EP is the following information relating to the environmental impact and risk assessment approach:

- terminology used
- summary of the approach.

A full description of the process applied in identifying, analysing, and evaluating the impacts and risks relating to the planned activity is documented in Santos' Offshore Division Offshore Division Environmental Hazard Identification and Assessment Guideline (EA-91-IG-00004_5).

Impact and Risk Assessment Terminology

Common terms applied during the impact and risk assessment process, and used in this EP, are defined in **Table 5-1**. For a more comprehensive listing of the terms and definitions used in environmental impact and risk assessment, refer to Santos' Offshore Division Environmental Hazard Identification and Assessment Guideline (EA-91-IG-00004_5).

Table 5-1: Impact and Risk Assessment Terms

Name	Definition
Acceptability	Determined for both impacts and risks. Acceptability of events is in part determined by the consequence of the impact following management controls. Acceptability of unplanned events is in part determined from its risk ranking following management controls. For both impacts and risks, acceptability is also determined from a demonstration of the ALARP principle, consistency with Santos Policies, consistency with all applicable legislation and consideration of relevant stakeholder consultation when determining management controls.
Activity	Specific tasks and actions undertaken throughout the lifecycle of oil and gas exploration, production, and decommissioning.
ALARP	As Low as Reasonably Practicable. The term refers to reducing risk to a level that is As Low as Reasonably Practicable. In practice, this means showing through reasoned and supported arguments, that there are no other practicable options that could reasonably be adopted to reduce risks further.
Authorised Person	Person with authority to make the decision or take the action. Examples are Vessel Master, Field Superintendent, Supervisor, Person-in-Charge, Company Authorised Representative, and Project Manager.

Name	Definition
Control Measure	Means a system, an item of equipment, a person, or a procedure, that is used as a basis for managing environmental impacts and risks.
DEMIRS	Department of Energy, Mines, Industry Regulation and Safety.
Environment	Includes the natural and socio-economic values and sensitivities which will or may be affected by the activity. Is defined by NOPSEMA and DEMIRS as: (a) ecosystems and their constituent parts, including people and communities (b) natural and physical resources (c) the qualities and characteristics of locations, places, and areas (d) the heritage value of places (e) the social, economic, and cultural features of the matters mentioned in paragraphs (a), (b), (c) and (d).
Environmental Consequence	A consequence is the outcome of an event affecting objectives. Note 1 An event can be one or more occurrences and can have several cases. Note 2 An event can consist of something not happening. (Reference ISO 73:2009 Risk Vocabulary).
Environmental Impact	Defined by the NOPSEMA to mean any change to the environment, whether adverse or beneficial, that wholly or partially results from the activity . . Defined by DEMIRS as any change to the environment, whether adverse or beneficial, that wholly or partly results from a petroleum activity of an operator.
ENVID	Environmental hazard identification workshop.
Environmental Risk	Applies to unplanned events. Risk is a function of the likelihood of the unplanned event occurring and the consequence of the environmental impact that arises from that event.
Hazard	A situation with the potential to cause harm.
Grossly Disproportionate	Where the sacrifice (cost and effort) of implementing a control measure to reduce impact or risk grossly exceeds the environmental benefit to be gained.
Impact Assessment	The process of determining the consequence of an impact (in terms of the consequence to the environment) arising from a planned or unplanned event over a specified period of time.
Likelihood	The chance of an unplanned event occurring.
Non-routine Planned Event	An attribute of the planned activity that may occur or will occur infrequently during the planned activity. A non-routine planned event is intended to occur at the time.
Planned Activity	A description of the activity to be undertaken, including the services, equipment, products, assets, personnel, timing, duration and location and aspect of the activity.
Planned Event	An event arising from the activity which is done with intent (i.e., not an unplanned event) and has some level of environmental impact. A planned event could be routine (expected to occur consistently throughout the activity) or non-routine (may occur infrequently if at all). Air emissions, bilge water discharge and drill cuttings discharge would be examples of planned events.
Receptor	A feature of the environment that may have environmental, social and/or economic values.
Risk	The effect of uncertainty on objectives.
Risk Assessment	The process of determining the likelihood of an unplanned event and the consequence of the impact (in terms of economic, human safety and health, or ecological effects) arising from the event over a specified period of time.
Routine Planned Event	An attribute of the planned activity that results in some level of environmental impact and will occur continuously or frequently through the duration of the planned activity.
Unplanned Event	An event that results in some level of environmental impact and may occur despite preventive safeguards and control measures being in place. An unplanned event is not intended to occur during the activity.

5.2 Summary of the Environmental Impact and Risk Assessment Approach

5.2.1 Overview

Santos operates under an overarching Risk Management Policy (QE-91-IF-10050). The company Risk Procedure (SMS MS1 ST01) underpins the Risk Management Policy and is consistent with the requirements of AS/NZS ISO 31000:2018, Risk Management – Guidelines.

The key steps to risk management are illustrated in **Figure 5-1**. The forum used to undertake the assessment is the environmental hazard workshop, referred to as an ENVID, which is described in Section 4 of Santos' Offshore Division Environmental Hazard Identification and Assessment Guideline (EA-91-IG-00004_6).

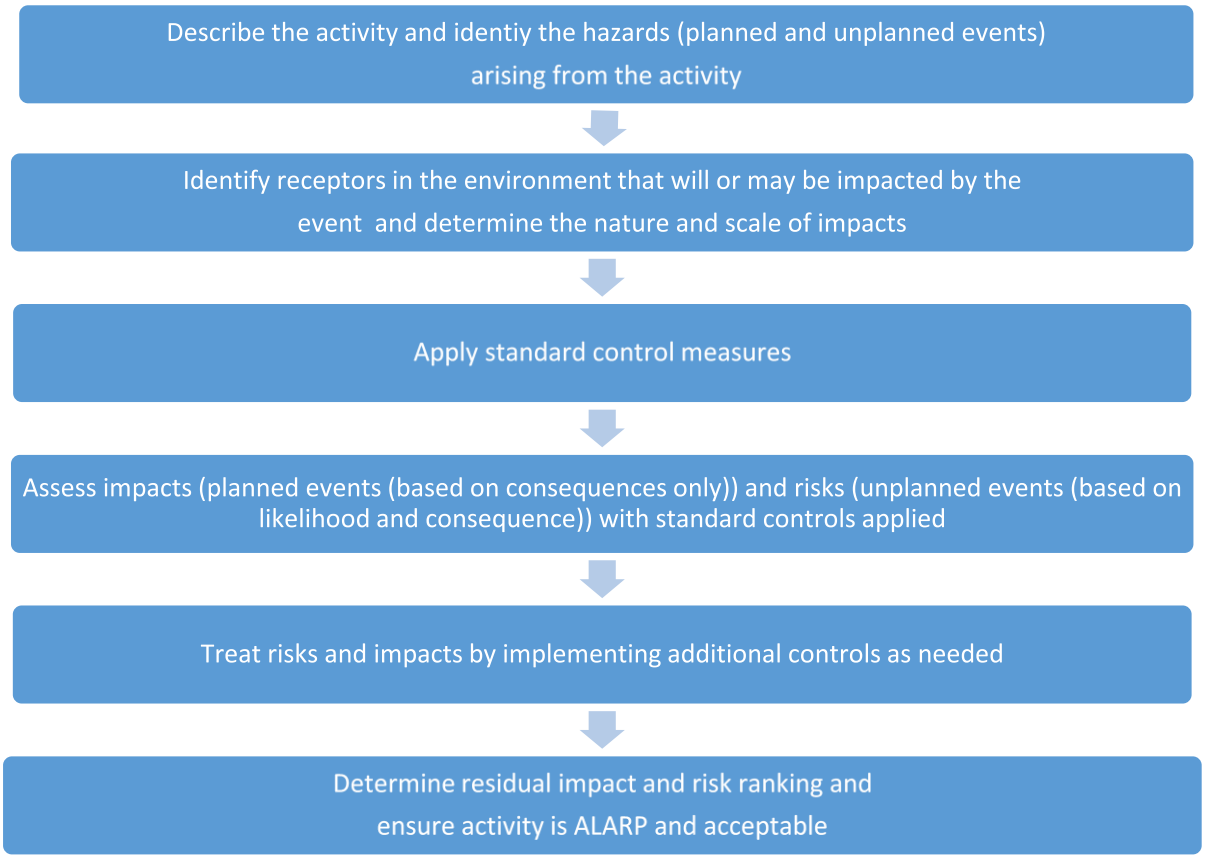

Figure 5-1: Environmental impact and risk assessment process

5.2.2 Context Setting

Santos' Offshore Division Environmental Hazard Identification and Assessment Guideline (EA-91-IG-00004_5) includes consideration of the following key areas in an impact and risk assessment:

- description of the activity (including location and timing)
- description of the environment (potentially affected by both planned activities and unplanned events)
- identification of relevant persons
- identification of legal requirements ('legislative controls') that apply to the activity
- Santos' policy and SMS requirements
- principles of Ecologically Sustainable Development (ESD)
- Santos acceptable levels of impact and risk.

These factors were considered during the environmental hazards identification (ENVID) workshop held on 7 December 2023 and 14 December 2023 for planned and unplanned events respectively. The workshop involved participants from Santos' project team, spill response departments and specialist environmental consultants.

5.2.3 Describe the Activities and Hazards (planned and unplanned events)

A description of the activity is required in order to determine the planned events that will take place and the credible unplanned events that may occur. The location, timing and scope of the activity must be described in order to determine the impacts from planned events, and the impacts and risks from unplanned events since these have a bearing upon the EMBA by the activity.

The outcome of this assessment is detailed in the relevant sub-sections of Section 6 and Section 7.

5.2.4 Identify Receptors and Determine Nature and Scale of Impacts

To determine the magnitude of effects from both planned and unplanned events, assessments are conducted using modelling and scientific reports, such as for hydrocarbon spills. A description of the environment (natural and socio-economic) within which hazards from the activity will, or may occur, is required (**Section 3**). It is crucial to understand the natural and socio-economic environment in which hazards may arise from the activity. This understanding is necessary to evaluate the type and consequences of impacts resulting from the activity. The environment must be examined in terms of the spatial and temporal boundaries of the activity in order to identify key resources that may be at risk from planned and unplanned events. Santos has developed an activity specific Ningaloo Vision CoPFAR Values and Sensitivities of the Marine and Coastal Environment (**Appendix C**), a reference document that provides information about the existing environment that maybe affected by the activities in this EP.

When evaluating the existing environment for regulatory approvals, a comparison is made with master Santos' Values and Sensitivities of the Western Australian Marine Environment, which is reviewed and updated annually. Additionally, a new protected matters search is carried out to ensure comprehensive understanding of the existing environment, in order to assess all risks (**Appendix D**).

The extent of actual impacts resulting from planned activities, as well as the risks associated with unplanned activities, are assessed using modelling and scientific reports, such as for hydrocarbon spills. The duration of each event is also described, including the potential duration of any impacts that may occur. **Section 3** and **Appendix C** provide detailed information about receptors that are be located within the affected area(s).

5.3 Describe the Environmental Performance Outcomes and Control Measures

For each planned and unplanned event, a set of Environmental Performance Outcome(s), Control Measures, Environmental Performance Standards and Measurement Criteria are identified. The definitions of the performance outcomes, control measures, standards and measurement criteria must be consistent with the OPGGS(E)R 2023, and the NOPSEMA Environment Plan Content Requirements Guidance Note (NOPSEMA, 2020).

Additional controls must also be considered and either accepted for use or rejected based on whether the standard controls reduce impacts and risks to levels that are ALARP and acceptable (refer **Section 5.7** and **Section 5.8**).

Controls are allocated in order of preference according to the hierarchy of controls as shown in **Figure 5-2**.

Control	Effectiveness	Example
Eliminate		*Removal of the risk.* Refueling of vessels at port eliminates the risks of an offshore refueling.
Substitute		*Change the risk for a lower one.* The use of low-toxicity chemicals that perform the same task as a more toxic additive.
Engineering		*Engineer out the risk.* The use of oil-in-water separator to minimise the volume of oil discharged.
Isolation		*Isolate people or the environment from the risk.* The use of bunding for containment of bulk liquid materials.
Administrative		*Provide instructions or training to people to lower the risk.* The use of Job Hazard Analysis to assess and minimise the environmental risks of an activity.
Protective		*Use of protective equipment.* Containment and recovery of spilt hydrocarbons.

Figure 5-2: Hierarchy of Controls

5.4 Determine the Impact Consequence Level and Risk Rankings (on the basis that all control measures have been implemented)

This step looks at the causal effect between the aspect/hazard and the identified receptor. Impact mechanisms and any thresholds for impacts are determined and described, using scientific literature and modelling where required. Impact thresholds for different critical life stages are also identified where relevant.

The consequence level of the impact is then determined for each planned and unplanned event using the Corporate Santos Risk Matrix (**Appendix G**).

These detailed environmental consequence descriptions are based on the consequence of the impact to relevant receptors in the following categories:

- threatened/migratory/local fauna
- physical environment/habitat
- threatened ecological communities
- protected areas
- socio-economic receptors.

This process determines a consequence level, based on set criteria for each receptor category, and takes into consideration the duration and extent of the impact, receptor recovery time and the effect of the impact at a population, ecosystem, or industry level. Refer to **Section 5.5** for determining consequence levels relating to First Nations cultural features.

For unplanned events, a risk ranking is also determined using an assessment of the likelihood (likelihood ranking) of the event as well as the consequence level of the potential impact should that event occur. Likelihood rankings are provided in the Santos risk in **Table 5-3**.

e level of information required to complete the impact or risk assessment depends on the nature and scale of the impact or risk. This process determines a consequence level based on set criteria for each receptor category and takes into consideration the duration and extent of the impact, receptor recovery time and the effect of the impact at a population, ecosystem, or industry level. Impacts to social and economic values are also considered based on

existing knowledge and feedback from stakeholder consultation. As the result of historic consultation with stakeholders, the social and economic values in the region that are of interest are evident.

As planned events are expected to occur during the activity, the likelihood of their occurrence is not considered during the risk assessment, and only a consequence level is assigned (**Table**).

Table 5-2: Summary Environmental Consequence Descriptors

Consequence Level	Consequence Level Description
I	**Negligible**- No impact or negligible impact
II	**Minor**- Detectable but insignificant change to local population, industry, or ecosystem factors
III	**Moderate**- Significant impact to local population, industry, or ecosystem factors
IV	**Major**- Major long-term effect on local population, industry, or ecosystem factors
V	**Severe**- Complete loss of local population, industry, or ecosystem factors AND/OR extensive regional impacts with slow recovery
VI	**Critica**l- Irreversible impact to regional population, industry, or ecosystem factors

For unplanned events, the consequence level of the impact is combined with the likelihood of the impact occurring (**Table 5-3**), to determine a residual risk ranking using the corporate Santos risk matrix (**Table 5-4**). For oil spill events, potential impacts to environmental receptors are assessed where they occur within the EMBA using results from modelling.

Table 5-3: Likelihood Description

N0.	Matrix	Description
f	Almost Certain	Occurs in almost all circumstances OR could occur within days to weeks
e	Likely	Occurs in most circumstances OR could occur within weeks to months
d	Occasional	Has occurred before in Santos OR could occur within months to years
c	Possible	Has occurred before in the industry OR could occur within the next few years
b	Unlikely	Has occurred elsewhere OR could occur within decades
a	Remote	Requires exceptional circumstances and is unlikely even in the long term

Table 5-4: Santos Risk Matrix

		Consequence					
		I	II	III	IV	V	VI
Likelihood	f	Low	Medium	High	Very High	Very High	Very High
	e	Low	Medium	High	High	Very High	Very High
	d	Low	Low	Medium	High	High	Very High
	c	Very Low	Low	Low	Medium	High	Very High
	b	Very Low	Very Low	Low	Low	Medium	High
	a	Very Low	Very Low	Very Low	Low	Medium	Medium

5.6 First Nations Cultural Features Assessment

The definition of 'environment' under the OPGGS(E) Regulations 2023 is broad, and means:

- ecosystems and their constituent parts, including people and communities; and
- natural and physical resources; and
- the qualities and characteristics of locations, places, and areas; and
- the heritage value of places.
- and includes the social, economic, and cultural features of the matters mentioned in paragraphs (a), (b), (c) and (d).

When assessing the consequence level of impact to cultural features, Santos considers the different types of cultural features and types of impacts. For impacts to cultural features, in the form of impacts to marine species that are either a cultural food source or are considered culturally significant to First Nations people, Santos assesses impacts with reference to the consequence assessment for threatened/migratory/local fauna.

Similarly, where cultural features are linked to a specific place, impacts to cultural features are assessed with reference to the consequence assessment for physical environment/threatened ecological communities/protected areas as applicable.

Where there are concerns raised about cultural and spiritual beliefs that do not link to a specific place (or physical/tangible feature), Santos will evaluate impact and risk acceptability through the consideration of:

- impacts from other activities in the vicinity of the EP activities (e.g., historical drilling, trawl fishing activity, shipping, commercial developments).
- information provided from people and /or organisations who assert the cultural and spiritual connections.
- any expert assessment(s) from suitably qualified expert(s) people with relevant experience and credentials.
- culturally appropriate control measures raised by relevant people, organisations, or experts; or proposed by Santos and workshopped with relevant people, organisations, or experts.

Impact and risk evaluation of cultural and spiritual beliefs will not form part of an ENVID workshop, and a consequence (or risk) ranking will not be assigned. Instead, a qualitative assessment demonstrating that impacts and risks of the activity will be reduced to as low as reasonably practicable and be of an acceptable level will be presented in the Environment Plan as informed by the above considerations.

5.7 Evaluate if Impacts and Risks are as Low as Reasonably Practicable

For planned and unplanned events, an ALARP assessment is undertaken to demonstrate that the standard control measures adopted reduce the impact (consequence level) or risk to ALARP. This process relies on demonstrating that further potential control measures would require a disproportionate level of cost/effort in order to reduce the level of impact or risk. If this cannot be demonstrated, then further control measures are adopted. The level of detail included within the ALARP assessment is based upon the nature and scale of the potential impact or risk. For example, more detail is required for a risk ranked as `Medium' compared to a risk ranked as `Low'.

5.8 Evaluate Impact and Risk Acceptability

Santos considers an impact or risk associated with the proposed activity to be acceptable if the following criteria are met:

- the consequence of a planned event is ranked as I or II; or a risk of impact from an unplanned event is ranked Very Low to Medium
- an assessment has been completed to determine whether further information or studies are required to support or validate the consequence assessment
- assessment and management of risks has addressed the principles of ecologically sustainable development
- the acceptable levels of impact and risks have been informed by relevant species recovery plans, threat abatement plans and conservation advice can be demonstrated
- performance standards are consistent with legal and regulatory requirements

- performance standards are consistent with the EHS Policy
- performance standards are consistent with industry standards and best practice guidance (e.g., National Biofouling Management Guidance Guidelines for the Petroleum Production and Exploration Industry (Marine Pest Sectoral Committee, 2018) and the Australian Biofouling Management Requirements (Department of Agriculture, Water, and the Environment, 2022)
- performance outcomes and standards are consistent with stakeholder expectations
- performance standards have been demonstrated to reduce the impact or risk to ALARP
- the consequence and risks associated with the proposed activity are not inconsistent with the relevant principles of ecologically sustainable development (ESD) under the EPBC Act as presented in **Table 5-5**.

Table 5-5: Activity Relevant Principles of Ecological Sustainable Development (EA-91-IG-00004)

No.	ESD Principle	Relevance
(a)	**Integration principle** Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social, and equitable considerations	Santos' environmental impact and risk assessment determines impact consequence levels considering the duration and extent of the impact, receptor recovery time and the effect of the impact at a population, ecosystem, or industry level. The Santos Environment Consequence Descriptors highlights the integration of long-term and short-term environmental, and socio-economic considerations (Appendix G). The assessment of impact consequence levels for the proposed activity simultaneously assesses of the activity's potential implications against this principle. Additional assessment of this principle in relation to acceptability will not be conducted.
(b)	**Precautionary principle** 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	For planned activities, assessment of this ESD principle is inherent in Santos' environmental impact and risk assessment process, as Santos does not proceed with activities if the consequence of a planned event is ranked III (Moderate) or above.
(c)	**Intergenerational principle** 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	For planned activities, assessment of this ESD principle is inherent in Santos' environmental impact and risk assessment process, as Santos does not proceed with activities if the consequence of a planned event is ranked III (Moderate). For an unplanned event, if the residual risk is ranked between Medium and Very High, an assessment against this principle is required. The assessment of this principle is implemented through further details on ALARP assessment highlighting assurance that potential impacts and risks are managed, and the environment is maintained for the benefit of future generations. Evaluation of the importance and relevance of stakeholder interest for this principle, if triggered, is fundamental in demonstrating that the environment is maintained for the benefit of future generations.
(d)	**Biodiversity principle** The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making	Evaluate if there is the potential to affect biological diversity and ecological integrity.
(e)	**Valuation principle** Improved valuation, pricing and incentive mechanisms should be promoted	This principle refers to activities which involve valuation, pricing and/or incentive mechanisms for the production, delivery, distribution or consumption of goods and services, especially those that are derived from natural or social capital or from ecological services. This principle is not relevant to the proposed activity as the proposed activity does not involve the production, delivery, distribution or consumption of goods and services.

6. Planned Activities Risk and Impact Assessment

OPGGS(E)R 2023 Requirements
Section21. Environmental Assessment
Evaluation of environmental impacts and risks 21(5) The environment plan must include: a) details of the environmental impacts and risks for the activity; and b) an evaluation of all the impacts and risks, appropriate to the nature and scale of each impact or risk; and c) details of the control measures that will be used to reduce the impacts and risks of the activity to as low as reasonably practicable and an acceptable level. 21(6) To avoid doubt, the evaluation mentioned in paragraph (5)(b) must evaluate all the environmental impacts and risks arising directly or indirectly from: a) all operations of the activity; and b) potential emergency conditions, whether resulting from accident or any other reason.

An ENVID workshop for planned activities was held on 7 December 2023. This workshop identified eight potential sources of environmental impact associated with the planned activities for this EP. The consequence rankings resulting from the environmental assessments are summarised in **Table 6-1**. The following subsections provide a detailed assessment of the risks and impacts for each planned event, as well as the control measures proposed by Santos to reduce them to ALARP and acceptable levels.

Table 6-1: Summary of the consequence level rankings for hazards associated with planned events

EP Section	Hazard	Summary of Activity/Planned Event	Consequence Ranking
6.1	Interaction with marine users	Physical presence of FPSO, vessels and ROVs during asset removal activity and physical presence of DTM prior to removal.	I - Negligible
6.2	Seabed and benthic habitat disturbance	Asset removal and wet storage of equipment until future decommissioning	II - Minor
6.3	Light emissions	Light spill from navigational/operational lighting, and ROV spotlights	I - Negligible
6.4	Noise emissions	Vessel activities, ROV activities, helicopter activities, equipment positioning, marine growth removal(subsea) and cutting of risers and damaged section of production flowline B	II - Minor
6.5	Atmospheric emissions	Vessel and helicopter operations	I - Negligible
6.6	Planned operational discharges	Sewage and grey water disposal, putrescible waste disposal, desalination brine disposal, cooling water disposal, boiler blowdown water, deck drainage disposal and bilge water disposal	I - Negligible
6.7	Planned chemical and hydrocarbon discharges	During IMMR activities, there may be release of small amounts of fluids such as hydraulic fluid, Monoethylene glycol (MEG) or methanol and potential residual hydrocarbons. There may be potential for minor discharge from ROV or tooling hydraulics (typically mineral oil) Some OIW and treated seawater may be discharged when risers and damaged section of flowline are recovered, and during additional flushing activities.	II - Minor
6.8	Contingency spill response operations	Light emissions	I - Negligible
		Noise emissions	I - Negligible
		Atmospheric emissions	I - Negligible
		Operational discharges and waste	I - Negligible
		Chemical dispersant application	II - Minor
		Physical presence and disturbance	II - Minor

EP Section	Hazard	Summary of Activity/Planned Event	Consequence Ranking
		Disruption to other users of marine and coastal areas and townships	II - Minor

6.1 Interaction with Marine Users

6.1.1 Description of Event

Event	Activities have the potential to disrupt activities of other marine users. Cessation of production phase activities that could interact with other marine users include: • Disconnection and sail away of the FPSO to port (the FPSO will be present within the operational area for 48 hours up to 5 days depending on weather). • The physical presence of the submerged DTM and the ongoing physical presence of subsea equipment (wells, flowlines, umbilicals, jumpers, XTs, mooring lines if wet parked) • The PSZ surrounding the FPSO/DTM and safety exclusion zones surrounding subsea infrastructure • General field management activities (vessel-based IMMR activities). Floating asset and damaged flowline removal activities that could interact with other marine users include: • DTM recovery • DTM and riser removal from the operational area (including DTM mooring lines if removed) • Removal of damaged section of production flowline B • Additional flushing of production flowlines A and B • Towing of the DTM. Note: Marine interaction with other users that may result in vessel collision are addressed in Section 7.6
Extent	Operational area
Duration	For the duration of the activity as described in **Section 2.5**.

6.1.2 Nature and Scale of Environmental Impacts

Potential receptors: Socio-economic (commercial fishers and fisheries, recreational fishers, tourism, commercial shipping and petroleum activity)

The presence of the 500 m PSZ which extends around the FPSO/DTM and temporary safety exclusion zones established around project vessels will potentially impact commercial fishing and recreational fishing activities by reducing available fishing areas due to displacement. The FPSO travelling to its Port may also interact with other vessels but it will be outside the operational area and subject to Maritime Law (E.g. AMSA Marine Orders, and MARPOL).

Socio-economic

There are four Commonwealth fisheries that overlap the operational area (**Section 3.2.7.3**). An analysis of the current fisheries, depth range of activity, historical fishing effort data, fishing methods and consultation feedback (Section 4) has revealed that there is a low potential for interaction with Commonwealth commercial fisheries. Even though commonwealth fishery management zones overlap the operational area, none of the Commonwealth fisheries identified in Section 3.2.7.3 are likely to be active in the operational area. Since, 2005 there has been fewer than five vessels active in the Western Tuna and Billfish fishery, down from 50 active vessels in 2000. The southern Bluefin Tuna fishery is only active in waters offshore of south and south-eastern Australia and there has been no fishing effort in Skipjack Tuna fishery since 2009. For North-west Slope Trawl fishery, the total catch with 3 vessels operating was only 85.80 tonnes.

There are 13 state managed fisheries that overlap the operational area. However, no recent fishing effort has been recorded from any of the 13 fisheries within the operational area (Table 3-10). Also, given the distance offshore and the water depth of the operational area, it is unlikely that any recreational fishing occurs in the area. No tourism related activities are expected to occur in the operational area, given the distance from nearest offshore (**Section 3.2.7.5**). Consultation confirmed that no recent fishing or tourism has occurred in the operational area and no concerns were raised by other marine users

Indigenous subsistence fishing may occur in shallow waters, close to the coastline outside of the operational area, and therefore interactions with vessels will not occur. Consultation with First Nations Peoples has raised no concerns about the activity, including towing of the DTM to Dampier and sail away of the FPSO to port.

There is no designated shipping route within the operational area with the nearest shipping route located 40 km northwest of the operational area. Also, other shipping traffic are excluded from the 500 m PSZ around the DTM location. The presence of exclusion zones may cause shipping to deviate from its preferred course to avoid the area.

As the PSZ is already gazetted and any wet stored equipment for removal during a future decommissioning campaign (e.g. DTM mooring lines and chains) will be located within the PSZ, and safety exclusion zones associated with the primary vessels will be communicated through a Notice to Mariners, marine users will be aware of their presence and as such are not expected to present any change in the navigation hazard.

6.1.2.1 Cumulative Impacts

There is a potential for field management activities and floating asset and damaged flowline removal to occur concurrently within the operational area. A maximum of four vessels may be present in the operational area at one time should the field management activities and floating asset and damaged flowline removal activities occur concurrently. There are no oil and gas facilities, or infrastructure operated by companies other than Santos in the operational area. However, vessels from other operators may need to avoid the operational area to reach exploration and development sites. There is a possibility of cumulative impacts on other marine users due to the increased likelihood of interaction. However, any impacts are expected to be limited to short term localised displacement of users from the operational areal.

6.1.3 Environmental Performance Outcomes and Control Measures

Environmental performance outcomes (EPOs) relating to this event include:

- Reduce impacts on other marine users through the provision of information to relevant stakeholders such that they are able to plan for their activities and avoid unexpected interference [NV-EPO-01].

The standard control measures (CM) considered for this activity are shown in Table , with environmental performance standards (EPSs) and measurement criteria for the EPOs described in **Section 8.4**.

Table 6-2: Control measures evaluation for interaction with other marine users

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
Standard Control Measures					
NV-CM-01	Maritime notices	Administrative	Ensures that the other marine users are aware of the presence of the vessels	Cost associated with the personnel time in issuing notifications and closing out queries and responses.	**Adopted**- benefits outweigh negligible costs. Maritime requirement to issue maritime notices.
NV-CM-02	Santos' stakeholder consultation strategy	Administrative	Santos will notify all relevant stakeholders listed, or as revised, in Section 4, of FAR and production flowline B removal activity details prior to commencement, including activity timing, vessel movements, proposed cessation date and vessel details. Ensures other marine users, such as commercial fishers, are aware of upcoming operations so they can plan their business accordingly.	Limited additional costs to Santos. Stakeholders' time required to review consultation material and communicate with Santos.	**Adopted** – Benefits outweigh negligible costs. Important control to ensure other marine users are aware of upcoming operations and potential business disruptions.

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
NV-CM-03	No fishing from project vessels	Eliminate	Reduce potential impacts to fisheries in the vicinity of the activity	Negligible costs.	**Adopted** – Benefits outweigh negligible costs.
NV-CM-04	Existing (gazetted) PSZ established around the DTM location	Isolate	Gazetted 500 m PSZ around the DTM prevents vessels from getting too close and causing damage to equipment of either party.	No additional costs. PSZs already gazetted.	**Adopted** – Benefits outweigh costs. No costs to Santos.
NV-CM-05	Safety Exclusion Zone established around primary vessels during floating asset and damaged flowline removal activities to reduce potential for collision or interference with other marine user activities	Engineering	The Safety Exclusion Zone around the primary vessels prevents other vessels from getting too close and causing damage to equipment of either party.	No additional costs to Santos. Other marine users may be temporarily excluded from small areas.	**Adopted**- The exclusion of other marine users is temporary. Marine users will still be able to access the operational area. Normal navigation at sea process whereby shipping vessels avoid navigational risks. Hence, the safety benefits to all marine users outweighs any potential costs.
NV-CM-06	Lighting will be used as required for safe work conditions and navigational purposes	Engineering	Ensures the vessels are seen by other marine users. Reduces the risk of collisions with other marine users.	Negligible costs of acquiring and operating navigation equipment, as required by maritime law.	**Adopted** – The safety benefits of having navigation equipment and procedures outweighs any cost. It is a maritime requirement.
NV-CM-07	Seafarer certification	Administrative	Requires appropriately trained and competent personnel to navigate vessels to reduce interaction with other marine users.	Costs associated with personnel time in obtaining qualifications.	**Adopted** – Benefits outweigh costs and is a legislated requirement.
NV-CM-08	Identification system	Engineering	Primary vessels have an Automatic Identification System to aid in their detection at sea.	Negligible costs of operating navigational equipment. Standard equipment on vessels.	**Adopted** – Benefits outweigh negligible costs to Santos.
NV-CM-09	Constant bridge watch	Protective	Crew of the primary vessels will maintain constant bridge watch, including for third party	No additional costs.	**Adopted** – No additional costs. It is a maritime requirement.

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
			vessels which may be approaching or enter the exclusion zone.		
NV-CM-10	Primary vessel personnel inductions	Administrative	Reinforcing the importance of marine communications in the event of any potential interactions with active commercial fishers will minimise project potential to displace other marine users.	Negligible, given it is a standard industry practice.	**Adopted** – Benefits outweigh negligible costs.
NV-CM-11	DTM tow and offloading procedure	Administrative	Tow plan for the towing of the DTM from the operational area to port of landing will minimise potential to interfere with or displace other marine users.	Costs associated with developing and implementing the plan.	**Adopted** – Benefits outweigh minor costs.
NV-CM-12	Recovery procedures	Administrative	Recovery procedures for the floating assets recovery within the operational area will minimise potential to interfere with or displace other marine users.	Negligible, given it is a standard industry practice.	**Adopted** – Benefits outweigh negligible costs.
NV-CM-14	Engagement of independent Marine Warranty Surveyor for verification of the tow connection points or primary structural members for towing or lifting of the buoy.	Administrative	Independent Marine Warranty Survey to verify condition of tow and lift points are suitable minimises risk of unplanned events which may impact other marine users	Costs associated with verification activity	**Adopted** – Benefits outweigh minor costs.
NV-CM-14	DTM pick up line removed , once the FPSO has departed the operational area.	Engineering	Removal of the DTM pickup line arrangement from the DTM once the FPSO has departed, reduces the risk of interference with other vessels (not withstanding they should not be within the 500m	Organisational costs associated with vessel to limit the length of attachment (rope or otherwise) from the DTM.	**Adopted** – Benefits considered to outweigh negligible costs to Santos.

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
			safety exclusion zone around the DTM) and also eliminates potential for entanglement with marine fauna.		
NV-CM-15	Add a float/buoy to the DTM once the FPSO has departed the operational area.	Engineering	Although not intended to be a navigational hazard marker, the float/buoy will also provide a visual cue to other marine users who inadvertently enter the 500m PSZ.	Organisational and logistics costs associated with installation of buoy.	**Adopted –** Benefits considered to outweigh negligible costs to Santos
Additional Control Measures					
NV-CM-16	Support vessel on standby during FPSO disconnection and sail away	Eliminate	Eliminates the potential for interaction between other marine users and the FPSO during FPSO disconnection and sail away activities.	Cost associated with support vessel operations	**Adopted –** benefits of eliminating the risk outweigh the costs.
N/A	Manage the timing of the operational activities to avoid peak marine user periods (e.g., fishing)	Eliminate	Would eliminate potential impacts to other marine users.	Not considered feasible as marine users could potentially be in the area all year round. The area that stakeholders are excluded from is small when compared to the area available to other marine users, and there is low fishing activity in the area as evidenced through consultation.	**Rejected** – Stakeholders and shipping in the area all year round. Cost grossly disproportionate to low socio-economic benefit, given the location of the activity has low usage by commercial fishers or areas of tourism.
N/A	Dedicated guard vessel in place during the activity to reduce potential for collision or interference with other marine users	Protective	Identifies and communicates with approaching third-party vessels to ensure exclusion zone is observed, preventing potential interaction or interference.	Significant additional cost of guard vessel for the duration of activities/campaigns.	**Rejected** – Cost grossly disproportionate to benefit, given the location of the activity has low usage by commercial fishers and does not overlap with any commercial shipping lanes or areas of tourism.
N/A	Avoidance of other active marine users, where safe to do so	Eliminate	The primary vessels don't have the ability to avoid other vessels under own propulsion when on station for project activities, in	Additional costs since primary vessels will need to be stationary and cannot be moved. Any unnecessary movement from their current position	**Rejected** – Not feasible as the primary vessel needs to be stationary. However, primary controls to avoid other marine users is through stakeholder engagement.

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
			the unlikely event interaction with marine user requires a primary vessel to avoid other user(s). Note, primary controls around stakeholder engagement and navigational lighting will suffice for this control to not be implemented.	could lead to delays in the activity.	
N/A	Eliminate the use of vessels	Eliminate	Would eliminate potential impacts to other marine users.	Not considered feasible as vessels are the only form of transport that can undertake the activities.	**Rejected** – Not feasible as vessels are required to complete the activities.
N/A	Do not recover and tow the DTM from the operational area to port of landing	Eliminate	Would eliminate the potential impacts to other users of the marine environment from towing activities.	Santos has committed to removing all floating assets from the operational area. Towing is the preferred method to remove the DTM from the operational area. Lifting the DTM onto a vessel in the operational area would be a significantly more hazardous operation and would require use of a larger vessel with similar or greater impacts on other users of the marine environment.	**Rejected-** Santos is committed to removing the floating assets from the operational area. Towing of floating assets has been assessed to be the safest method of removing recovered assets from the Title area and has negligible additional impact.
N/A	Reducing or removing the PSZ	Administrative	Reduces the area of displacement of other marine users	The PSZ is mandated by the OPGGS Act and cannot be reduced.	**Rejected** OPGGS Act requires PSZ is in place around the DTM.

6.1.4 Environmental Impact Assessment

Receptor	Consequence Level
Interaction with Other Marine Users	
Threatened, migratory or local fauna	• N/A
Physical environment or habitat	
Threatened ecological communities	
Protected areas	
Socio-economic Receptors	The impact of the vessel operations on socio-economic receptors are considered to be I (Negligible) due to the fact that: • the operational area is not within an AMSA defined shipping fairway • tourism activities are not expected to occur in the operational area, given the water depth, lack of seafloor features and distance from shore • the operational area is not extensively fished – commercially, traditionally, or recreationally. The presence of subsea infrastructure (well heads, flowlines, and associated equipment) is not expected to present a hazard to commercial fisherman, considering that no trawl fishing occurs within the operational area • stakeholder consultation and a review of recent shipping data did not raise any concerns regarding disruptions to commercial shipping or other oil and gas operators • other operators may have vessels traversing the region that will need to avoid the operational area to access exploration and development sites. Any interaction would be temporary, and other operators' vessels can go around the operational area • any cumulative impacts from concurrent activities would be localised to within the operational area with no lasting impacts. • EP stakeholder consultation did not raise any concerns regarding potential impacts to cultural features including sea country.
Overall Worst-case Consequence	I-Negligible

6.1.5 Demonstration of As Low As Reasonably Practicable

Vessels are required for the activities described in this EP. The presence of subsea infrastructure in offshore fields is normal industry practice. The management of activities relating to interactions with other marine users is well established, understood and regulated. Given the remote offshore location, recreational and tourism activities are not expected to occur in the area. Impacts to commercial fishing activities are not expected, given the lack of fishing effort in the area. Impacts to commercial shipping movements are expected to be minimal. Towing the DTM or removing it from the operational area on a barge or deck of a vessel and transit of the FPSO from the operational area to port are considered standard maritime activities, and the adopted controls are effective in reducing the impacts and risks on other marine users. There is little uncertainty associated with this aspect. No objections or concerns were raised by relevant stakeholders regarding the activity. WAFIC queried whether vessels could potentially impact commercial fishers, and Santos provided information on proposed vessel use, noting that the vessel use would be infrequent, of short duration and did not anticipate impacts due to no fishing effort in the operational area based on DPIRD Fishcube data.

Stakeholders have been informed of the proposed cessation of production activity. Ongoing consultation, along with Notice to Mariners issued via notifications to Australian Hydrographic Service before commencing in-field campaigns minimise the risk of interference with other marine users. The DTM upon disconnection from the FPSO will sit at approximately 20 to 30 m depth, to minimise risk as a navigation hazard. The DTM pick up line will be removed and the installation of a marker buoy as a visual sea surface indicator further limits the potential for third party interaction with the submerged DTM.

With the controls adopted, the assessed residual consequence for this impact is negligible and cannot be reduced further. Additional control measures were considered but rejected, since the associated cost/effort was grossly disproportionate to any benefit as detailed above. Therefore, it is considered the impact is ALARP.

6.1.6 Acceptability Evaluation

Is the consequence ranked as I (Negligible) or II (Minor)?	Yes – maximum consequence from interaction with other marine users is I (Negligible).
Is further information required in the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – activity evaluated in accordance with Santos' Environmental Hazard Identification and Assessment Procedure (EA-91-IG-00004_5), which considers principles of ESD. The consequence against this aspect is I (Negligible) and therefore does not affect the outcomes of the principles of ecologically sustainable development as per **Table 5-5.**
Are risks and impacts consistent with relevant legislation, international agreements and conventions, guidelines, and codes of practice (including species recovery plans, threat abatement plans, conservation advice and Australian Marine Park zoning objectives)?	Yes – management consistent with Safety of Life at Sea (SOLAS) 1974 and Navigation Act 2012.
Are risks and impacts consistent with Santos' Environmental, Health and Safety Policy?	Yes – aligns with Santos' Environmental, Health and Safety Policy.
Are risks and impacts consistent with stakeholder expectations?	Yes. WAFIC queried vessel use and the potential for impact on commercial fishers and Santos confirmed it did not anticipate any impact given controls that are in place, part of the operational area being within a PSZ and DPIRD Fishcube data showing no historical fishing effort in the operational area (**Table 4-9**). Recfishwest requested to be kept informed about proposed activities so they can provide information to the fishing clubs and communities. Recfishwest have been added to **Table 8-4**Activity Notification and Reporting Requirements.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – see ALARP above.

The presence of the vessels and subsea infrastructure and removal of floating assets and damaged flowline is not expected to significantly affect other marine users, including commercial fishing operations or shipping traffic, given the:

- small existing (gazetted) PSZ established around the NV DTM location in relation to the wider areas for shipping transit and navigation
- Infrequent and short duration of vessel based activities (around 30 to 90 days, depending on weather, equipment, and operational issues).

6.2 Seabed and Benthic Habitat Disturbance

6.2.1 Description of Event

Event	Activities have the potential to impact the seabed and benthic habitats within the operational area. Cessation of production phase activities that could impact the seabed and benthic habitats within the operational area include: • Use of ROV during IMMR activities • Temporary placement of work baskets, mats and supports on the seabed • IMMR activities during cessation of production phase Floating asset and damaged flowline removal activities that could impact the seabed and benthic habitats within the operational area include: • Use of ROV during IMMR activities • Temporary placement of work baskets, mats and supports on the seabed • Wet storage of equipment until future decommissioning (e.g. risers and DTM mooring lines if these are not removed under this EP) • Localised seabed disturbance to allow subsea cutting and installation of plugs/caps. • Use of high-pressure water jetting to remove excess marine growth from the DTM prior to removal • Removal of DTM, risers (including riser bases) and mooring lines (if these are removed under this EP) • Removal of 910 m damaged section of production flowline B between DC2 and DC3 which may require some sediment displacement to allow cutting of line, and potential hydrocarbon discharges (Please note that planned hydrocarbon releases from this particular activity are covered in **Section 6.7**) There will be no planned anchoring of primary vessels or support vessels within the operational area during cessation phase IMMR activities or during floating asset and damaged flowline removal activities. Potential impacts to sediment from planned discharge of swarf from subsea cutting activities and planned chemical and hydrocarbon discharges are discussed in **Section 6.6** and **Section 6.7** respectively. Potential unplanned seabed disturbance impacts outside of the operational area if the DTM was lost to the seabed during tow to port are discussed and assessed in **Section 7.1.** Release of solid objects.
Extent	All planned seabed disturbance will occur **within the operational area** and will include seabed disturbance - from wet storage/wet parking of disconnected equipment not removed (e.g. mooring chains if wet parked) - within close proximity of existing infrastructure if IMMR activities require the use of baskets and the like); or - Along part of Production Flowline B where a 910m damaged section will be removed, and the rest of the flowlines and subsea equipment will remain wet parked until future decommissioning.,
Duration	Temporary – for the duration of the activity.

6.2.2 Nature and Scale of Environmental Impacts

Potential receptors: Benthic habitats and infauna, cultural receptors (spiritual values), Continental Slope Demersal Fish Communities KEF in southernmost portion of the Operational area.

Operational activities may disturb seabed and benthic habitat through:

- direct physical disturbance of an area of seabed habitat, including benthic fauna, of up to around 4 m² per basket placement, mats and supports on the seabed
- direct physical disturbance to the seabed, including benthic fauna during IMMR activities such as maintenance and repair activities and debris clearance (disturbance footprint cannot be quantified as it depends on the particular IMMR activity. However, planned disturbance will largely relate to temporary placement of work baskets, mats, supports and equipment on the seabed and would be typically within tens of metrs of the equipment)
- indirect disturbance to benthic habitats and associated marine fauna by highly localised sedimentation
- direct physical disturbance to a localised area of seabed habitat surrounding the riser bases, including benthic fauna, during riser disconnection and removal
- direct physical disturbance to a localised area of seabed habitat, including benthic fauna, during removal of unburied section of mooring lines (if removed and recovered under this EP)

- direct physical disturbance to a localised area of seabed habitat, including benthic fauna, during removal of the 910 m damaged section of production flowline B
- direct physical disturbance to a localised area of seabed habitat, including benthic fauna, from wet parking of equipment that may be recovered during a future decommissioning campaign – approximately 125 m^2 per riser (5 risers) and 105 m^2 per mooring chain (9 mooring chains, noting that this figure is conservative given that some length of mooring chains is buried beneath the seabed), resulting in a potential seabed disturbance footprint of approximately 1,570 m^2
- increased turbidity of the near-seabed water column.

Physical environment

The operational area does not contain any unique communities or communities of regional significance (RPS, 2011). As described in **Section 3.2.3,** the operational area consists of soft sediment seabeds as the dominant habitat with sparse epibenthic fauna (including anemones, sea stars, soft corals, crabs, shrimp, and sea urchins) and an infaunal community dominated by polychaetes and crustaceans. The depth of the operational area (340 m to 400 m) precludes the existence of benthic primary producers (i.e., photosynthetic organisms including hard corals, seagrasses and macroalgae. There are no known offshore reefs or islands within or in close proximity (less than 20 km) to the operational area.

Disturbance to bare sediment habitat from IMMR activities during the cessation of production phase, such as the placement of materials on the seabed and ROV operation / tooling placement will have a localised disturbance to infauna and epifauna which could result in epifauna removal or localised decrease in abundance and diversity of infauna. However, such disturbance will have no impact at an ecosystem or population level. Any turbidity generated would be momentary and is not predicted to impact water column or benthic fauna given the deep water in an open ocean environment. Material is placed in localised areas in the proximity of the subsea infrastructure and usually over areas of previous disturbance (e.g. within the flowline corridor). Given the localised disturbance coupled with the fact that previous surveys have not identified any sensitive seabed habitats impacts to benthic habitat are considered minor.

A temporary reduction in water and sediment quality may occur due to increased turbidity and increased sediment deposition during IMMR activities such as those requiring placement of materials and / or the placement of the ROV / ROV tooling baskets on the seabed. Placement of materials on the seabed may result in a localised and temporary plume of suspended sediment over the area of seabed disturbance. Sediment within the plume will subsequently settle on the seabed after a period in the water column. Localised areas of the seabed and associated biota may be affected, however given the expected nature and scale of turbidity resulting from IMMR activities and the small footprint of such material, it is not considered likely to cause a significant environmental impact, given the high background levels of natural sediment movement in the area, the minor disturbance caused by the activity and the short duration of the activity.

The removal of floating assets and the 910 m damaged section of production flowline B, and temporary wet storage will cause localised direct and indirect impacts on the benthic habitat and associated fauna in the operational area, potentially leading to the removal of epifauna or a decrease in the abundance and diversity of infauna. However, these disturbances will not affect the ecosystem or population as a whole. Any turbidity generated will be momentary and is not expected to harm the water column or benthic fauna since the area has deep water in an open ocean environment. Materials are placed in specific areas near the subsea infrastructure, usually over previously disturbed areas (such as the flowline corridor). Considering the localised disturbance and the absence of sensitive seabed habitats identified in previous surveys, the impacts on the benthic habitat are considered minor.

Depressions on the seabed as a result of the removal of the 910 m damaged section of production flowline B, risers and mooring lines or from wet stored equipment are expected to infill as a result of movement of sediments by water currents and by the deposition of detrital matter. Given the nature of the habitat and associated benthic communities (**Section 3.2.4**), recolonisation would also be expected to be rapid.

The operational area overlaps the Continental Slope Demersal Fish Communities KEF, which covers a large area with high endemism and diversity of demersal fish species. However, apart from the artificial habitat provided by the subsea infrastructure, no known sensitive seabed features (e.g., reefs, canyons, shipwrecks) or benthic primary producer habitat (e.g., areas of hard corals, seagrass, macroalgae or mangroves) are present in the operational area.

Any temporary turbidity and sedimentation associated with the removal or wet storage and retrieval of equipment is not considered likely to cause a significant environmental impact, given the high background levels of natural sediment movement in the area, the minor disturbance caused by the activity and the short duration of the activity.

No cultural features have been identified in the operational area and no matters raised in relation to cultural features during consultation.

6.2.3 Environmental Performance Outcomes and Control Measures

EPOs relating to this event include:

- Seabed disturbance is limited to planned activities and defined locations within the operational area [NV-EPO-02]

The control measures considered for this activity are shown in **Table 6-3** with EPSs and measurement criteria for the EPOs described in **Section 8.4**.

Table 6-3: Control measures evaluation for seabed disturbance

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
Standard Control Measure					
NV-CM-17	Pre- and post-asset removal seabed ROV surveys of seabed asset removal activities and wet storage locations	Engineering	Provides baseline and confirms understanding of physical environment in operational area pre and post activities.	Costs associated with personnel and operations time in conducting surveys while on site.	**Adopted** – Benefits outweigh negligible costs to Santos.
NV-CM-18	Wet storage positioning	Engineering	Wet storage of equipment within 50 m of existing infrastructure limits the potential for environmental impacts.	Negligible costs of acquiring and operating ultra-short baseline/low baseline to position equipment that is wet stored.	**Adopted** – Benefits outweigh negligible costs to Santos.
Additional Control Measures					
N/A	No removal of floating assets and damaged section of production flowline B	Eliminate	Would eliminate the seabed disturbance caused by removal of floating assets and damaged section of production flowline B.	Removal of floating assets and damaged section of production flowline B is a requirement of Santos' decommissioning of the NV facility.	**Rejected** – Requirement of Santo's decommissioning of the NV facility.
N/A	No wet storage of equipment on the seabed	Eliminate	Would eliminate the seabed disturbance caused by wet storage.	Not considered as wet storage is required for some equipment prior to a future decommissioning campaign, or in the event of issues during removal of assets.	**Rejected**- Not feasible. Wet storage is required for some equipment and as a contingency if equipment planned for removal cannot be removed during the floating asset and damaged flowline removal campaign. Impact of seabed disturbance is low, given the lack of sensitive receptors.

6.2.4 Environmental Impact Assessment

Receptor	Consequence Level
Seabed Disturbance	
Threatened, migratory or local fauna	No sensitive seabed features are known to occur within the operational area. The area of seabed that will be impacted is mostly soft sediment with sparse epibenthic fauna (including anemones, sea stars, soft corals, crabs, shrimp, and sea urchins) and an infaunal community dominated by polychaetes and crustaceans (refer to Section 3.2.3). The depth of the

Receptor	Consequence Level
	operational area (340 m to 400 m) precludes the existence of benthic primary producers (i.e., photosynthetic organisms including hard corals, seagrasses and macroalgae. The area of soft sediment habitat that is potentially impacted is small compared to the amount of habitat available and therefore the disturbance is not expected to affect prey availability, and therefore protected fauna species. Habitat modification is identified as a potential threat to a number of marine fauna species in relevant Recovery Plans and Conservation Advice, but the operational area does not overlap any habitat critical to the survival of a species. Impacts will be temporary, and the area potentially impacted is small compared to the size of the areas used by species for foraging. Therefore, no long-term impacts to these species are expected. No decrease in local population size, area of occupancy of species, loss or disruption of critical habitat or disruption to the breeding cycle of any threatened / migratory/ local fauna is expected. Given the small-scale area of the activity, minor and short-term nature of indirect impacts and the regional availability of the habitats present, seabed and benthic habitat disturbance is not expected to impact threatened or migratory species at a population level. The consequence level is therefore considered to be I (Negligible).
Physical environment or habitat	The operational area overlaps the Continental Slope Demersal Fish Communities KEF, although habitat surveys of the Coniston/Novara fields revealed a flat soft sediment habitat comprising sand, silt, and mud, and therefore fish abundance is expected to be low. As such, long-term or significant impacts to habitat values or ecosystem function are not expected. Impacts to the physical environment or habitat are assessed as II (Minor).
Threatened ecological communities	Not applicable – No threatened ecological communities are identified in the area where seabed disturbance could occur.
Protected areas	Not applicable – No Protected Areas are identified in the area where seabed disturbance could occur.
Socio-economic receptors	Disturbance of the seabed and benthic habitat within the operational area is highly unlikely to impact socio-economic receptors such as shipping and tourism. Any minor alteration or modification to habitats is not expected to impact commercial fisheries' target species based on the small size of disturbance relative to the available fishing grounds. EP stakeholder consultation did not raise any concerns regarding potential impacts to cultural features including sea country. No stakeholder concerns have been raised regarding this aspect. Therefore, impacts to socio-economic receptors are assessed as I (Negligible).
Worst-case consequence level	II-Minor

6.2.5 Demonstration of As Low As Reasonably Practicable

The planned CoPFAR activities will cause some disturbance of the seabed and associated fauna/habitats as well as short term and localised turbidity. The planned activities will take place in an area that has been previously disturbed. Given the remote offshore location, the sparse habitats in the operational area and the absence of significant fishing effort in the area, no sensitive environmental receptors will be affected. No objections or concerns were raised by relevant stakeholders regarding the activity.

All practicable control measures have been reviewed (**Section 6.2.3)** and those adopted are considered appropriate to manage the impacts such that the residual consequence is assessed to be minor and cannot be reduced further. The proposed management controls for seabed disturbance are in accordance with Santos' risk management criteria and are considered appropriate to manage the risk to ALARP.

6.2.6 Acceptability Evaluation

Is the consequence ranked as I (Negligible) or II (Minor)	Yes – maximum consequence from seabed disturbance is II (Minor).
Is further information required in the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – activity evaluated in accordance with Santos' Environmental Hazard Identification and Assessment Procedure (EA-91-IG-00004_5), which considers principles of ESD. The consequence against this aspect is II (minor) and therefore does not affect the outcomes of the principles of ecologically sustainable development as per **Table 5-5**.
Are risks and impacts consistent with relevant legislation, international agreements and conventions, guidelines, and codes of practice (including species recovery plans, threat abatement plans, conservation advice and Australian Marine Park zoning objectives)?	Yes – No plans identified seabed disturbance as those described above as being a threat to marine fauna or habitats. Habitat modification is identified as a potential threat to a number of marine fauna species in relevant Recovery Plans and Conservation Advice (**Table 3-9).**
Are risks and impacts consistent with Santos' Environmental, Health and Safety Policy?	Yes – aligns with Santos' Environmental, Health and Safety Policy.
Are risks and impacts consistent with stakeholder expectations?	Yes. No concerns raised on planned seabed and habitat disturbance.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes - see ALARP above

The potential consequence of seabed disturbance on receptors is assessed as Minor (II). With the control measures in place, including compliance with industry standards and legislation, no significant impacts are expected. Therefore, the impacts of seabed disturbance to the receiving environment are ALARP and considered environmentally acceptable.

6.3 Light Emissions

6.3.1 Description of the Event

Event	Light emissions will occur during the activities as a result of: • vessel operations • FPSO disconnection and sail away • ROV operations. Vessels (including the FPSO) will routinely have external lighting to facilitate navigation and safe operations at night. Lighting typically consists of bright white (i.e., metal halide, halogen, fluorescent) lights, and are not dissimilar to other offshore activities in the region, including fishing and shipping. The ROV will be used during the activity, and it will require the use of spot lighting while it is underwater working. Lighting will typically consist of bright white (i.e., metal halide, halogen, fluorescent) lights.
Extent	The light assessment boundary of 20 km from the source will be used as the extent of light exposure, in accordance with National Light Pollution Guidelines for Wildlife (Commonwealth of Australia, 2023).
Duration	Navigational and safety lighting will be required on a 24-hour basis for the duration of the activity.

6.3.2 Nature and Scale of Environmental Impacts

Potential receptors: Threatened, migratory or local fauna (marine mammals, marine turtles, sharks, rays, fish, and seabirds), cultural receptors (totemic species)

Continuous lighting emanating from the same location for an extended period of time may result in alterations to fauna behaviour. The combination of colour, intensity, closeness, direction, and persistence of a light source are key factors in determining the magnitude of environmental impact (EPA, 2010). Disturbance may include the following:

- seabirds may either be attracted by the light source itself or indirectly due to marine fauna prey (such as fish and invertebrates) being attracted to light
- marine turtles and turtle hatchlings may be misoriented and disoriented by lights
- fish and zooplankton may be directly or indirectly attracted to lights.

According to the National Light Pollution Guidelines for Wildlife (Commonwealth of Australia, 2023), a 20 km threshold provides a precautionary limit based on observed effects of sky glow on marine turtle hatchlings, demonstrated to occur at 15 to 18 km from the light source and fledgling seabirds grounded in response to artificial light 15 km away. The intensity and scope of the light glow, and its potential to cause biological harm, will vary depending on factors such as the light source's number, intensity, spectral output, and positioning. It is important to note that the impact of light glow may extend beyond 20 km for certain species and under specific environmental conditions (Commonwealth of Australia, 2023).

Marine mammals

As described in Section 3.2.6.1, the pygmy blue whale migration BIA and humpback whale migration BIA overlaps the operational area (**Figure 3-8**). However, there are no reports of direct effects of artificial light on marine mammals and cetaceans and other marine mammals are not known to be significantly attracted to light sources at sea. Cetaceans predominantly use acoustic senses to monitor their environment rather than visual cues (Simmonds et al., 2004). Therefore, impacts are thought to be unlikely.

Marine turtles

Internesting habitat considered critical to the survival of flatback turtles overlaps the operational area, and the operational area is 7 km from an internesting BIA for flatback turtles (**Figure 3-11**). It is possible that individual turtles may occur within the operational area, however considering the water depths of the operational area (340 m to 400 m) compared to observed water depths of internesting turtles (< 50 m deep, Whittock et al., 2026) large numbers of the species are not expected.

Marine turtles are particularly sensitive to artificial lighting, which is known to disrupt breeding adult turtles, post-emergent hatchlings and hatchlings dispersing in nearshore waters (Limpus, 1971; Salmon et al., 1995; Limpus, 2007, 2008a, 2008b, 2009a, 2009b; Wilson et al., 2018).

Adult female marine turtles return to land, mostly at night, to nest on sandy beaches. During this process, they rely on visual cues to select and navigate towards nesting sites, as well as to find their way back to the ocean after nesting. Beaches that are exposed to excessive artificial lighting, such as those near urban developments, roads, and piers, often have fewer nesting females compared to less developed beaches (Salmon, 2003; Hu et al., 2018). This is because the presence of bright lights can disorient adult female turtles as they try to return to the open ocean after nesting. However, research suggests that nesting females are less affected by artificial lighting compared to hatchlings (Witherington, 1991a).

Hatchling turtles emerge from the nest at night (Mrosovsky & Shettleworth,1968), and locate the ocean using a combination of topographic and brightness cues, orienting towards the lower, brighter oceanic horizon, and away from elevated darkened silhouettes of dunes and/or vegetation behind the beach (Pendoley & Kamrowski, 2015; Lohmann et al., 1997; Limpus & Kamrowski, 2013). Hatchlings can become disoriented by artificial lights, such as those from platforms and vessels, and may end up trapped in the illuminated areas. This can lead to increased energy expenditure, higher predation risk, and decreased survival rates (Witherington & Martin, 2003., Commonwealth of Australia, 2023). Disoriented hatchlings may take longer to reach the sea or even fail to reach it (if the artificial light attracts them away from the sea), resulting in dehydration, exhaustion, predation, and increased mortality (Salmon & Witherington, 1995).

As the hatchlings swim offshore from their natal beach, they become less influenced by light cues and rely predominantly on wave motion, currents, and the earth's magnetic field (Lohmann and Lohmann, 1992). They use a combination of an internal compass set during their crawl down the beach and cues from waves to guide them offshore (Lohmann & Lohmann, 1992; Stapput & Wiltschko, 2005; Wilson et al., 2021). However, in the absence of wave cues, hatchlings have been observed to orient themselves towards light cues while swimming (Harewood & Horrocks, 2008), and in some cases, light cues have overridden wave cues (Thums et al., 2013, 2016; Wilson et al., 2018).

The speed and direction of hatchlings' dispersal in the ocean are influenced by currents (Wilson et al., 2018, 2021). However, research has shown that when artificial light is present, hatchlings actively swim against the currents and towards the light source (Wilson et al., 2018). This behaviour can increase their energy expenditure or expose them to higher predation risk.

Turtles in the nearshore may be able to see the lighting especially during the flaring events but this is not expected to have adverse impacts to nesting turtles of hatchings given the 35 km separation distance from the Ningaloo Coast and Muiron islands (> 35 km). Once in the water, hatchling navigation is influenced by wave motion, currents, and the earth's magnetic field. Therefore, there is no expected impact of lighting from the artificial light on hatchlings once in the water.

The WA Environmental Protection Authority (EPA) conservatively estimates there is only a light influence on marine turtles if the light source is within 1.5 km of the nesting beach (EPA, 2010). Additionally, considering the water depths at the NV location, internesting females are not expected at the activity site.

The Recovery Plan for Marine Turtles in Australia: 2017-2027 (Commonwealth of Australia, 2017) specifies the following priority action for the Pilbara genetic stock of flatback turtles in relation to artificial light:

- manage artificial light from onshore and offshore sources to ensure biologically important behaviours of nesting adults and emerging/dispersing hatchlings can continue.

Based on the justifications above, it is considered that the activity will not compromise the objectives as set out in the marine turtle recovery plan and impact of lighting associated with the activities to turtles is negligible.

Sharks, fish, and rays

The operational area is within the whale shark foraging BIA. The response of fish to light emissions varies according to species and habitat and it may be directly or indirectly attracted to lights. Artificial light attracts organisms, increasing food sources for predatory species, which leads to marine predators aggregating at the edges of artificial light halos.

In a light trap study conducted by Shaw et al. (2002), it was noted that the juvenile tunas (Scombridae) and jacks (Carangidae), which are highly predatory were preying on the concentrations of zooplanktons that had been attracted to the light field of the platforms. This led to increased predation rates as compared to the unlit areas.

Artificial light is shown to impact hatching success of fish eggs, however, the spawning behaviour of adult fish, in terms of frequency and duration, was no different under artificial light conditions compared to natural conditions (Fobert et al., 2019).

The potential for increased predator activity is unlikely to result in significant impacts to the fish populations considering the low level of light and the relatively short duration of the activity. Given the relatively small impact area in respect to fish habitat, potential impacts are expected to be highly localised and unlikely to have discernible consequences at population level.

Birds (seabirds/shorebirds)

The operational area is within the wedge-tailed shearwater reproduction BIA. Lighting from the vessels may result in behavioural impacts to seabirds including terns and shearwaters. However, as the activities will be for a short duration, the consequence is considered negligible.

Studies conducted between 1992 and 2002 in the North Sea confirmed that artificial light was the reason birds were attracted to, and accumulated around, illuminated offshore equipment (Marquenie *et al*., 2008) and that lighting can attract birds from large catchment areas (Wiese *et al*., 2001). Birds may either be attracted by the light source itself or indirectly as structures in deep-water environments tend to attract marine life at all trophic levels, creating food sources and shelter for seabirds. The light from vessels may also provide enhanced capability for seabirds to forage at night.

Light potentially impacts breeding seabirds in the operational area in much the same way as it does marine turtles, though is species dependent, and some seabirds may not be expected to experience any impact at all due to their diurnal behaviour.

Species with a nocturnal component of their life history, such as procellariforms (albatrosses, petrels, shearwaters) are at greater risk of negative impacts. Fledglings are particularly vulnerable to artificial light (Montevecchi, 2006; Mitkus et al., 2016) with impacts upon the synchronized mass exodus of fledgling seabirds from their nesting sites being well documented (Deppe et al., 2017; Raine et al., 2007; Rodriguez et al., 2015a; Le Corre et al., 2002; Reed et al., 1985).

Nocturnal foraging at sea is known to occur in pelagic seabird species, such as petrel, shearwater, and albatross, with preferences for bioluminescent prey (Imber, 1975). This is linked to the DMV of prey in the water column resulting in the greater abundance of prey closer to the sea surface under darkness.

Artificial light may also attract migratory shorebirds in flight (Longcore et al., 2013) influencing stop- over selection and impacting successful migration (McLaren et al., 2018). Artificial light has the potential to disrupt the natural migratory patterns of migratory birds that rely on visual cues, such as ambient light, moonlight, and starlight, in addition to their magnetic compass for navigation. This is especially true in areas where there are no terrestrial landmarks to guide them. Studies conducted in the North Sea have shown that light emissions from offshore platforms can attract migrating birds, with those that migrate during the night being particularly affected (Verheijen, 1985). Furthermore, it has been observed that birds traveling within a 5 km radius of illuminated offshore platforms may deviate from their intended route and either circle or land on the nearby platform (Marquenie et al., 2008). However, beyond this distance, it is believed that the strength of the light source is not sufficient to lure birds away from their preferred migration route.

The fledglings leaving the colony for the first time are unlikely to be impacted by the artificial light considering the distance between the nearest land the operational area. However, newly fledged juveniles maybe more susceptible to attraction, disorientation and collision in the weeks or months following fledging, compared to adults and older juveniles. This is especially true for smaller species like storm-petrels, petrels, and shearwaters, which rely on nocturnal foraging and may be more prone to colliding with the structures.

Whilst attraction to light sources is well documented, the potential impacts on the population viability of migratory seabirds, if any, which result from this attraction to light sources is not well understood (Shell, 2009). Induced behavioural disturbances, such as disorientation and attraction, are assumed to be temporary. Such disturbances during migrations could, however, lead to physical effects such as exhaustion and mortality. These effects, however, will likely only affect individuals, or at most, a small proportion of the population.

6.3.3 Environmental Performance Outcomes and Control Measures

EPOs relating to this event include:

- Reduce impacts to marine fauna from lighting on vessels through limiting lighting to that required by safety and navigational lighting requirements [NV-EPO-03]

The control measures considered for this activity are shown in **Table 6-4** with EPSs and measurement criteria for the EPOs described in **Section 8.4**.

Table 6-4: Control measures evaluation for light emissions

CM Reference No.	Control Measure	Hierarchy Control Level	Environmental Benefit	Potential Cost/Issues	Evaluation
Standard Control Measures					
NV-CM-06	Lighting will be used as required for safe work	Administrative	Light spill from unnecessary lighting reduced, even further lowering likelihood of	Additional costs associated with	**Adopted–** Cost is considered acceptable for

CM Reference No.	Control Measure	Hierarchy Control Level	Environmental Benefit	Potential Cost/Issues	Evaluation
	conditions and navigational purposes		impacts to the fauna from vessel lighting. Lighting is assessed to only provide necessary lighting for safety and navigation during the activity, reducing the potential for additional light pollution to the environment, thus reducing the potential impacts to fauna.	implementing control.	the benefit that may be realised from this control.
NV-CM-19	Premobilisation review and planning of lighting on vessels is undertaken prior to vessel based activities	Administrative	Where an IMMR activity may require 24-hour lighting, a project execution plan, planning and inductions, will include a requirement to minimise external lighting where practicable during the activity.	Cost associated with personnel involved in preparation of the execution plan.	**Adopted**– Cost is considered acceptable for the benefit that may be realised from this control.
Additional Control Measures					
N/A	Manage the timing of the activity to avoid sensitive periods at the location (e.g., turtle nesting/ hatching).	Eliminate	Reduces the risk of impacts from light emissions during environmentally sensitive periods for listed marine fauna.	The activity duration may get extended.	**Rejected** – Given the minimal risk of impacts to listed marine species (e.g., turtles) occurring due to lighting, the financial and environmental costs of extending the activity duration are deemed grossly disproportionate to low environmental benefits.
N/A	Use of shrouding on external lights	Protective	Reduce potential for impacts on turtles from light emissions during hours of darkness when light sources are more apparent and potential impacts are greatest.	Cost associated with retro fitting external lighting with shrouding/shielding. Can only be done for lighting that does not impact on navigational requirements or safety.	**Rejected-** The financial and environmental costs of extending the activity duration are deemed grossly disproportionate to low environmental benefits.
N/A	Use of dark, matt surfaces to reduce sky glow across all activities	Protective	Reduce potential for impacts on turtles from light emissions during hours of darkness when light sources are more apparent and potential impacts are greatest.	Additional cost to repaint vessel surfaces.	**Rejected** – Given the minimal risk of impacts to listed marine species (e.g., turtles) occurring due to lighting, the financial and environmental costs of

CM Reference No.	Control Measure	Hierarchy Control Level	Environmental Benefit	Potential Cost/Issues	Evaluation
					extending the activity duration are deemed grossly disproportionate to low environmental benefits.
N/A	Review lighting to a type (colour) that has less impact	Engineering	Could reduce potential impacts of artificial light on certain fauna.	High cost to complete lighting change out on vessels in area of low sensitivity. Navigational lighting colours are stipulated by law.	**Rejected** – Given the minimal risk of impacts to listed marine species (e.g., turtles) occurring due to lighting, the financial and environmental costs of extending the activity duration are deemed grossly disproportionate to low environmental benefits.
N/A	Limit or exclude night-time operations	Eliminate	Would eliminate potential impacts of artificial light during hours of darkness when light sources are more apparent and potential impacts are greatest.	Would double duration of activity, increase impacts or potential impacts in other areas, including increase in waste, air emissions, risk of vessel collision, etc. A minimal level of artificial lighting will still be required on board the vessels on a 24-hour basis for safety reasons.	**Rejected** – Given the minimal risk of impacts to turtles occurring, the financial and environmental costs by requiring all works to be undertaken during daylight hours only are not considered appropriate, given the extended duration of the activity that would occur.

6.3.4 Environmental Impact Assessment

Receptor	Consequence Level
Light Emissions	
Threatened, migratory or local fauna	Sensitive receptors that may be impacted by light emissions in the same location for an extended period of time include marine mammals, turtles, shark, and seabirds. Impacts to marine fauna are expected to be restricted to localised attraction and temporary disorientation but with no long-term or residual impact and no decrease in local population size, area of occupancy of species or loss or disruption of critical habitat/disruption to the breeding cycle. The potential impacts are therefore considered to be I (Negligible).
Physical environment or habitat	Not applicable – No impacts to physical environments and/or habitats from light emissions are expected.

Receptor	Consequence Level
Threatened ecological communities	Not applicable – No threatened ecological communities identified in the area over which light emissions are expected.
Protected areas	Not applicable – No protected areas are identified in the area over which light emissions are expected.
Socio-economic receptors	Not applicable – Lighting is not expected to cause an impact to socio- economic receptors other than to act as a visual cue for avoidance of the area by other marine users for safety purposes. EP stakeholder consultation did not raise any concerns regarding potential impacts to cultural features including sea country.
Overall worst-case consequence	I-Negligible

6.3.5 Demonstration of As Low As Reasonably Practicable

With the described controls, the consequence of artificial light on marine fauna and seabirds is considered negligible, with insignificant impacts to ecological function. No population level impacts are expected, and the consequence is considered environmentally acceptable. A minimum level of lighting is necessary for operational and navigational safety during the activity. This lighting also serves to notify other marine users of the ongoing activity. Additionally, minimum light levels are required to ensure safe working conditions. Further reduction of lighting at night would limit the hours of activity, resulting in the activity taking longer to complete. This extended duration would increase the period of time other marine users would need to avoid the operational area and also lead to more waste, discharges, and emissions.

The potential risks and impacts associated with lower light levels are considered to be significant in comparison to any environmental benefits. Since the lighting on the vessels adheres to industry standards and has negligible consequences, and no feasible alternative controls were identified, the use of artificial lighting on vessels or ROVs for 24 hours at an intensity that ensures safe work is considered as low as reasonably practicable (ALARP).

Internesting habitat critical to the survival of flatback turtles overlaps the operational area and the operational area is located 7 km from an internesting BIA for flatback turtles. While there is a possibility of encountering individual turtles during the activities, it is unlikely that large numbers of these turtles will be present due to the water depths of the operational area (340 m to 400 m) compared to observed water depths of internesting turtles (< 50 m deep).

The proposed activities will not compromise the objectives outlined in the Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia, 2017), the Draft Wildlife Conservation Plan for Seabirds (Commonwealth of Australia, 2019) or the National Light Pollution Guidelines for Wildlife (Commonwealth of Australia, 2023). This is because crucial behaviours of nesting turtle and seabird adults and emerging/dispersing hatchlings can still occur, given the distance from the nearest nesting beaches. The assessed residual consequence for this impact is considered negligible and cannot be further reduced. Various additional control measures were evaluated but were ultimately rejected due to their excessive cost or effort compared to the potential benefits, as explained in **Section6.3.3.** Therefore, the use of artificial lighting for 24 hours a day at an intensity that ensures safe work is deemed to be as low as reasonably practicable (ALARP).

6.3.6 Acceptability Evaluation

Is the consequence ranked as I or II?	Yes – maximum consequence from light emissions is I (Negligible).
Is further information required in the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – activity evaluated in accordance with Santos' Environmental Hazard Identification and Assessment Procedure (EA-91-IG-00004_5), which considers principles of ESD. The consequence against this aspect is I (Negligible) and therefore does not affect the outcomes of the principles of ecologically sustainable development as per **Table 5-5**.
Are risks and impacts consistent with relevant legislation, international agreements and conventions, guidelines, and codes of practice (including species recovery plans, threat abatement plans, conservation advice and Australian Marine Park zoning objectives)?	Yes – management consistent with International Convention of the Safety of Life at Sea (SOLAS) 1974 and the Navigation Act 2012. Consistent with relevant species recovery plans, conservation management plans and management actions set out in **Table 3-9**.
Are risks and impacts consistent with Santos' Environment, Health, and Safety Policy?	Yes – aligns with Santos' Environment, Health, and Safety Policy.
Are risks and impacts consistent with stakeholder expectations?	Yes – No concerns raised by stakeholders for this aspect.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – see ALARP.

The presence of lighting on vessels and ROVs is necessary for safety purposes while conducting operations for 24 hours a day, and it cannot be eliminated. If the lighting levels are reduced, it would lead to non-compliance with occupational safety regulations.

The appropriate lighting levels for safety were determined as part of the assessment carried out for the FPSO Safety Case, and it conforms to the Safety of Life at Sea (SOLAS) 1974 regulations. The lighting on the vessels is designed to meet the minimum safe operational level required by the Marine Order 30 and Marine Order 21. The potential effects of human-made lighting sources in the operational area are considered to be insignificant and limited to short-term behavioural impacts on a small number of individual fauna present in that area.

The operational area is situated more than 35 km away from turtle nesting beaches. At such distances, the light emissions will not affect the hatching of turtle hatchlings. While and area defined as habitat critical to the survival of flatback turtles overlaps the operational area, and the operational area is located about 7 km from an internesting BIA flatback turtles, it is unlikely that the operational area will have large number of these turtles given the water depths of the operational area (340 m to 400 m) compared to observed water depths of internesting turtles (< 50 m deep). The separation of the light sources associated with the activity from the nesting beaches aligns with the appropriate measures outlined in the Recovery Plan for Marine Turtles in Australia: 2017-2027 (Commonwealth of Australia, 2017).

The proposed activities adhere to the relevant actions outlined in the Recovery Plans and Conservation Advice, and they do not have any negative impact on AMP values. No concerns have been raised by stakeholders regarding the lighting during the proposed activities. Considering the nature and extent of the environmental effects, the impacts of the lighting on the receiving environment are deemed as "As Low as Reasonably Practicable" (ALARP) and are considered to be environmentally acceptable.

6.4 Noise Emissions

6.4.1 Description of the Event

Event	Potential impacts from noise emissions may occur in the operational area during the cessation of production phase, and floating asset and damaged flowline removal activities, including: • noise from the FPSO during disconnection and sail away • vessel activities • ROV activities including marine growth removal subsea and ROV sonar • helicopter activities • equipment positioning using low baseline or ultra-short baseline • subsea cutting tool (such as diamond wire saw, hydraulic shear cutter, super grinder or multi cutters) used during damaged flowline, riser and DTM and mooring lines removal.
Extent	Impacts from all potential noise sources will be localised. This is based on: • noise from ROV operations being limited to when ROVs are operating within the operational area • vessel using main engines and thrusters to maintain position will become inaudible above background noise within around 4 to 5 km • noise from helicopters being limited to when they are transiting over the operational area • noise from subsea cutting tools will be limited to when subsea cutting tools are operating • concurrent IMMR activities within the operational area but outside of the 500 m PSZ around the DTM location
Duration	For the duration of the activity, as described in Section 2.5.

6.4.1.1 Noise Generated by Vessels and the FPSO

Vessel operational noise consists of machinery noise (e.g., engine and generator noise) and hydrodynamic noise (e.g., water flowing past the hull and propeller singing). All machinery on a ship radiates sound through the hull into the water.

For offshore vessels, the noisiest anticipated activity is when the vessel uses thrusters to maintain its position. McCauley (1998) measured underwater sound pressure levels equivalent to around 182 dB re 1 µPa @ 1 m with a frequency range of 20 Hz to 10 kHz from a support vessel holding station in the Timor Sea. The thruster noise dropped below 120 dB re 1 µPa within 3 to 4 km and was audible above ambient noise up to 20 km away (McCauley, 1998). McCauley (1998) also measured underwater sound levels from the Pacific Ariki, a 64 m long support vessel with 8000 HP (6000 kW) main engines during calm conditions in the Timor Sea in 110 m of water while transiting at 11 knots, and found the distance to 120 dB re 1 µPa to be around 1 km. More recently, Koessler and McPherson (2020) modelled underwater sound levels from an offshore support vessel (OSV) in 90 m of water, with underwater SPL of 183 dB re 1 µPa @ 1 m whilst operating all three thrusters. The modelling indicated that thruster noise dropped below 120 dB re 1 µPa within 4 to 5 km. This has been taken as the greatest noise-generating activity for assessment purposes, as other vessel activities will require the vessel to be idle or moving, e.g., inspection and maintenance activities will typically require the vessel to be moving slowly at around four knots.

The mean source level of noise from the NV FPSO as it disconnects and sails away is expected to be approximately 183 dB re 1 µPa @ 1 m. (Erbe et. al., 2013). Based on a source level of 183 dB re 1 µPa @ 1 m it is expected that mean and maximum levels of the broadband noise produced by the FPSO would drop to the level of ambient sea noise within 5.5 km. Disconnection and sail away activities are only expected to take two to five days, depending on weather conditions.

There is potential for floating asset and damaged flowline removal activities and IMMR activities to occur concurrently within the operational area. As described in **Section 2.6**, one vessel is typically used for IMMR activities, whilst up to four vessels may be required for floating asset and damaged flowline removal activities. Potential cumulative impacts from concurrent operations with the operational area are described below.

6.4.1.2 Noise Generated by Helicopters

Sound traveling from a source in the air (e.g., a helicopter) to a receiver underwater is affected by both in-air and underwater propagation processes, which are further complicated by processes occurring at the air seawater surface interface (e.g., wind and waves). The level of noise received underwater depends on source altitude and lateral distance, receiver depth, water depth, and other variables.

Helicopter engine noise is emitted at various frequencies; however, the dominant tones are generally of a low frequency below 500 Hz (Richardson et al., 1995). Sound pressure in the water directly below a helicopter is greatest at the surface and diminishes with increasing receiver depth. Noise also reduces with increasing helicopter altitude,

but the duration of audibility often increases with increasing altitude, with sound penetrating water at angles less than 13°. The noise from the flyover of a Bell 214 helicopter (stated to be a noisy model) has been recorded underwater (Richardson et al., 1995). The sound source was 162 dB re 1 µPa @ 1 m at its peak and had frequency of 155 Hz.

6.4.1.3 Noise Generated by Remote Operated Vehicles Operations

As underwater sound levels are dependent on the primary (noisiest) sound source rather than being strictly additive, and since ROV operations will be undertaken from a vessel, they will make little contribution to the overall noise emissions associated with vessel activities, as described above and are not risk assessed further. The ROV will not be equipped with multi beam echo sounder, side scan sonar or sub bottom profiling sensors.

6.4.1.4 Noise Generated by Positioning Equipment

A low baseline or ultra-short baseline transponder may be temporarily attached on equipment that is being lowered to or positioned on the seabed. Transponders typically emit pulses of medium frequency sound, generally within the range 21 to 31 kHz. The estimated sound pressure level (SPL) would be 180 to 206 dB re 1 µPa at 1 m (Jiménez-Arranz et al., 2017). Transmissions are not continuous but consist of short 'chirps' with a duration that ranges from 3 to 40 milliseconds. A DP compatibility transponder / beacon may also be deployed temporarily on the seabed. All transponders / beacons will be recovered to vessel deck after each deployment.

6.4.1.5 Noise Generated by Subsea Cutting Tools

The subsea cutting of risers, mooring lines and damaged section of production flowline B assets using a subsea cutting tool may generate underwater noise. Similarly, ROV-mounted suction pump or water jet may generate underwater noise if required during the activity.

Twachtman et al. (2004) studied the operations and socio-economic impact of non-explosive removal of offshore structures, including noise, and concluded that mechanical cutting and abrasive water jet, as well as diamond wire cutting methods, are generally considered harmless to marine life and the environment. Similarly, Pangerc et al. (2016) described the underwater sound measurement data during an underwater diamond wire cutting of a 32-inch conductor (10 m above seabed in around 80 m depth) and found the sound radiated from the diamond wire cutting of the conductor was not easily discernible above the background noise at the closest recorder located 100 m from the source. The sound that could be associated with the diamond wire cutting was primarily detectable above the background noise at the higher acoustic frequencies (above around 5 kHz) (Pangerc et. al., 2016) above the hearing range of low frequency cetaceans.

As underwater sound levels are dependent on the primary (noisiest) sound source rather than being strictly additive, and since cutting operations will be undertaken using an ROV or directly from a vessel, they will make little contribution to the overall noise emissions associated with vessel activities as described above and are not risk assessed further.

6.4.1.6 Noise Generated by Side Scan Sonar or Echo Sounders

Side scan sonar (SSS), single-beam echo sounders (SBESs) and multi-beam echo sounders (MBESs) are used to develop high-resolution images of the seafloor or objects on the seafloor such as subsea infrastructure. Sound pressure levels for SBESs and MBESs typically range from 210 to 245 dB re 1 µPa @ 1 m, and SSS typically range from 220 to 226 dB re 1 µPa @ 1 m (DECC, 2011).

A modelling study completed in 2013 (Zykov, 2013) indicated the maximum distances at which sound pressure levels were reduced to just above background levels used for the modelling study (120 dB re 1 µPa) from different equipment types. These were:

- MBES: Approximately 1 km from the sound source
- SBES: Approximately 350 m from the sound source
- SSS: 1.5 km from the sound source.

SDES, MBES and SSS used for surveys have the potential to cause some temporary behavioural disturbance to marine fauna, however noise levels are well below injury thresholds. Due to the short duration chirps, the temporary and intermittent use and the mid-frequencies used by positioning and survey equipment, the acoustic noise from the survey equipment is unlikely to have a substantive effect on the behavioural patterns of marine fauna.

6.4.2 Nature and Scale of Environmental Impacts

Potential receptors: Threatened or migratory fauna (marine mammals, marine turtles, sharks, fish, and rays). The operational area, including a 20 km buffer, overlaps eight BIAs, outlined in **Table 6-5**.

Table 6-5: Summary of biologically important areas that overlap the operational area (including 20 km buffer)

BIA		
Migration BIA	**Foraging BIA**	**Reproduction BIA**
Pygmy blue whale, Humpback whale	Whale shark (within 20 km buffer only)	Wedge-tailed shearwater Flatback turtles, Green turtles, Hawksbill turtles, Loggerhead turtles (all within 20 km buffer only)

The use of sound in the underwater environment is important for marine animals, particularly cetaceans, to navigate, communicate and forage effectively, along with turtles, sharks, rays, and other fish, for a range of functions such as social interaction, foraging and orientation. Underwater noise may impact on marine fauna through:

- attraction to the noise source
- increased stress levels
- disruption to underwater acoustic cues
- localised avoidance
- disturbance, leading to behavioural changes or displacement from areas
- masking or interference with other biologically important sounds such as communication or echolocation
- physical injury to hearing or other organs
- indirectly by inducing behavioural and physiological changes in predator or prey species.

The nature and scale of impacts must be considered in the context of the ambient noise environment. Ambient underwater noise levels are dependent on location, and are often dominated by local wind noise, waves, biological noise, and ship traffic. Wind speed and seabed conditions have a clear influence on the ambient noise level. Existing anthropogenic underwater noise sources in the region of the proposed activity include shipping, small vessel traffic, and petroleum-production activities.

Marine fauna respond variably when exposed to underwater noise from anthropogenic sources, with effects dependent on a number of factors, including distance from the sound source, water depth and bathymetry, the animal's hearing sensitivity, type and duration of sound exposure and the animal's activity at time of exposure. Broadly, the effects of sound on marine fauna can be categorised as:

- Acoustic masking – anthropogenic sounds may interfere with, or mask, biological signals, therefore reducing the communication and perceptual space of an individual. Auditory masking impacts may occur when there is a reduction in audibility for one sound (signal) caused by the presence of another sound (noise). For this to occur the noise must be loud enough and have a similar frequency to the signal and both signal and noise must occur at the same time.
- Behavioural response – behavioural impacts will depend on the audible frequency range of each potential receptor in relation to the frequency of the noise, as marine animals will only respond to acoustic signals they can detect, as well as the intensity of the noise. The intensity of behavioural responses of marine mammals to sound exposure ranges from subtle responses, which may be difficult to observe and have little implications for the affected animal, to obvious responses, such as avoidance or panic reactions. The context in which the sound is received by an animal affects the nature and extent of responses to a stimulus. The threshold for elicitation of behavioural responses depends on received sound level, as well as multiple contextual factors such as the activity, state of animals exposed to different sounds, the nature and novelty of a sound, spatial relations between a sound source and receiving animals, and the gender, age, and reproductive status of the receiving animal.
- Physiological impacts - auditory threshold shift (temporary and permanent hearing loss) – marine fauna exposed to intense sound may experience a loss of hearing sensitivity, or even potentially mortal injury. Hearing loss may be in the form of a temporary threshold shift (TTS) from which an animal recovers within minutes or hours, or a permanent threshold shift (PTS) from which the animal does not recover.

Available threshold criteria associated with behavioural and physiological impacts for sensitive receptors have been derived from a number of sources (National Marine Fisheries Service, 2018a; Popper et al., 2014; Southall et al., 2019a). These criteria have been compared with measured and predicted sound levels for different sound sources to assess potential impacts.

Marine Mammals

Marine mammals, especially cetaceans, rely on sound for individual recognition, socialising, detecting predators and prey, navigation, and reproduction (Erbe, 2012; Erbe et al., 2016; Weilgart, 2007). Underwater noise can affect marine mammals in various ways including interfering with communication (masking), behavioural changes, a shift in the hearing threshold (PTS and TTS), physical damage and stress (Erbe, 2012).

The thresholds that could result in a behavioural response, temporary threshold shift (TTS) and permanent threshold shift (PTS) for cetaceans as a result of continuous and impulsive noise sources are presented in Table 6-6 and Table 6-7. These thresholds have been adopted by the United States National Oceanic and Atmospheric Administration (NOAA) (2019a), National Marine Fisheries Service (NMFS) (2018b) and Southall et al. (2019b).

Table 6-6: Thresholds for, and behavioural responses, TTS and PTS onset for cetaceans and sirenians for continuous noise

Hearing Group	Behavioural Response (dB re 1 µPa)	TTS Onset Thresholds SEL_{24h} (dB re 1 $\mu Pa^2.s$)	PTS Onset Threshold: SEL_{24h} (dB re 1 $\mu Pa^2.s$)
Low frequency cetaceans	120	179	199
High frequency cetaceans	120	178	198
Very high frequency cetaceans	120	153	173
Sirenians	-	186	206

Source: NMFS (2018b), Southall et al. (2019b), NOAA (2019a)

Table 6-7: Thresholds for behavioural response TTS, and PTS onset for cetaceans and sirenians for impulsive noise

Hearing Group	NOAA (2019b)	NMFS (2018); Southall et al. (2019a)			
	Behaviour	TTS Onset Thresholds (Received Level)		PTS Onset Thresholds (Received Level)	
	SPL (L_p; dB re 1 µPa)	Weighted SEL_{24h} ($L_{E,24h}$; dB re 1 $\mu Pa^2 \cdot s$)	PK (L_{Pk}; dB re 1 µPa)	Weighted SEL_{24h} ($L_{E,24h}$; dB re 1 $\mu Pa^2 \cdot s$)	PK (L_{Pk}; dB re 1 µPa)
Low frequency cetaceans	160	168	213	183	219
High frequency cetaceans	160	170	224	185	230
Very high frequency cetaceans	160	140	196	155	202
Sirenians	-	190	226	175	220

Source: Southall et al. (2019b), NOAA (2019a)

The operational area overlaps a small portion of the humpback whale migration corridor and, the eastern (nearshore) edge of the pygmy blue whale migration BIA (Figure 3-8). Humpback and pygmy blue whales are listed as migratory and pygmy blue whales are also listed as endangered under the EPBC Act. Other species of cetaceans may also be exposed to underwater noise from the activities; however, humpback and pygmy blue whales are considered to be the most vulnerable to impacts due to their known seasonal presence in the vicinity of the operational area.

Thums et al. (2022) suggest that the pygmy blue whale migration corridor may extend much further west from the shelf edge, into waters deeper than the migration BIA established by DCCEEW and deeper than those of the operational area. Consequently, pygmy blue whales are unlikely to occur in the operational area in significant numbers, with observed and modelled distributions of pygmy blue whales occurring further offshore in deeper water (Double et al., 2014; Thums et al., 2022). It is likely that transient individuals or small groups are occasionally in and around the operational area during migration periods (April to July and October to January, respectively) (McCauley, 2011; Gavrilov et al., 2018; Thums et al., 2022). Significant numbers of pygmy blue whales are not expected to be encountered, particularly outside peak periods for northbound or southbound migrations.

The Conservation Management Plan for the Blue Whale (Commonwealth of Australia, 2015b), a recovery plan made under the EPBC Act, defines BIAs for pygmy blue whales, with particular emphasis placed on foraging areas and migration corridors. Action Area A.2.3 of the BWCMP states: “Anthropogenic noise in biologically important areas will be managed such that any blue whale continues to utilise the area without injury, and is not displaced from a foraging

area". Based on the Guidance on Key Terms within the Blue Whale Conservation Management Plan (DAWE, 2021), underwater noise emissions from the petroleum activities program must not:

- result in injury (TTS or PTS) to any pygmy blue whale in BIAs
- displace a pygmy blue whale from a foraging BIA.

The noise source with the greatest potential for impacts to pygmy blue whales is vessels holding station using DP. As described above in Section 6.4.1.1, noise from vessels using DP is expected to be below 120 dB re 1 µPa within 4-5 km of the source (McCauley, 1998; Koessler and McPherson, 2020).

When considering the Conservation Management Plan for the Blue Whale (Commonwealth of Australia, 2015b) and Guidance on key terms within the Blue Whale Conservation Management Plan (DAWE, 2021), underwater noise emissions from the activities are consistent with the requirements of the plans. The nearest foraging BIA is approximately 42 km from the operational area and is not expected to be impacted by the activity, given behavioural responses to vessel noise are expected to be limited to within 5 km of the source. The operational area is surrounded by open water, with no restrictions (e.g., shallow waters, embayment's) to a cetacean's ability to avoid the activities. Behavioural response by pygmy blue whales may result in a deviation in course during migration, which is expected to be insignificant in the context of the long distances over which individuals migrate (thousands of kilometres).

Humpback whales are seasonally present in the NWS region during their annual migrations to and from breeding areas in northern Western Australia. The migration BIA for humpback whales overlaps the operational area. Aerial surveys and tagging studies of humpback whales indicate that most migrating humpbacks occur in shallower water than the operational area (ranging from approximately 95 m – 125 m), but considerable numbers of humpback whales have been observed in the region in water depths similar to the operational area (Double et al., 2012, 2010; RPS Environment and Planning, 2010; Thums et al., 2018). It is reasonable to conclude that a portion of the humpback whale population may occur in or near the operational area during seasonal migrations and hence be exposed to underwater noise at levels that may cause impacts. Other known important areas for humpback whales, such as foraging or cow/calf resting areas do not occur in or near the operational area.

Vessels holding station using DP have the greatest potential to cause impacts to humpback whales due to their relatively high source level and broadband nature, which includes low frequency components that overlap the functional hearing range of humpback whales. Other noise sources are less likely to result in impacts due to their lower source levels (e.g., ROV, positioning equipment noise), relatively high frequency and consequent rapid attenuation (e.g., positioning equipment noise) or short duration (e.g., helicopter noise). Source levels of noise from vessels using DP will not credibly exceed the PTS threshold for low frequency cetaceans. Noise levels would only credibly exceed the TTS threshold in the immediate vicinity of the source (i.e., 10's of metres from a thruster) and would require a humpback to remain in this proximity to the noise source for a sustained period of time. Humpback whales receiving sufficient noise for PTS and TTS is not considered credible.

Noise levels that exceed the behavioural impact threshold may extend from vessels to approximately 5 km. Migrating humpback whales within this area may experience behavioural disturbances, such as avoidance of the noise source, increased swimming speed and increased diving frequency. These behavioural responses have been observed in response to the presence of vessels in humpback migration areas, although the effect of the vessel (and seismic source) did not stop migration (Dunlop et al., 2015). Consequently, underwater noise emissions to humpback whales may induce short-term behavioural responses in animals close to vessels, but this will affect a small portion of the population and will not impact migration behaviour.

Vessel noise may also mask humpback whale calls, which may interfere with the perception of communication and result in humpback whales increasing their call volumes. Masking would only credibly occur when vessels are holding station using DP. Adult male humpback whales call most frequently and loudly during migration, with females and calves vocalising more quietly and far less frequently (Gosby et al., 2022; Salgado-Kent et al., 2012).

High and very high frequency cetaceans, such as dolphins and pilot whales, may occur in the operational area. High and very high frequency cetaceans may be impacted by underwater noise generated by the activities, particularly acoustic emissions from positioning equipment (e.g., USBL and LBL) operate in frequencies that overlay the functional hearing range of high-frequency cetaceans. Source levels for acoustic positioning equipment may exceed the TTS and behavioural impact thresholds for high and very high frequency cetaceans (Table 6-7). High-frequency noise attenuates rapidly in seawater and the noise emissions from positioning equipment on the seabed (> 100 m water depth) will be substantially lower power for receivers near the sea surface, which is where high frequency cetaceans are most likely to occur. High frequency noise from positioning equipment will be of relatively short duration (e.g., several hours when positioning equipment) and infrequent during the activities. The operational area is not known to be important habitat for high and very high frequency cetaceans. Consequently, impacts to high frequency cetaceans are likely to be limited to short-term behavioural impacts.

Helicopter noise would only credibly impact upon cetaceans during take-off and landing at the primary vessel or support vessels. Cetaceans are unlikely to be close to the primary vessel or support vessels during helicopter take-off and landings, as they are likely to be displaced due to the noise generated by the vessels. Given helicopter noise

is largely be reflected by the sea surface and take-off and landing operations are short-term, impacts to cetaceans from helicopter noise are very unlikely to occur.

There is no significant habitat or biologically important areas for sirenians in or near the operational area.

Marine Turtles

There are no BIAs for marine turtles within the operational area, however internesting habitat considered critical to the survival of flatback turtles overlaps the operational area. The nearest BIA is the internesting BIA for flatback turtles, located approximately 7 km away. Given the water depths of the operational area (340 m to 400 m) it is expected that only individual marine turtles may pass through the operational area.

Recent tagging studies have identified that waters utilised by flatback turtles during post-nesting migration and foraging are typically less than 50 m deep and less than 66 km from shore (Whittock et al. 2016; Thums et al. 2018). Thums et al. (2018) specifically studied flatback turtles during their post-nesting migration from the Lacepede Islands and during foraging. The study found that flatback turtles migrated along the coast in water depths of 63 ± 5 m, passing near Adele Island on the way to foraging grounds on the Sahul Shelf in the Timor Sea. Based on this, it is unlikely that internesting flatback turtles would be present within the operational area.

The Recovery Plan for Marine Turtles in Australia 2017-2027 (Commonwealth of Australia, 2017) specifies the following priority actions for all stocks of marine turtles:

- manage anthropogenic activities to ensure marine turtles are not displaced from identified habitat critical to the survival
- manage anthropogenic activities in BIAs to ensure that biologically important behaviours (BIBs) can continue
- the plan also highlights noise interference from anthropogenic activities as a threat to marine turtles. The plan refers to vessel noise and the operation of some oil and gas equipment as sources of chronic (continuous) noise in the marine environment, exposure to which may lead to avoidance of important turtle habitat.

Finneran et al. (2017) presented revised thresholds for sea turtle injury and hearing impairment (TTS and PTS). Their rationale is that sea turtles have best sensitivity at low frequencies and are known to have poor auditory sensitivity (Bartol & Ketten, 2006; Dow Piniak et al., 2012). Accordingly, TTS and PTS thresholds for turtles are likely more similar to those of fishes than to marine mammals (Popper et al., 2014).

Studies show behavioural responses occur to received sound levels of around 166 dB re 1 µPa and that avoidance responses occur at around 175 dB re 1 µPa (McCauley et al., 2000). These levels overlap with the sound frequencies produced by vessels. Based on the limited data regarding noise levels that illicit a behavioural response in turtles, the lower level of 166 dB re 1 µPa level drawn from National Science Foundation (2011) is typically applied, both in Australia and by NMFS, as the threshold level at which behavioural disturbance could occur. The recommended criteria for continuous and impulsive sound sources are shown in **Table 6-8** and **Table 6-9**.

Table 6-8: Acoustic effects of continuous noise on sea turtles

Marine Fauna	Popper *(et al. (2014)*		Finneran *et al.* (2017) Weighted SEL_{24h} ($LE_{,24h}$; dB re 1 µPa^2·s)	
	Masking	Behaviour	TTS onset threshold	PTS onset threshold
Marine turtles	(N) High (I) High (F) Moderate	(N) High (I) Moderate (F) Low	200	220

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 metres, intermediate (I) – hundreds of metres, and far (F) – thousands of metres.

Table 6-9: Acoustic effects of impulsive noise on sea turtles

NFS (2011)	Moein et al. (1995); McCauley et al. (2000b), (2000a)	Finneran et al. (2017)			
Behaviour		TTS onset threshold		PTS onset threshold	
SPL (L_p; dB re 1 µPa)		Weighted SEL_{24h} ($LE_{,24h}$; dB re 1 µPa^2·s)	PK (L_{pk}; dB re 1 µPa)	Weighted SEL_{24h} ($LE_{,24h}$; dB re 1 µPa^2·s)	PK (L_{pk}; dB re 1 µPa)
166	175	189	226	204	232

Based on the criteria detailed within Table 6-8 if vessels operating on DP emit approximately 182 dB re 1 µPa at 1 m (RMS SPL) (McCauley 1998) or the FPSO emitting approximately 183 dB re 1 µPa at 1 m (RMS SPL), PTS and TTS will not credibly occur. Behavioural changes, for example, avoidance and diving, are only predicted for

individuals in close proximity to noise sources, particularly vessels holding station using DP. These are expected to occur in within hundreds of metres of the noise source, and hence may result in a short-term displacement of marine turtles around vessels. Turtles have not been shown to have a reliance on sound for finding food or avoiding predators, hence masking is unlikely to occur.

Injury to marine turtles from impulsive noise sources (i.e., positioning equipment) will not credibly occur. Behavioural changes, for example, avoidance and diving, are only predicted for individuals in close proximity to the noise sources, which are near the seabed where individuals are unlikely to be present.

Sea Snakes

There is limited information about the effects of noise on sea snakes. A current research project investigating the impacts of seismic surveys found that hearing sensitivity of sea snakes is similar to species of fish without a swim bladder (discussed below). Therefore, it is considered that there is a moderate risk to individual but only minor to a population, in the near and intermediate distances (which extends hundreds of metres) of behavioural impacts to sea snakes, with the impacts being limited to temporary avoidance of the area.

Sharks, Rays and Fish

All fish species can detect noise sources, although hearing ranges and sensitivities vary substantially between species (Dale et al., 2015). Sensitivity to sound pressure seems to be functionally correlated in fishes, to the presence and absence of gas-filled chambers in the sound transduction system. These enable fishes to detect sound pressure and extend their hearing abilities to lower sound levels and higher frequencies (Ladich & Popper, 2004; Braun & Grande, 2008). Based on their morphology, Popper *et al*. (2014) classified fishes into three groups, comprising fishes:

- with swim bladders whose hearing does not involve the swim bladder or other gas volumes
- whose hearing does involve a swim bladder or other gas volume
- without a swim bladder that can sink and settle on the substrate when inactive.

Underwater noise impact thresholds for continuous and impulsive noise for the fish categories listed above are provided in **Table 6-10** and **Table 6-11** for continuous and impulsive noise respectively. Given there is no exposure criteria for sharks and rays, the same criteria are adopted, though typically sharks and rays do not possess a swim bladder.

Table 6-10: Continuous noise: Criteria for noise exposure for fish, adapted from Popper *et al*. (2014)

Potential Marine Fauna Receptor	Mortality and Potential Mortal Injury	Impairment			Behaviour
		Recoverable injury	TTS	Masking	
Fish: No swim bladder (particle motion detection)	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low
Fish: Swim bladder not involved in hearing (particle motion detection)	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) High (I) High (F) Moderate	(N) Moderate (I) Moderate (F) Low
Fish: Swim bladder involved in hearing (primarily pressure detection)	(N) Low (I) Low (F) Low	170 dB SPL for 48 h	158 dB SPL for 12 h	(N) High (I) High (F) High	(N) High (I) Moderate (F) Low
Fish eggs and fish larvae	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low	(N) Moderate (I) Moderate (F) Low

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 6-11: Impulsive noise: Criteria for noise exposure for fish, adapted from Popper et al. (2014)

Potential Marine Fauna Receptor	Mortality and Potential Mortal Injury	Impairment			Behaviour
		Recoverable injury	TTS	Masking	
Fish: No swim bladder (particle motion detection)	> 219 dB SEL_{24h} or > 213 dB PK	> 216 dB SEL_{24h} or > 213 dB PK	> 186 dB SEL_{24h}	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low
Fish: Swim bladder not involved in hearing (particle motion detection)	210 dB SEL_{24h} or > 207 dB PK	203 dB SEL_{24h} or > 207 dB PK	> 186 dB SEL_{24h}	(N) Low (I) Low (F) Low	(N) High (I) Moderate (F) Low
Fish: Swim bladder involved in hearing (primarily pressure detection)	207 dB SEL_{24h} or > 207 dB PK	203 dB SEL_{24h} or > 207 dB PK	186 dB SEL_{24h}	(N) Low (I) Low (F) Moderate	(N) High (I) High (F) Moderate
Fish eggs and fish larvae	> 210 dB SEL_{24h} or > 207 dB PK	(N) Moderate (I) Low (F) Low	(N) Moderate (I) Low (F) Low	(N) Low (I) Low (F) Low	(N) Moderate (I) Low (F) Low

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.

Based on criteria developed by Popper *et al*. (2014) for noise impacts on fish, vessel/FPSO, helicopter and ROV noise has a low risk of resulting in mortality and a moderate risk of TTS impacts when fish are within tens of metres from the source. The most likely impacts to fish from noise will be behavioural responses. Popper *et al*. (2014) identified a moderate risk of behavioural impacts to fish in near (tens of metres) and intermediate distances (hundreds of metres) from the noise source. Masking could occur within thousands of metres under a worst-case scenario of vessel operations; however, typically any effect will be limited to within hundreds of metres.

A foraging BIA for whale sharks is located approximately 8 km from the operational area. Whale sharks could potentially be impacted from operational noise if in the area. Whale sharks would be expected to show avoidance to vessel noise, although they are likely to tolerate low level noise, as they have been observed swimming close to oil and gas platforms on the NWS, as well as charter vessels for tourism purposes during the aggregations at Ningaloo Coast.

Thresholds for PTS and recoverable injury from impulsive noise are between 207 dB PK and 213 dB PK (depending on the presence or absence of a swim bladder), and the threshold for TTS is 186 dB SELcum (Popper et al., 2014). Given there is no exposure criteria for sharks and rays, the same criteria are adopted, though typically sharks and rays do not possess a swim bladder.

Based on criteria developed by Popper et al. (2014) for continuous and impulsive noise impacts on fish, noise from the activities has a low risk of resulting in mortality and TTS impacts and would only occur if fish remain in very close proximity of the noise sources. The most likely impacts to fish from noise will be behavioural responses. Popper et al. (2014) identified a moderate risk of behavioural impacts to fish in near (tens of metres) and intermediate distances (hundreds of metres) from the noise source.

Given the thresholds outlined in Table 6-10 and Table 6-11, it is reasonable to expect that fish, sharks and rays may demonstrate avoidance or attraction behaviour to the noise generated by the activities. However, potential impacts from predicted noise levels from the project vessels are not considered to be ecologically significant at a population level.

Seabirds

The operational area overlaps the reproductionBIA for the wedge-tailed shearwater. Seabirds and migratory shorebirds within the operational area are unlikely to be directly affected by underwater noise generated during the activity. Given the expected low density of seabirds and migratory shorebirds within the operational area, the relative infrequency of helicopter flights and lack of lasting effect of potential behavioural responses to helicopter and vessel noise, impacts are expected to be negligible.

Invertebrates

Underwater noise emissions from the activity are not expected to cause a change in behaviour to benthic invertebrates.

Benthic invertebrates are unlikely to be negatively impacted from noise generated from vessel operations; there is no convincing scientific evidence for any significant effects induced by non-impulsive noise in benthic invertebrates.

Plankton, including fish eggs and larvae, and pelagic invertebrates could drift into proximity to high energy noise sources (for example, bow thrusters). However, any negative impacts that could occur would be restricted to within metres of the sound source. At such a localised extent, impacts would be negligible at an ecosystem or population level.

Protected and Significant Areas

The operational area does not intersect any marine parks, State marine parks, World Heritage, or National Heritage areas. The nearest protected or significant area is the Ningaloo Coast World Heritage Area (including the Ningaloo State Marine Park), located approximately 27 km from the operational area. The Ningaloo and Gascoyne AMPs are located approximately 27 and 28 km from the operational area respectively. Due to the distance of protected and significant areas from the operational area, impacts from noise emissions on the values of these areas are not expected.

No recognised reproduction or resting area for marine mammals, cetaceans, shark, or fish species are known to occur in the operational area. However, a migration BIA for the humpback whale and a migration BIA for the pygmy blue whale overlap the operational area (see details above).

Cumulative Impacts

During FAR and damaged flowline removal activities up to four vessels may be present in the operational area at any one time. However, all four support vessels would only be in the operational area simultaneously for short periods of time and would only use thrusters to maintain positions for short, intermittent periods of time, and may be carrying out support activities (e.g., delivering equipment and consumables to the primary vessel) with spatial separation from each other.

It is possible that IMMR activities involving a single vessel outside of the 500 m PSZ surrounding the DTM location may occur concurrently with FAR activities in the operational area.

Continuous noise levels from the helicopters and vessels that may cause behavioural responses are expected to generally be confined to the operational areas and concentrated within a radius of a few hundred metres of the noise source, and as such cumulative impacts from concurrent project activities are not expected. During the activity, there is no potential for SIMOPS with drilling activities and therefore, no potential cumulative noise impacts from SIMOPS will occur. Consultation with other operators have not identified any concurrent activities, therefore no potential additive or cumulative noise impacts from concurrent activities with other operators will occur.

6.4.3 Environmental Performance Outcomes and Control Measures

EPOs relating to this event include:

- No injury or mortality to *Environment Protection and Biodiversity Conservation Act 1999* and the WA *Biodiversity Conservation Act 2016* listed fauna during activities [NV-EPO-04].

The control measures considered for this activity are shown in

Table 6-12 with EPSs and measurement criteria for the EPOs described in **Section 8.4**.

Table 6-12: Control measures evaluation for noise emissions

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
Standard Control Measure					
NV-CM-20	Procedures for interacting with marine fauna	Administrative	Reduces risk of physical and behavioural impacts to marine fauna from vessel, because if they are sighted, then the vessel can slow down or move away, and helicopters can increase distances from sighted fauna if required.	Operational costs to adhere to marine fauna interaction restrictions, such as vessel speed and direction, are based on legislated requirements and must be accepted.	**Adopted** – Benefits in reducing impacts to marine fauna outweigh the costs incurred by Santos. Control drives compliance with EPBC Regulations (Part 8).
NV-CM-21	Vessel planned maintenance system (PMS) to maintain vessel DP, engines, and machinery	Engineering	Reduces noise emissions from the vessels because equipment is operating within its parameters.	Costs are standard for routine PMS	**Adopted** – Benefits in reducing noise impacts.
NV-CM-22	Marine assurance	Administrative	Ensures contracted vessels are operated, maintained, and manned in accordance with industry standards (for example, Marine Orders) and regulatory requirements (this EP) and the relevant Santos procedures mentioned in this EP.	Costs are expected as part of standard procedure.	**Adopted –** Benefits in reducing noise impacts.
NV-CM-23	Vessel bridge crew receive induction in marine fauna observations, marine fauna interaction procedure requirements	Administrative	Reduces risk of physical and behavioural impacts to marine fauna from vessel, because if they are sighted, then the vessel can slow down or move away.	Minor additional costs associated with induction/training material and time.	**Adopted –** Benefits in reducing noise impacts**.**
Additional Control Measures					
N/A	Dedicated Marine Fauna Observer on vessels	Protective	Improved ability to spot and identify fauna at risk of impact by vessel noise	Additional cost to contract several specialists (marine fauna observers) while the risk to all listed marine fauna cannot be reduced due variability in timing of environmentally sensitive periods and unpredictable presence of some species.	**Rejected** - Cost incurred disproportionate to the negligible environmental benefit. Although the operational area overlaps a very small portion of the PBW and humpback whale migration BIAs, source levels of noise from vessels will not credibly exceed the PTS threshold

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
					for low frequency cetaceans. Noise levels would only credibly exceed the TTS threshold in the immediate vicinity of the source (i.e., 10's of metres from a thruster) and would require a cetacean to remain in this proximity to the noise source for a sustained period of time. Fauna receiving sufficient noise for PTS and TTS is not considered credible. Behavioural responses to noise are expected to be limited to within 5 km of the source. The operational area is surrounded by open water, with no restrictions (e.g., shallow waters, embayment's) to a cetacean's ability to avoid the activities. Behavioural response by cetaceans may result in a deviation in course during migration, which is expected to be insignificant in the context of the long distances over which individuals migrate. Although up to four vessels may be present in the operational area at any one time, typically only two vessels will be within the operational area – the primary vessel and the support vessel. All vessels will either be stationary or slow moving, thereby reducing

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
					underwater noise emissions and will adhere to Santos procedures for interacting with marine fauna (NV-CM-19). Bridge crew will maintain a visual lookout for marine fauna as part of their watchkeeping duty (NV-CM-23.
N/A	Site specific acoustic modelling	Administrative	The distance at which the fauna could experience behavioural impacts can be predicted and compared to published literature. Accordingly, management controls can then be included to reduce potential impacts to marine fauna.	Additional cost to contract consultant to develop model and produce predicted noise outputs.	**Rejected**- The cost associated with site specific modelling outweighs any environmental benefit. The peak sound level, frequency and potential distances to effect (PTS TTS and behavioural) associated with underwater noise from the types of vessels proposed to be used in the activity is well understood Considering that the potential impacts are expected to be minor and temporary in nature, site specific noise modelling will not provide additional information which would alter the current ALARP position.
N/A	Noise management plan	Administrative	Impacts are predicted to be minor and therefore a management plan and associated management controls will have little or no benefit in terms of outcomes i.e., reducing impacts further.	No additional cost other than cost associated with preparation and review of the management plan.	Rejected - The activity does not occur in any resting, foraging, calving or confined migratory pathway for protected cetacean species. Therefore, the cost associated with

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
					developing a management plan outweighs the little or no benefit for a short duration activity which has a minor impact.
N/A	Use of passive acoustic monitoring	Protective	Improve detection of some sensitive receptors.	Costs of passive acoustic monitoring operators. Operational costs of shutdowns will potentially prolong the activity.	**Rejected** - Cost incurred disproportionate to the negligible environmental benefit given the low-level behavioural response expected. Noise from vessels will not credibly exceed the PTS threshold for low frequency cetaceans. Noise levels would only credibly exceed the TTS threshold in the immediate vicinity of the source (i.e., 10's of metres from a thruster) and would require a cetacean to remain in this proximity to the noise source for a sustained period of time. Cetaceans receiving sufficient noise for PTS and TTS is not considered credible. Additionally, passive acoustic monitoring has a (Limited ability to detect cetaceans and would provide little benefit to species expected to be present.
N/A	Verification of noise levels	Administrative	Allow implementation of adaptive management controls should impact be greater than expected.	Costs of deploying noise monitoring equipment and processing of data.	**Rejected** - Relatively short duration of the activity would prevent noise verification being completed

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
N/A	Operational activities to avoid coinciding with sensitive periods for marine fauna present in the operational area (pygmy blue whale migration)	Eliminate	Reduces the risk of impacts from noise emissions during environmentally sensitive periods for listed marine fauna.	High cost in moving or delaying activity schedule. The risk to all listed marine fauna cannot be reduced due to variability in timing of environmentally sensitive periods and unpredictable presence of some species.	**Rejected** - TTS thresholds from underwater noise (vessels primary source when operating on DP) will be limited to within a few hundred meters of the source and will not overlap the water depths (500m+) that pygmy blue whales are known to use during their migration. Therefore, potential for impacts to migrating whales extremely limited, given close proximity to the source for underwater noise to fall below TTS levels (considered an injury under the Management Plan for Pygmy Blue Whales), in water depths shallower than preferred by migrating PBW. Therefore, the activities are not inconsistent with the objectives of the Pygmy Blue Whale Management Plan.
N/A	Start up of acoustic equipment and ROV equipment only when ROV is in position near the seabed.	Engineering	Restricts ROV noise emissions to smaller portion of water column near seabed. Reduces potential noise interactions with marine fauna.	Not possible	**Rejected** - Not possible. The equipment needs to be functioning on deployment.
N/A	Do not conduct IMMR activity concurrently with asset removal	Eliminate	Eliminates the potential for impacts from additional source of underwater noise.	IMMR may be required to be undertaken concurrently with FAR activities in order to maintain subsea infrastructure condition. Additive and cumulative impacts form additional vessel generated underwater noise are expected to be negligible and generally be confined to the operational areas and concentrated within a radius	**Rejected** Cost is disproportionate to the negligible environmental benefit.

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
				of a few hundred metres of the noise source.	

6.4.4 Environmental Impact Assessment

Receptor	Consequence Level
Noise Emissions	
Threatened, migratory or local fauna	While the level of noise expected from temporary and intermittent operational activities has the potential to cause physical injury to marine fauna, most species that may transit through the area are expected to demonstrate avoidance behaviour if noise levels approach those that could cause pathological effects. Avoidance behaviour is likely to be localised within the area of the activity (due to small spatial extent of elevated noise) and temporary, i.e., for the duration of the activity only. The operational area overlaps the eastern (nearshore) edge of the Pygmy Blue Whale migration BIA. However, since pygmy blue whales show preference for water depths >500 m, only a small number of individuals are likely to be encountered transiting the operational area. Behavioural responses to vessel or FPSO noise are expected to be limited to within 5 km of the vessel and are therefore not expected reach the foraging BIA (located around 42 km away at its closest point). Individuals are not expected to be displaced from foraging areas (located distant from the operational area) or from potential opportunistic foraging activities. Any migrating individuals ae expected to show avoidance behaviour with no significant impact to migration expected. The operational area overlaps a humpback whale migration BIA. Due to behavioural responses to noise within the operational area, humpback whales may be displaced from a small proportion of the BIA. However, the area overall represents a small proportion of the BIA width, which is unlikely to present a barrier to movement or disrupt migratory pathways or behaviour. Internesting habitat critical to the survival of flatback turtles overlaps the operational area and the nearest BIA is for flatback turtle (internesting habitat) approximately 7 km operational area. The water depths of the operational area (340 m to 400 m) are deeper than the water depths that critical internesting activities are known to occur in (< 50 m, Whittock et al. 2016; Thums et al. 2018). Hence turtles will not be displaced from critical habitat or BIAs. Individual turtles may be encountered within the operational area but are unlikely to be internesting females due to the distance from the closest nesting beaches (approximately 30 km) and water depth (340 to 400 m). Hence noise from the activities will not displace turtles from critical habitats or BIAs. A whale shark foraging BIA is located approximately 8 km for the operational area. It is possible that whale sharks could pass through the operational area, particularly before and after their annual aggregation off Ningaloo Reef. Any impacts to whale sharks will be limited to potential short-term behavioural impacts given the sensitivity of this species and the nature and scale of the noise emissions from the activities. Impacts to other fish species will be similar and limited to short-term behavioural impacts. Seabirds are also unlikely to be directly affected by underwater noise generated during the activity. Although a reproduction BIA for the wedge-tailed shearwater overlaps the operational are, due to the distance of the operational area from any seabird nesting colonies, the potential for airborne noise from the activity to cause disturbance to seabirds is extremely low. Given the generally low level of noise expected from the vessels, helicopters and associated activities, and the relatively short duration of noise emissions, significant impacts to threatened or migratory species are not expected. Some temporary and localised behavioural response may result from the noise levels emitted, but these will not be at levels that could cause mortality or injury to marine fauna or cause a decrease in local population size or area of occupancy of species. The consequence level for fauna is considered to be II – Minor.
Physical environment or habitat	Not applicable – Noise emissions will not impact the physical environment / habitats, apart from increasing ambient noise levels which is considered under other receptors.
Threatened ecological communities	Not applicable – No threatened ecological communities identified in the area over which noise emissions are expected.
Protected areas	Not applicable – Noise levels are not expected to impact on habitats or species at a population or community level. The nearest protected area is the Ningaloo Coast WHA, located approximately 27 km from the operational area.
Socio-economic receptors	Noise levels are not expected to impact on socio-economic receptors due to their low activity level within the vicinity of the operational area. There are no recreation areas within the area expected to be impacted by noise.

Receptor	Consequence Level
	EP stakeholder consultation did not raise any concerns regarding potential impacts to cultural features including sea country. The consequence level for socio-economic receptors is I – Negligible.
Overall worst-case consequence	II - Minor

6.4.5 Demonstration of As Low As Reasonably Practicable

The use of vessels and equipment is unavoidable if the operational activities are to proceed as required and operating 24 hours a day will reduce the overall timeframe and exposure to impacts and risks. Further limiting or reducing the potential number of vessels could introduce a disproportionate operational safety risk. Equipment maintenance will keep the vessel noise levels to within normal operating limits, which will also aid in keeping noise emissions within the boundaries that have been risk assessed.

The vessels and the FPSO are also expected to produce similar noise emissions to other marine vessels that frequent or transit through the vicinity of the operational area (oil and gas industry vessels, commercial shipping). The vessels will adhere to the EPBC Regulations (Part 8) to ensure actions are undertaken to avoid marine mammals (and whale sharks) within 100 m of a vessel, and all crews will be inducted into these requirements. It is further expected that the vessels will typically emit sufficient noise for sensitive marine fauna to exhibit avoidance behaviour and move away from the activity to avoid physical impact zones.

The use of helicopters to transfer personnel to and from the vessels is necessary to allow operational activities to occur safely and effectively, with some personnel required to be rotated to and from other locations, and to provide for a rapid method of transferring to and from the vessels in the case of an emergency. A performance standard prohibiting helicopters from landing or taking off in the presence of marine megafauna would introduce an unacceptable risk to human life.

Management controls are in place to reduce operating noise, including vessel and helicopter operational protocols through adherence to the Santos' Protected Marine Fauna Interaction and Sighting Procedure (EA-91-11-00003). This requires compliance with Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000 and includes controls to reduce the risk of disturbance to or collision with EPBC Act listed marine fauna. Vessel bridge crew will receive as part of the induction process, expectations relating to marine fauna observations and marine fauna interaction procedure requirements. Santos has considered the actions prescribed in the Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia, 2017) when developing these controls to minimise noise impacts on marine turtles.

Any behavioural impact caused by vessel activity noise is likely to be localised and temporary, with marine species expected to resume normal behavioural patterns in the open oceanic waters surrounding the operational area in a short timeframe with no significant impact on their normal behaviour, including during sensitive periods such as migration, nesting, or foraging.

Avoiding periods of higher sensitivity such as migration or nesting periods for whales and turtles (for example) is not considered feasible. The operational area overlaps with four BIAs for fauna: pygmy blue whale migration, humpback whale migration and wedge-tailed shearwater reproduction. Given the low potential impacts to individual fauna, there is not expected to be an impact at population level or significant impacts on migratory, foraging or production behaviours.

Significant impacts are not expected on fauna, including cetaceans and turtles, and the assessed residual consequence for this impact is Minor (II). Additional control measures were considered but rejected since the associated cost or effort was grossly disproportionate to any benefit (**Section 6.4.3).** Therefore, the impact from noise associated with the activities is considered ALARP.

6.4.6 Acceptability Evaluation

Is the consequence ranked as I (Negligible) or II (Minor)?	Yes – maximum consequence from noise emissions is II (Minor).
Is further information required in the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are the risks and impacts consistent with the principles of ESD?	Yes – activity evaluated in accordance with Santos' Environmental Hazard Identification and Assessment Procedure (EA-91-IG-00004_5), which considers principles of ESD. The consequence against this aspect is II (Minor) and therefore does not affect the outcomes of the principles of ecologically sustainable development as per **Table 5-5**.

Are risks and impacts consistent with relevant legislation, international agreements and conventions, guidelines, and codes of practice (including species recovery plans, threat abatement plans, conservation advice and Australian marine park zoning objectives)?	Yes – controls implemented during the activity will minimise the potential impacts to species identified in Recovery Plans as having the potential to be impacted by noise emissions. Relevant species recovery plans, conservation management plans and management actions listed in **Table 3-9**.
Are risks and impacts consistent with Santos' Environmental, Health and Safety Policy?	Yes – aligns with Santos' Environmental, Health and Safety Policy.
Are risks and impacts consistent with stakeholder expectations?	Yes – No concerns raised by stakeholders for this aspect.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – see ALARP above.

The activities will be conducted over a relatively short duration (approximately 2 to 5 days for FPSO disconnect and sail away, 30 days for IMMR activities and 90 days for floating asset and damaged flowline removal activities, dependent on weather delays and operational downtime) in a remote offshore location, with a relatively low probability of encountering significant numbers of noise sensitive fauna. The activities that will generate noise are standard offshore industry practice and the potential impacts are well documented. With the controls proposed and considering the relatively short duration and characteristics of noise types planned, the potential consequences of impacts to noise sensitive receptors in the area, including pygmy blue whales, are assessed to be Minor (II) and ALARP.

Management plans and conservation advice for cetaceans

The operational area intercepts the eastern (nearshore) edge of the migration BIA for pygmy blue whales (refer to Figure 3-8). The Conservation Management Plan for the Blue Whale (Commonwealth of Australia, 2015b) includes the following relevant information and requirements:

- Interim Objective No. 4: "Anthropogenic threats are demonstrably minimised."
- Section 5C: discusses threats from noise interference including seismic surveys, acute and chronic industrial noise, masking from anthropogenic noise, shipping noise and aircraft noise.
- Action A.2.3 under Anthropogenic threats are demonstrably minimised states that "Anthropogenic noise in biologically important areas will be managed such that any blue whale continues to utilise the area without injury and is not displaced from a foraging area". The Guidance on Key Terms within in the Blue Whale Conservation Management Plan (CMP) (DAWE, 2021) provides guidance on what constitutes a foraging area, including opportunistic foraging areas outside of known foraging BIAs.

Activities are considered consistent with the objectives of the conservation management plan and the impacts acceptable for the following reasons:

- A review of noise monitoring data from sources associated with the activity, including the vessels, FPSO, ROV operation, side scan sonar (SSS) or echosounders and positioning equipment, determined that the highest noise emitting activity is associated with support vessels using their thrusters to maintain position. The sound pressure level for continuous noise, such as thrusters, above which behavioural impacts are expected for low-frequency cetaceans including the pygmy blue whale, is 120 dB re 1 µPa. Thruster noise from support vessels has been measured below 120 dB re 1 µPa within 5 km from the noise source (McCauley, 1998; Koessler and McPherson, 2020). Noise from other continuous noise sources is expected to attenuate to below the behavioural impact threshold of 120 dB re 1 µPa within 1 km (Austin et al., 2018).
- The sound pressure level above which behavioural impacts are expected for continuous noise is more conservative than for impulsive noise; 120 dB re 1 µPa versus 160 dB re 1 µPa. Noise monitoring data from impulsive sources, such as SSS or echosounders, have similarly been measured below 120 dB re 1 µPa within 1.5 km from the noise source (Zykov, 2013).
- Given the operational area overlaps the eastern (nearshore) edge of the migration BIA and that observed and modelled distributions of pygmy blue whales occurring further offshore in deeper water (Double et al., 2014; Thums et al., 2022), no significant behavioural impacts to migration activities are expected. No injury to pygmy blue whales that may be encountered during the activity due to noise emissions is also expected as any individuals would be expected to exhibit avoidance behaviours before being exposed to noise levels that may cause injury. Acoustic masking and avoidance behaviour may be expected if pygmy blue whales come within 5.5 km from the noise source, however no significant impacts to foraging or migration BIAs are expected.
- The nearest pygmy blue whale foraging BIA is more than 40 km away from the operational area and is not expected to be exposed to elevated underwater noise levels. Therefore, pygmy blue whales will not be displaced from a foraging BIA as a result of the activity.

- The controls to manage anthropogenic noise include adaptive management in the event that whales are encountered by vessels and helicopters. Santos' Procedures for Interacting with Marine Fauna (EA-91-11-00003) drives activity compliance with EPBC Regulations (Part 8) for managing the risks of noise to cetaceans. Additionally, the activities will not displace an individual or individuals from foraging areas (located distant from the operational area) or from potential opportunistic foraging.
- Additional controls were considered, such as dedicated marine mammal observers, scheduling operational activities outside of sensitive periods, noise monitoring etc, however they were assessed and rejected because the risk of impact from noise on the BIA's is considered minor and therefore the cost is disproportionate to the increase in environmental benefit.

Recovery plan for marine turtles

The Recovery Plan for Marine Turtles in Australia: 2017 to 2027 (Commonwealth of Australia, 2017) highlights noise interference from anthropogenic activities as a threat to marine turtles. The plan refers to vessel noise and the operation of some oil and gas equipment as sources of chronic (continuous) noise in the marine environment, exposure of which may lead to avoidance of important turtle habitat.

It specifies the following priority action related to noise, for all marine turtle stock:

- Manage anthropogenic activities to ensure marine turtles are not displaced from identified habitat critical to the survival.

Although internesting critical habitat to the survival of flatback turtles overlaps the operational area and an internesting BIA is located approximately 7 km from the operational area, given the water depths of the operational area(340 m to 400 m deep), critical internesting activities are not expected to occur. Whilst transiting individuals may occur in the operational area, given the relatively short duration of the activity and the proposed management measures, it is reasonable to conclude noise emissions will not affect the conservation status of marine turtles or compromise the objectives of the marine turtle recovery plan. Therefore, potential impacts are acceptable.

Summary

The controls proposed are consistent with relevant standards, including EPBC Regulations Part 8 (Vessels and Aircraft), and aligned with the applicable management actions outlined in relevant Recovery Plans and Approved Conservation Advice. No concerns from stakeholders (including fisheries) have been raised regarding noise emissions during the activity. Therefore, the Minor (II) impacts expected from noise emissions are considered environmentally acceptable.

6.5 Atmospheric Emissions

6.5.1 Description of Event

Event	Potential impacts from atmospheric emissions may occur in the operational area during the activities as a result of the operation of vessel engines, helicopters, generators, mobile and fixed plant, and equipment. These emissions will include greenhouse gas (GHG) emissions, such as carbon dioxide, methane, and nitrous oxide, and non-GHG emissions, such as sulphur oxides and nitrogen oxides. Although the vessels may use ozone-depleting substances (ODS), this will be in a closed rechargeable refrigeration system and there is no plan to release ODS to the atmosphere. Atmospheric emissions may also result from the towing of the DTM to the port of landing and from road transport to the waste management facility, recycling, and disposal of infrastructure.
Extent	Localised: The quantities of gaseous emissions are relatively small and will, under normal circumstances, quickly dissipate into the surrounding atmosphere.
Duration	Intermittent for the duration of the activity.

6.5.2 Nature and Scale of Environmental Impacts

Potential receptors: Physical environment (air quality)

Physical environment

The combustion of hydrocarbons can cause a temporary decrease in air quality in in the environment immediately surrounding the discharge point during the activity. Incomplete combustion under certain scenarios may also generate dark smoke, these can lead to a reduction in local air quality which can impact humans and seabirds in the immediate vicinity of release. Non-GHG emissions, such as nitrogen oxides and sulphur oxides, can lead to a reduction in local air quality. GHG emissions are recognised to also contribute to the greenhouse gas emissions loading globally. Atmospheric emissions from these sources will under normal circumstances disperse quickly into the surrounding atmosphere. The air emissions are similar to those produced by other vessels in the region.

The operational area is in a remote offshore location, with no expected adverse interaction with populated areas or sensitive environmental receptors associated with air emissions. There are no nearby human receptors such as townships within 30 km and there are no resident bird population within the operational area. Transiting birds are not expected to reside on the vessels for the length of the time that would significantly expose them to reduced air quality conditions.

The emissions associated with transit of the FPSO from the operational area to anchorage and later to its end destination are expected to dissipate quickly into the surrounding environment in an open offshore environment.

Similarly the towing/transporting the DTM to shore its subsequent onshore transportation and disposal/recycling are expected to be temporary and quickly dissipate into the surrounding atmosphere. The disposal and recycling process is expected to require electricity purchased through the local electrical grid, which is generated by a mix of renewable and fossil fuel generation sources.

Atmospheric emission impacts are not expected to have direct or cumulative impacts on sensitive environmental receptors or be above National Environmental Protection (Ambient Air Quality) measures.

There is a potential for accidental release and fugitive emission of ozone-depleting substances (ODS), which can contribute to ozone layer depletion. However, the refrigeration systems that contain ODS are maintained regularly, with measures in place to prevent accidental releases. The likelihood of a significant release is considered to be rare.

Any impacts on air quality are expected to be short-term and limited to the immediate vicinity of the emissions. These atmospheric emissions are not predicted to have direct or cumulative effects on sensitive environmental areas or exceed Environmental Protection (Ambient air quality) measures.

6.5.3 Environmental Performance Outcomes and Control Measures

EPOs relating to this event include:

- No unplanned objects, emissions or discharges to sea or air [NV-EPO-05]

The control measures considered for this activity are shown in **Table 6-13** with EPSs and measurement criteria for the adopted controls are presented in **Section 8.4.**

Table 6-13: Control measure evaluation for atmospheric emissions

CM Reference No	Control Measure	Hierarchy of Controls	Environmental Benefit	Potential Cost/Issues	Evaluation
Standard Controls					
NV-CM-24	Waste incineration	Administrative	Reduces the potential for emissions or particulates by ensuring only permissible waste is incinerated as per International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI and Marine Order 97.	Personnel cost of maintaining waste records and training of staff.	**Adopted** – Negligible environmental impact outweighs the costs associated with transporting waste to shore for landfill.
NV-CM-25	Fuel oil quality	Administrative	Reduces emissions through use of low sulphur fuel in accordance with Marine Order 97.	No additional costs, as this is a regulatory requirement.	**Adopted** – No additional costs.
NV-CM-26	International air pollution prevention certification	Administrative	Ensure vessels are operating with acceptable emissions as per international standards. Ensure compliance with Australian Marine Orders as appropriate for vessel class.	No additional costs, as this is a regulatory requirement.	**Adopted** – Benefit of ensuring vessel is compliant outweighs the minimal costs and it is a legislated requirement.
NV-CM-27	Ozone depleting substance handling procedures	Administrative	Reduces probability of potential impacts to air quality due to ODS emissions.	Personnel cost of maintaining ODS record book or recording system.	**Adopted** – Benefit of ensuring no ODS release outweighs the minimal costs.
NV-CM-21	Vessel PMS to maintain vessel DP, engines, and machinery	Engineering	Ensure vessel is running efficiently and routine maintenance endeavours to ensure emissions are minimal.	No additional costs, is industry best practice.	**Adopted** – No additional costs.
NV-CM-22	Marine Assurance Standard	Administrative	Reduces emissions from vessels because equipment is operating within its parameters.	Cost associated with implementing procedures.	**Adopted** – Benefit of implementing procedure outweighs the minimal costs.
Additional Control Measures					
N/A	No incineration during vessel-based operations activities	Eliminate	Removes all emissions associated with incineration activities during the project.	Increase in health risk from storage of wastes. Limited space available to store additional waste, additional trips to shore would be required to transport waste. Increase in risk due to transfers (increased fuel usage, potential increase in collision risk, disposal on land).	**Rejected** – Health and safety risks outweigh the benefit, given the offshore location. Cost associated with transporting waste to shore for landfill or incineration outweighs onboard incineration. Incineration on the vessels (outside the 500 m PSZ) is a permitted maritime operation
N/A	Removal of all ozone-depleting substance	Eliminate	Eliminates potential of ODS emissions occurring, impacting on air quality.	Lack of refrigeration systems on board the vessels would	**Rejected** – Based on cost associated to replace all equipment

CM Reference No	Control Measure	Hierarchy of Controls	Environmental Benefit	Potential Cost/Issues	Evaluation
	containing equipment			lead to unacceptable workplace conditions (i.e., air conditioning) and poor food hygiene standards, limiting the vessel's ability to undertake the activity; therefore, there is no practical solution to the use of refrigeration. It is noted that ODSS are rarely found on vessels.	considering there is only a low potential for ODS releases.
N/A	Use incinerators and engines with higher environmental efficiency	Substitute	Improves air quality by more efficient burning or fuel combustion.	Significant cost in changing unknown vessel equipment.	**Rejected** – Cost grossly disproportionate to low environmental benefit (impact rated Negligible).
N/A	No support vessels	Eliminate	Reduces the emissions and GHG associated with the activity.	The primary vessels require support vessels for crew and supplies during a campaign and a vessel is also on standby to provide emergency services. Alternative transfer of supplies via helicopter is not feasible due to the size of containers being transferred.	**Rejected** – Support vessels are required to undertake the activity and no alternatives are considered feasible.

6.5.4 Environmental Impact Assessment

Receptor	Consequence Level
Atmospheric Emissions	
Threatened, migratory or local fauna	Emissions from the activity are relatively small and will, under normal circumstances quickly dissipate into the surrounding atmosphere. There are no resident bird populations within the operational area and transiting birds are not expected to reside on the vessels for the length of the time that would significantly expose them to reduced air quality conditions. Any potential impacts are not expected to result in a decrease in local population sizes particularly to seabirds or disruption to breeding cycles. Therefore, the consequence of air emissions to fauna is I (Negligible).
Physical environment or habitat	The activity will occur in the open ocean and offshore waters, the combustion of fuels and rare ODS releases in such a remote location will not impact on air quality in coastal towns. The emissions from the onshore disposal/recycling of floating assets and risers are relatively small and will dissipate quickly into the surrounding atmosphere under normal conditions.

Receptor	Consequence Level
	The quantities of gaseous emissions are relatively small and will, under normal circumstances, quickly dissipate into the surrounding atmosphere. The highly dispersive nature of local winds (i.e., strong, and consistent) is expected to reduce potentially harmful or 'noticeable' gaseous concentrations within a short distance from the vessels and road transport. EP stakeholder consultation did not raise any concerns regarding potential impacts to cultural features including sea country. The consequence level is assessed as I (Negligible).
Threatened ecological communities	N/A
Protected areas	
Socio-economic receptors	The operational area is in a remote offshore location, with no expected adverse interaction with populated areas. There are no nearby human receptors such as townships within 30 km. Atmospheric emission from road transport of removed infrastructure are not expected to have direct or cumulative impacts on sensitive environmental receptors or be above National Environmental Protection (Ambient Air Quality) measures. The quantities of gaseous emissions are relatively small and will, under normal circumstances, quickly dissipate into the surrounding atmosphere. The highly dispersive nature of local winds (i.e., strong, and consistent) is expected to reduce potentially harmful or 'noticeable' gaseous concentrations within a short distance from the source. EP stakeholder consultation did not raise any concerns regarding potential impacts to cultural features including sea country. The consequence is assessed as I (Negligible).
Worst-case consequence level	I-Negligible

6.5.5 Demonstration of As Low As Reasonably Practicable

Combustion of fossil fuels to power the vessels, helicopters and equipment is necessary to undertake the activities and there are currently no viable alternative fuel sources or power options available for these vehicles. It is common for vessels to generate atmospheric emissions offshore as part of their normal operations.

Implementing a zero-incineration policy on the vessels would incur significant costs for transporting waste back to shore for disposal. This would also increase environmental impacts and risks due to more vessel movements and higher emission volumes. Additionally, more space would be needed for waste storage, requiring larger vessels with higher emissions from engine combustion and added refrigeration units. Since incineration is allowed under maritime operation in accordance with Marine Order 97 (reflecting MARPOL Annex VI requirements), it is considered ALARP.

The management of vessel air emissions is well established and understood. In the remote offshore location, no sensitive environmental receptors were found, and there is little uncertainty about this aspect. There are strict regulations in place for air emissions, and no objections or concerns were raised by relevant stakeholders. The assessed residual consequence for this impact is Negligible (I) and cannot be further reduced. Additional control measures were considered but deemed impractical and disproportionate to the benefits. The offshore open environment allows atmospheric emissions to dissipate rapidly, away from sensitive receptors, as explained in **Section 6.5.4**. Therefore, the impact of the activities is considered ALARP.

6.5.6 Acceptability Evaluation

Is the consequence ranked as I (Negligible) or II (Minor)	Yes – maximum consequence from atmospheric emissions is I (Negligible).
Is further information required in the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – activity evaluated in accordance with Santos' Environmental Hazard Identification and Assessment Procedure (EA-91-IG-00004_5), which considers principles of ESD. The consequence against this aspect is I (Negligible) and therefore does not affect the outcomes of the principles of ecologically sustainable development as per **Table 5-5.**
Are risks and impacts consistent with relevant legislation, international agreements and conventions, guidelines, and codes of practice (including species recovery plans, threat abatement plans, conservation advice and Australian Marine Park zoning objectives)?	Yes – pursuant to Marine Order 97 (Marine pollution prevention – air pollution), which gives effect under Australian law to MARPOL Annex VI.

Are risks and impacts consistent with Santos' Environmental, Health and Safety Policy?	Yes – aligns with Santos' Environmental Health and Safety Policy.
Are risks and impacts consistent with stakeholder expectations?	Yes – No concerns raised by stakeholders for this aspect.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – see ALARP above.

Atmospheric emissions from vessels are permissible under the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*, which is enacted in Australian waters by Marine Order 97 (Marine pollution prevention – air pollution) (which also reflects MARPOL Annex VI requirements). This is an internationally accepted standard that is utilised industry wide, and compliance with Australian Marine Order standards is considered to be an appropriate management measure in this case.

The overall impacts to the atmosphere and sensitive receptors are expected to be I (Negligible) and impacts from emissions that are generated by the various operational activities are considered to be ALARP and environmentally acceptable.

6.6 Planned Operational Discharges

6.6.1 Description of the Event

Event	Potential impacts may occur in the operational area from operational discharges from vessels undertaking field management activities during the cessation of production phase, and floating asset and damaged flowline removal activities. Potential impacts may also occur outside the operational area from FPSO sail away to port and removal/towing of the DTM to the port of landing and associated onshore waste management and disposal. Planned operational discharges from these activities include: • sewage and greywater • putrescible waste • desalination brine • cooling water • deck drainage • bilge water • swarf from cutting risers and mooring lines subsea. • Marine growth if removal undertaken on back deck of vessel Sewage and grey water The volume of sewage, grey water and food waste is directly proportional to the number of persons on-board the primary and support vessels. Up to 30 to 40 L of sewage/greywater will be generated per person per day. Treated sewage will be disposed in accordance with Marine Order 96 (Marine pollution prevention – sewage) requirements. Putrescible waste Putrescible waste is estimated to consist of around 1 L of food waste per person per day. Putrescible waste will be disposed in accordance with Marine Order 95 (Marine pollution prevention – garbage) requirements. Cooling water Seawater may be used by some vessels as a heat exchange medium for the cooling of machinery engines. Seawater is drawn from the ocean and flows counter current through closed-circuit heat exchangers, transferring heat from the vessel engines and machinery to the seawater. The seawater is then discharged to the ocean (i.e., it is a once-through system). Cooling water temperatures may vary depending on the vessel's engines' workload and activity. Desalination brine Brine generated from the water supply systems on board the vessels will be discharged to the ocean at a salinity of around 10% higher than seawater. The volume of the discharge depends on the requirement for fresh (or potable) water and will vary between the vessels and the number of people on board. The effluent may contain scale inhibitors such as Alpacon that controls inorganic scale formation, such as the formation of calcium carbonate and magnesium hydroxide, in water-making plants. Other water purification chemicals such as chlorine may also be added to the potable water. Other water-making plant cleaning chemicals such as Ameroyal or Saf Acid may be used and discharged to sea after completion of the cleaning process. Bilge water While in the operational area, the vessels may discharge oily water after treatment to 15 ppm via a MARPOL-approved oily water filter system. Bilge water will be disposed in accordance with Marine Order 91 (Marine pollution prevention – oil, as appropriate to class) requirements. Deck drainage Drainage water on vessels typically consists of rainwater and seawater spray and may potentially contain small residual quantities of oil, grease, and detergents if present or used on the decks. However, controls are in place to prevent, contain and clean up such spills. Swarf from subsea cutting activities The five risers and the damaged section of production flowline B may be cut using a subsea tool at the seabed. The width of material removed during each cut is expected to be approximately 10 mm (approximate width of the cutting blade). Risers will also be cut where they attach to the DTM. Mooring lines may be cut in close proximity to the seabed. Although not expected to be present, NORMS may be present in the scale on the inside of risers and could be released to the marine environment on the swarf when these are cut. Marine Growth removal if undertaken on deck for safe handling of removed infrastructure. Onshore disposal Onshore disposal/recycling of floating assets, risers, the damaged section of production flowline B and the FPSO may result in the following indirect environmental risks and impacts:

	• indirect atmospheric and GHG emissions from unavoidable onshore (road) transport and disposal of recycling activities • discharge of minor volumes of metal swarf from cutting the floating assets prior to loading for road transport • contribution to landfill (DTM-98% is steel and planned to be recycled, risers have plastics and polymer sheaths that require disposal) • management and disposal of hazardous waste from the removed section of production flowline B and the FPSO. An unplanned release of solid objects causing potential impacts to sensitive receptors is discussed in **Section 7.1**
Extent	Offshore The small volumes of non-hazardous discharges may cause localised nutrient enrichment, organic and particulate loading, toxic impacts to marine fauna, thermal impacts, and increased salinity in waters around discharge points and in the direction of the prevailing current. The environment that may be affected by operational discharges will likely be contained within the operational area and are predicted to be restricted to within around 100 m of the discharge point in the upper 5 m of the water column or on the seabed in the case of any swarf. Onshore Port of landing for the DTM, risers, flowline, and potentially mooring chains within Australia (including storage and processing areas), onshore transportation infrastructure (e.g., roads) and licensed waste management facilities. End point destination potentially in Australian or an international facility for the FPSO disposal.
Duration	During the activity localised impacts to water and/or air quality may occur. However, water and air quality conditions will return to normal within minutes to hours of cessation of discharges

6.6.2 Nature and Scale of Environmental Impacts

Offshore aspects

Potential receptors: Water quality, fish (pelagic) and sharks, marine mammals, marine turtles, seabirds, and cultural receptors (totemic species).

Physical environment

The discharge of non-hazardous wastes in small volumes into the marine environment will lead to a localized decrease in water quality. These discharges will only last for a short period of time and will be confined to the surface waters at depths of less than 5 meters. It is expected that these discharges will disperse and dilute quickly, resulting in significant reductions in waste concentrations as distance from the discharge point increases. It is unlikely that there will be any changes to the overall water quality outside of the area where the discharges occur.

Specific potential impacts to water quality from the discharge of non-hazardous waste are as below.

Eutrophication impacts from Sewage, Greywater and Putrescible Waste

The discharge of food waste, treated sewage, and grey water can cause localized increases in nutrient concentrations (e.g., ammonia, nitrite, nitrate, and orthophosphate), organic compounds (e.g., volatile, and semi-volatile organic compounds, oil and grease, phenols, and endocrine disrupting compounds) and inorganics (e.g., hydrogen sulphide, metals and metalloids, surfactants, phthalates, and residual chlorine) in the water. This could lead to higher levels of phytoplankton and bacteria activity in the receiving waters, which may subsequently impact higher order predators.

However, due to the low volume of these discharges, they are expected to disperse and dilute rapidly. Additionally, the organic compounds in the discharges are subject to biodegradation and evaporation, and the high currents in the offshore waters where the discharges occur contribute to short-term changes in surface water quality within the operational area.

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. Similar studies (Parnell, 2003) concluded similar results with rapid dispersion and dilution within hours of discharge.

The discharge of sewage, grey water and putrescible wastes is not expected to contact any offshore reefs, islands, shoals or banks or marine parks.

Salinity increases

Desalination of seawater results in the discharge of brine with slightly higher (10% higher) salinity than seawater. This brine is denser and expected to sink and disperse in the currents upon discharge. Most marine species can tolerate short-term fluctuations in salinity (Walker and McComb, 1990) and are expected to tolerate the slight increase caused by the discharged brine. The impact on water quality in the operational area is expected to be low due to the low volume of discharge, low salinity increase, and the deep, open water surrounding the vessels.

The brine discharge is not expected to affect any offshore reefs, islands, shoals, banks, or marine parks.

Changes in temperature

Cooling water will be discharged into the sea at a temperature higher than the ambient seawater temperature. However, the water temperature of the discharged water will decrease rapidly as it mixes with the receiving waters. The discharged water will be within 1°C of the background levels within less than 100 meters horizontally and within the background levels within 10 meters vertically from the discharge point (Woodside, 2011).

Cooling water discharge points vary for each vessel. However, they all adopt the same discharge design, which permits cooling water to be discharged above the water line to facilitate cooling and oxygenation of this wastewater stream before mixing with the surrounding marine environment.

Cooling water discharge to the marine environment could cause temporary increases in ambient water temperature and potentially affect physiological processes in marine organisms. However, the low volume and temperature differential of the discharge, along with the deep, open water surrounding the vessels, are expected to result in low and short-term impacts on water quality.

The cooling water discharge is not expected to affect any offshore reefs, islands, shoals, banks, or marine parks.

Contamination from release of bilge water

The discharge of oily bilge water may result in localised reduction of water quality affecting protected marine animals and planktons. However, the water discharged will be treated to a concentration of less than 15 ppm before it is released, as required by Marine Order 91 (Marine pollution prevention-oil). Therefore, it is unlikely that the released bilge water will impact the receiving environment. The concentration of the discharged water in surface waters is expected to be very low, and any potential toxic effects on water quality and benthic habitats would be minimal.

Contamination from swarf

The risers, section of damaged production flowline B and mooring chains may be cut using a diamond wire saw or chop saw. The width of pipeline material resulting in swarf during each cut is expected to be approximately 10 mm. Metal (steel) swarf discharged during cutting of risers and damaged section of production flowline B may settle quickly to the seabed or drift with prevailing currents before settling on the seabed distant from the cutting location. Swarf discharged during cutting of mooring lines on or near the seabed is expected to settle quickly to the seabed, given the close proximity to the seabed for this equipment. Discharge of swarf during cutting activities may result in minor impacts to water quality and sediment quality (e.g. through smothering), however given the very small volume of swarf expected to be discharged, any impacts would be highly localised.

NORM refers to materials containing radionuclides that exist in the natural environment. Radionuclides of interest include long-lived radionuclides such as uranium-238, uranium-235 and thorium-232 and their radioactive decay products (such as isotopes of radium, radon, polonium, bismuth and lead), and individual long-lived radionuclides such as potassium-40, rubidium-87 and indium-115. During the cutting and recovery of risers and damaged section of production flowline B, minor quantities of NORMs scale (if present; it is not anticipated) may be released to the marine environment.

Given the small release volumes, any exposure to NORMs would be highly temporary due to rapid dilution and dissipation in the marine environment. Marine fauna in the open water environment are highly mobile, transient species, making it unlikely any species would be exposed to discharged material for long enough to cause toxicity. Benthic habitats in the operational are largely unconsolidated sediments supporting infauna and epifauna with associated sparse assemblages of filter- and deposit-feeders. This habitat type and associated biota are very widely represented in the region and not of conservation. Potential impacts are likely to be highly localised and restricted to within the operational area.

Toxicity

Discharges from vessel systems may contain chemicals found in sewage systems, greywater, desalination, and residues of those used for cleaning decks. On discharge to the marine environment, the low volumes of these types of chemicals are expected to rapidly disperse in the offshore marine environment. Hence, any potential impacts would be confined to a localised area immediately surrounding the discharge.

There may be a localised and temporary (hours) reduction in water quality in the immediate vicinity of the release. Toxicity impacts to marine fauna from the release of chemicals are unlikely to eventuate because:

- strong ocean currents result in the discharge being further diluted upon release to the marine environment, so the duration of exposure of chemicals to fauna will be minimal

- deck cleaning products planned to be released to sea will meet the criteria for not being harmful to the marine environment according to MARPOL Annex V
- other products with potential to be released to the sea meet the criteria for not being harmful to the marine environment according to MARPOL Annex V; or Gold/Silver/D or E rated through OCNS; or have a completed Santos ecotoxicological risk assessment so only environmentally acceptable products are used
- potential discharges will be intermittent and temporary within the operational area.

Threatened or migratory fauna

As discussed in the sections above, the discharge extent for all planned discharges is localised, and rapid dilution is predicted to occur within the offshore waters. Marine fauna within the operational area are likely to be transient. If contact does occur with any marine fauna, it will be for a short duration due to the rapid dispersion of the plume and the transient fauna movement, such that any exposure is likely not of sufficient duration to cause a toxic effect.

Discharges may cause changes to behaviour in marine fauna (avoidance or attraction). Fishes and oceanic seabirds may be attracted to the discharge of food scraps. However, such discharges would be isolated occurrences and not in any one location, so no prolonged influence on faunal behaviour is expected. Discharges of cooling water and brine may cause avoidance behaviour in marine fauna. Given the nature of the discharges (localised, rapid dilution, intermittent), any behavioural impacts are expected to be short term and minimal.

Given the nature of discharged chemicals, the small volumes expect to be released to the marine environment and the nature of the marine environment within the vicinity of the operational area, the operational planned discharges are not predicted to have ecologically significant effects.

Cultural receptors

Given the nature of planned operational discharges, the small volumes that could be released to the marine environment and the nature of the marine environment within the vicinity of the operational area, the planned discharges are not predicted to have impact on cultural receptors located both within and outside of the operational area.

Onshore aspects

Atmospheric and greenhouse gas emissions

The onshore transport (likely by road), recycling and disposal of recovered assets may also result in atmospheric and GHG emissions. The disposal and recycling process is expected to require electricity purchased through the local electrical grid, which is generated by a mix of renewable and fossil fuel generation sources.

Any impacts from atmospheric emissions associated with the unavoidable onshore transport and disposal / recycling of the recovered assets are expected to be short-term, and relate to localised reduction in air quality, limited to the immediate vicinity of the emissions release. Atmospheric emission impacts are not expected to have direct or cumulative impacts on sensitive environmental receptors or be above National Environmental Protection (Ambient Air Quality) measures.

FPSO waste disposal management is outlined in **Section 2.9**.

Hazardous materials and waste management for DTM, risers, mooring lines, production flowline B.

All waste resulting from the removal of equipment will be managed through the application of the waste management hierarchy:

- Avoid
- Reduce
- Reuse
- Repurpose
- Recycle
- Dispose

Santos will seek opportunities to reuse and recycle materials where possible with disposal as a last resort. Licenced waste management contractors will be engaged to perform the onshore waste management.

Santos will undertake a waste management contractor selection audit to ensure contractors comply with State and Commonwealth legislation. The ability of bidders to meet the waste management hierarchy will be considered in the Santos evaluation of tenders, and agreed performance indicators will be included in the final contract.

The waste management contractor will be required to prepare the following documents:

- Waste management plan (onshore) this plan includes:
  - Details on the applicable waste legislation and standards.
  - Details on required licenses for the quayside/ laydown area for receipt of contaminated materials.
  - Details on handling, storage and disposal of waste.
  - Requirement for a Radiation/ HAZMAT inspector to inspect recovered equipment that has been in contact with production fluids for NORM and Mercury when handed over, prior to transportation.
  - Details on decontamination process (if this is performed quayside prior to transport).
  - Details on material and waste tracking.
- Waste transportation plan

Onshore waste disposal will be at licensed facilities. Waste management planning is expected to continue post-contract award with full details of material end-fates included in project execution plans that will be in place before removal activities commence.

Hazardous material will be managed in accordance with a Santos NORMS and HAZMAT Management Plan (9885-236-HSM-0004). Removed equipment that has been exposed to produced fluids will be monitored for NORMs and mercury contamination by a radiation HAZMAT inspector on the vessel when it is recovered. If NORMS or HAZMAT is identified during testing, the effected equipment will be stored in a dedicated area on the vessel and segregated from other equipment, personnel and work areas and clearly labelled. Any material assessed as NORMS contaminated will be classified as hazardous waste and will be handled and transported in accordance with Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) guidelines and disposed of at a licensed facility.

Key materials for recycling / disposal include:

- metals: the recovered assets (e.g. DTM, risers, damaged section of production flowline B, the FPSO) are predominantly steel (carbon steel and stainless steel) structures with epoxy paint coatings and aluminium and other sacrificial metal. Metals will be recycled where possible.
- plastics: recovered assets (e.g. risers, damaged section of production flowline B and the FPSO) contain plastics such as nylon, polypropylene (i.e. 4LPP), polyethylene (i.e. 3LPE), polyvinylidene difluoride (PVDF), PVC, XLPE, HDPE, LLDPE, coflon, rislan, polyethylene rods, polypropylene rope, PE coated wire, hoses and tubes.
- other materials: such as fabric tapes and insulation.

All waste streams will be managed in accordance with relevant legislation of the receiving jurisdiction and by suitably qualified contractors. Therefore, no impacts from general or hazardous waste materials associated with the onshore disposal of decommissioned assets are expected.

Swarf from onshore cutting

After arriving at the port, the recovered assets may be cut into smaller pieces for transportation to a licensed waste management facility. This cutting process will produce a small amount of metal swarf from the steel components. However, there will be no adverse effects from cutting the floating assets onshore.

6.6.3 Environmental Performance Outcomes and Control Measures

The EPOs relating to this event include:

- No unplanned objects, emissions or discharges to sea or air [NV-EPO-05]
- No unplanned discharges to sea, air, or land as a result of the transport and disposal of recovered seabed and floating assets [NV-EPO-06].
- Disposal of floating assets is undertaken by suitably experienced contractors at appropriately licenced waste facilities, with the final disposal of the waste streams undertaken in accordance with SMS-EXA-OS01-PD02-PD01 Waste Monitoring and Reporting [NV-EPO-07].

The control measures considered for this event are shown in **Table 6-14** and EPSs and measurement criteria for the EPOs are described in **Section 8.4.**

Table 6-14: Control measures evaluation for planned operational discharges

CM Reference No	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
Standard Control Measures					
NV-CM-28	Waste (garbage) management procedure	Administrative	Reduces probability of garbage being discharged to sea, reducing potential impacts to marine fauna. Stipulates putrescible waste disposal conditions and limitations. Provides compliance with Marine Order 95 (Marine pollution prevention – garbage).	Personnel cost of pre-mobilisation audits and inspections, and in reporting discharge levels.	**Adopted** – Benefits of ensuring vessel is compliant outweigh the minimal costs of personnel time and it is a legislated requirement.
NV-CM-29	Deck cleaning product selection	Administrative	Improves water quality discharge (reduced toxicity) to the marine environment. Those deck cleaning products planned to be released to sea meet the criteria for not being harmful to the marine environment according to MARPOL Annex V.	Personnel costs of implementing, potential additional cost, and delays of chemical substitution.	**Adopted** – Benefits of ensuring vessels are compliant and those deck cleaning products planned to be released to sea meet MARPOL criteria.
NV-CM-30	General chemical management procedures	Administrative	Reduces potential for inappropriate discharge of chemicals at sea through appropriate handling.	Personnel time associated with vessel inspection and implementation.	**Adopted** – Benefits of ensuring vessel is compliant outweigh the minimal costs of personnel time and it is a legislated requirement.
NV-CM-31	Chemical selection procedure	Administrative	Improves water quality discharge (reduced toxicity) to the marine environment e.g., from AFF and potable water systems.	Personnel costs of implementing, potential additional cost, and delays of chemical substitution.	**Adopted** – Benefits of ensuring vessels are compliant outweighs the cost.
NV-CM-22	Marine assurance	Administrative	Vessels selected and on-boarded in accordance with the Offshore Marine Assurance Procedure (SO-91-ZH-10001) to ensure contracted vessels are operated, maintained, and manned in accordance with	No additional cost.	**Adopted** – Benefits of ensuring vessel is compliant outweigh the minimal costs of personnel time and it is a legislated requirement.

CM Reference No	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
			industry standards (for example, Marine Orders) and regulatory requirements (this EP) and the relevant Santos procedures mentioned in this EP.		
NV-CM-32	Sewage treatment system	Engineering	Reduces potential impacts of inappropriate discharge of sewage. Provides compliance with Marine Order 96 (Marine pollution prevention – sewage).	Personnel cost in ensuring vessel certificates are in place during vessel contracting and in pre-mobilisation audits and inspections, and in reporting discharge levels.	**Adopted –** Benefits of ensuring vessel is compliant outweigh the minimal costs of personnel time and it is a legislated requirement.
NV-CM-33	Oily water treatment system	Engineering	Reduces potential impacts of planned discharge of oily water to the environment. Provides compliance with Marine Order 91 (Marine pollution prevention – oil).	Time and personnel costs in maintaining oil record book.	**Adopted** – Benefits of ensuring vessel is compliant outweigh the minimal costs of personnel time and it is a legislated requirement.
NV-CM-34	Recycling/onshore disposal of decommissioned assets in accordance with relevant legislative requirements	Administrative	Reduced potential impacts from landfill or incorrect recycling/disposal of decommissioned assets	Costs associated with the removal and recycling/disposal of decommissioned assets	**Adopted-** Environmental benefit gained outweighs the costs.
Additional Control Measures					
NV-CM-33	Hazardous Materials Management Plan (or similar)	Administrative	Reduces the potential for cross-contamination during the recovery activities and reduces the potential for indirect impacts during transport and disposal of contaminated waste.	Costs associated with implementing the requirements of the plan	**Accepted -** Environmental benefit gained outweighs the costs to Santos.
NV-CM-34	On deck cutting of risers will be conducted in a bunded area, with any discharge captured for onshore disposal.	Engineering	Helps prevent discharges to the marine environment.	Reduces risk of discharge to ocean but requires increased handling to end point.	**Adopted** – Benefits outweigh minor costs
N/A	Zero discharge of deck water	Eliminate	Would eliminate potential impacts of contaminants being discharged to sea.	Increased health and safety risks from wet deck not draining. Large amounts of water on a vessel's deck can also cause stability	**Rejected –** Safety considerations outweigh the benefit, given the small volumes of contaminants. Deck drainage is a

CM Reference No	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
				issues (free surface effect). Storage space required for containment of drained liquids, increase in transfers to vessels resulting in increased potential impacts and risks. Increased transfers results in increased fuel usage, increased safety risks to personnel during transfer (e.g., crushing between skips), increase in crane movements.	permitted maritime practice and an important safety requirement.
N/A	Zero discharge of bilge water	Eliminate	Would eliminate potential impacts of contaminants being discharged to sea from oily water.	Costs associated with containment and onshore disposal; space required for additional containment on primary vessels could create hazards for working on deck by limiting available space.	**Rejected** – Safety considerations regarding containment outweigh the environmental benefit, given the small volumes of contaminants. Discharge of treated oily water to sea is permitted maritime practice.
N/A	Zero discharge of sewage	Eliminate	Would eliminate potential impacts of contaminants being discharged to sea from sewage.	Costs associated with containment and onshore disposal; space required for additional containment on primary vessels could create hazards for working on deck by limiting available space.	**Rejected** – Safety considerations regarding containment outweigh the environmental benefit, given small volumes of contaminants. Discharge of treated sewage to sea is permitted maritime practice.
N/A	Scupper plugs continuously in place to prevent deck drainage	Engineering	Would eliminate potential impacts of contaminants being discharged to sea in rainwater.	Increased health and safety risks from wet deck not draining. Large amounts of water on a vessel's deck can also cause stability issues (free-surface effect).	**Rejected** – Safety considerations outweigh the benefit, given small volumes of contaminants.
N/A	Zero discharge of cooling water	Eliminate	Would eliminate potential impacts of cooling water (elevated temperature) being discharged to sea.	Costs associated with containment and onshore disposal; space required for additional containment on primary vessels could create	**Rejected** – Safety considerations outweigh the benefit, given small volumes of contaminants.

CM Reference No	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
				hazards for working on deck by limiting available space.	
N/A	Restrict use of desalination plant	Eliminate	Would eliminate potential impacts from brine discharges by importing potable water.	Cost associated with transporting potable water. Health risks associated with limited supply of potable water.	**Rejected** – Cost outweighs the benefit, given the low impact expected from planned discharges and high potential impacts from risk transfer.
N/A	Re-design desalination plant effluent discharge system	Engineering	Limited benefit to be gained, given desalination brine will be diluted.	High costs associated with modifications to vessels. May not be feasible with some vessels. Salinity difference would be minimal compared to significant cost of altering the desalination plant effluent discharge system.	**Rejected** – Cost grossly disproportionate to environmental benefit. Limited benefit to be gained, given low impact. Minimal detectable change in water quality expected. Water making and brine discharge permitted maritime practice.
N/A	Zero discharge of brine water	Eliminate	Would eliminate potential impacts from brine discharges by storing on-board for onshore disposal.	Cost associated with transporting waste brine water; space required for additional containment on primary vessels could create hazards for working on deck by limiting available space.	**Rejecte**d – Cost grossly disproportionate to environmental benefit. Limited benefit to be gained, given low impact. No detectable change in water quality expected. Water making and brine discharge permitted maritime practice.
N/A	Zero discharge of putrescible waste	Eliminate	Would eliminate potential impacts from putrescible waste discharges by storing on-board for onshore disposal.	Cost associated with transporting putrescible waste to shore, space required for additional containment on primary vessels could create hazards for working on deck by limiting available space. Health risks and costs associated with storage on board and transport/disposal onshore.	**Rejected** – Cost grossly disproportionate to environmental benefit. Limited benefit to be gained, given low impact. Health risks associated with managing putrescible waste in hot weather conditions, putrescible waste discharge is a permitted maritime practice.

6.6.4 Environmental Impact Assessment

Receptor	Consequence Level
Operational Discharges	
Threatened, migratory or local fauna Physical environment or habitat	Offshore aspects Operational discharges from the vessels and other activities have the potential to cause a localised decrease in water quality alteration to marine fauna behaviour. Sensitive receptors that may be impacted include fish at surface, marine turtles, mammals, and seabirds. Any effects on water quality are expected to be within the surface waters only and have no effect on seabed receptors. Given the distance from shorelines and that the activity will be for a relatively limited duration, impacts will be limited to short-term water quality impacts and temporary avoidance behaviour in fish, marine mammals, sharks, and seabirds. Impacts to water quality will be experienced in the discharge mixing zone which will be localised and will occur only as long as the discharges occur (i.e., no sustained impacts), therefore, recovery will be measured in hours to days. Similarly, any discharge from swarf cuttings on the sediment quality and seabed will be localised and temporary. Consequently, only short-term behavioural impacts are expected with no decrease in local population size, area of occupancy of species, loss, or disruption of habitat critical or disruption to the breeding cycle and introduction of disease. Given the nature of the planned operational discharges, the small volumes that could be released to the marine environment, the high levels of dilution and the nature of the marine environment in the vicinity of the operational area, impacts to the physical environment and habitat are expected to be I (Negligible). Onshore aspect for DTM, risers, mooring lines, production line B The activity will be carried out using existing transport infrastructure (roads) and at licensed waste facilities. There is no need for land clearance for onshore disposal/recycling. The disposal or recycling of assets at licensed waste facilities is not expected to have any impacts on threatened, migratory, or local fauna and is expected to have a negligible impact. Onshore management and disposal of the FPSO will managed in accordance with the applicable legislative requirements including international requirements, and as such impacts are considered to be minor.
Socio-economic receptors	Not applicable – Planned operational discharges are not expected to impact on socio-economic receptors. EP stakeholder consultation did not raise any concerns regarding potential impacts to cultural features including sea country. In addition, no stakeholder concerns have been raised regarding this event.
Threatened ecological communities	Not applicable – No threatened ecological communities identified in the area over which operational discharges are expected.
Protected areas	Not applicable – No protected areas are identified in the area over which operational discharges are expected.
Overall worst-case consequence	I-Negligible

6.6.5 Demonstration of As Low As Reasonably Practicable

Vessels are required to undertake the activities. The alternative to discharging these small amounts of liquid wastes to the marine environment is to store and transport the wastes to land, where they would be disposed of in line with industry best practice. However, this would result in an increase in environmental impacts through increased fuel consumption and increased atmospheric emissions, from vessels having to return to port a number of times to unload the wastes and by land transport to the nearest disposal facility. Increased energy consumption and atmospheric emissions would also result from the disposal (e.g., incineration, treatment) of the additional wastes. This method would also result in an increased risk of vessel-to-vessel collision, which could lead to a marine diesel spill. Therefore, this option would be of no net environmental benefit and would increase the risk associated with the activity, so it has not been adopted. In some cases, the containment of discharges is difficult without significant modifications to vessels (e.g., additional bunding or containment systems) presenting an increase in safety risk to personnel through the reduction in deck space, increased lifts, and health hazards of storing wastes or other discharges.

To reduce the impacts and risks associated with discharging liquid wastes, these wastes will be treated in line with industry best practice. Discharge of sewage and other liquid wastes from vessels in Australian waters is permissible under the Protection of the Sea (Prevention of Pollution from Ships) Act 1983, which reflects requirements of MARPOL 73/78 Annexes IV, V and I and AMSA Marine Orders 95 and 96.

On-board treatment of most wastes and their subsequent discharge to the marine environment is considered to be the most environmentally sound method of disposal, considering that the waste streams will either be treated to a level unlikely to cause significant environmental harm or will be of a nature not considered to pose significant risk to the receiving environment. The proposed management controls for planned operational discharges are considered appropriate to manage the risk to ALARP. Additional control measures were considered but rejected since the associated cost or effort was grossly disproportionate to any benefit, as detailed in **Section 6.6.3**.

Very small volumes (approximately 10 mm per cut) of swarf will be discharged subsea when the risers and damaged sections of production flowline B are disconnected. However, the number of subsea cuts is limited, with risers to be recovered whole to the vessel if practicable to do so, with any further cuts required for transport purposes completed on the vessel deck in a bunded area.

No feasible alternatives to the onshore disposal / recycling for the recovered assets (DTM and its mooring lines (if recovered), risers, section of damaged production flowline B, the FPSO) have been identified. Santos is obliged to remove these assets from the operational area as part of decommissioning commitments. Onshore disposal and recycling allow for the safe disposal and recycling of the recovered assets, which are majority steel. Onshore disposal / recycling will only occur using suitably experienced contractors and facilities and in accordance with relevant waste legislation.

6.6.6 Acceptability Evaluation

Is the consequence ranked as I (Negligible) or II (Minor)	Yes – maximum consequence from planned operational discharges is I (Negligible).
Is further information required in the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – activity evaluated in accordance with Santos' Environmental Hazard Identification and Assessment Procedure (EA-91-IG-00004_5), which considers principles of ESD. The consequence against this aspect is I (Negligible) and therefore does not affect the outcomes of the principles of ecologically sustainable development as per **Table 5-5.**
Are risks and impacts consistent with relevant legislation, international agreements and conventions, guidelines and codes of practice (including species recovery plans, threat abatement plans, conservation advice and Australian Marine Park zoning objectives)?	Yes – management consistent with the Protection of the Sea (Prevention of Pollution from Ships) Act 1983, which in Australian waters is enacted by the Marine Orders. Yes –disposal and recycling will only be carried out in accordance with relevant waste regulations by licensed contractors and at appropriately licensed waste management facilities, and meet applicable legislation to the end point destination. Disposal/recycling will be managed in accordance with applicable requirements. For example, within Western Australia will be in accordance with legislation, such as, the Environmental Protection Act 1986.
Are risks and impacts consistent with Santos' Environmental, Health and Safety Policy?	Yes – aligns with Santos' Environmental, Health and Safety Policy.
Are risks and impacts consistent with stakeholder expectations?	Yes – No concerns raised by stakeholders for this aspect.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – see ALARP above.

Release of non-hazardous discharges into the sea from vessels in Australian waters is permissible under the Protection of the Sea (Prevention of Pollution from Ships) Act 1983, which in Australian waters reflects Australian Marine Orders requirements respectively, and is enacted by:

- Marine Order 91 (Marine pollution prevention – oil)
- Marine Order 96 (Marine pollution prevention – sewage)
- Marine Order 95 (Marine pollution prevention – garbage).

The operational discharges are not expected to significantly impact the receiving environment with management controls proposed, including compliance with all MARPOL requirements. The MARPOL standard is considered to be the most appropriate standard, given the nature and scale of the activities. These standards are internationally accepted and utilised industry wide. Therefore, compliance with the relevant and appropriate MARPOL requirements and standards is expected to reduce the potential for environmental impacts to a level which is considered environmentally acceptable.

Disposal / recycling of decommissioned assets will be managed in accordance with applicable legislation and requirements, as such the potential for environmental impacts is expected to be reduced to a level which is considered environmentally acceptable.

6.7 Planned Chemical and Hydrocarbon Discharge

6.7.1 Description of Event

Event	Activities will result in the discharge of residual hydrocarbons and chemicals to the marine environment. Cessation of production activity discharges could include: • small amounts of fluids such as hydraulic fluid, inorganic or organic acid wash chemicals, MEG or methanol and potential residual hydrocarbons may be discharged subsea during IMMR activities • there may also be potential for minor discharge from ROV or tooling hydraulics (typically mineral oil) • worst-case discharge hydrocarbon volumes are expected to be in the region of 10 L. Floating asset and damaged flowline removal activity discharges could include: • small volumes of residual hydrocarbons and chemicals in treated seawater may be released to the marine environment during floating asset removal, e.g., when the two production risers and production umbilicals are pressure bled and are cut from the DTM to allow for DTM removal • hydrocarbons released when the damaged section of production flowline B is cut for removal • Small discharges of treated seawater containing minor concentrations of chemicals and residual hydrocarbons when production flowline A is disconnected to install the flushing loop to allow additional flushing. • residual volumes of dry gas released subsea from disconnection of risers, during the flushing campaign to minimise gas returned to surface for safety reasons, and potentially from when the damaged section of production flow B is cut for removal. The residual volume of hydrocarbon that may be discharged when risers are recovered is estimated as 2.5 L for both production risers and 1.25 L for the water injection riser (assuming conservative OIW concentration of 50 ppm (worse case) following flushing of the systems (**Section 2.10).** The residual volume of chemicals from the treated seawater within the production risers and umbilicals, and production chemicals (e.g., scale inhibitor, hydraulic control fluid and glycol) that may be discharged is estimated at 25 L for each production risers and 25 L for the gas injection and 25L for the water injection riser (**Table 2-6).** Methanol in the umbilical will have been flushed during SoOps under the NV Operations EP. Santos has conservatively estimated potential discharge of the whole volume of the umbilical riser as it is cut and removed equating to approximately 760 L of hydraulic fluid and 351 L of demulsifier, and 1,169 L of scale inhibitor may be released when the umbilical riser is disconnected. These chemicals are OCNS rated D, and/or have been previously approved for discharge to the marine environment in the NV Operations EP. NORMS are not anticipated, and the discharge of Mercury is not expected as testing over the operational life of the FPSO to date, has not detected any Mercury. The 910 m damaged section of production flowline B cannot be flushed and hence will contain production fluids estimated to contain 6% hydrocarbon. The volume of hydrocarbon that may be released when the damaged flowline has been cut has been estimated to be 4 m^3. This estimation is based on the volume of an undamaged 910 m section (i.e. not flat like the section for removal) and assumes the hydrocarbon can flow at ambient seabed water temperatures (unlikely given the viscosity of Van Gogh crude oil). This scenario would not trigger any environmental thresholds of concern requiring oil release dispersion modelling. In such deep, open-water settings, natural dispersion and dilution would be significant, minimizing any localized impact. Further to this, the estimated volume would not be released in one single event, but rather incrementally over a period of days as the damaged flowline section is cut into 10 m lengths on the seabed for recovery. Additionally, the damaged section of flowline is holding constant pressure below ambient seabed pressure, so when cut, seawater is expected to flow into the section and displace production fluids towards the undamaged section of the flowline. Small volumes (litres) of inorganic or organic acid wash chemicals (such as citric acid or sulfamic acid) may be discharged during calcareous marine growth removal if water jetting is not sufficient.
Extent	Chemicals, residual hydrocarbons, and hydraulic fluids may be discharged to the marine environment at the surface or close to the seabed. Discharges will be small in volume and dissipate quickly in the open ocean marine environment. Temporary localised decline in water quality in the immediate vicinity of the discharge; and toxicity to marine fauna.
Duration	Various hydrocarbon and chemical discharges will occur intermittently during floating asset and damaged flowline removal or IMMR activities and will last for minutes to several hours over the course of the activity. Duration will be longer for umbilicals if left uncapped and wet stored until future decommissioning.

6.7.2 Nature and Scale of the Environmental Impacts

Potential receptors: Water quality, benthic fauna, fish (pelagic) & sharks, marine mammals, marine turtles, seabirds, socio-economic and cultural receptors.

Physical environment

The potential environmental impacts from planned chemical and hydrocarbon discharges include:

- temporary localised decline in water quality in the immediate vicinity of the discharge
- toxicity to marine fauna.

Hydraulic fluids

Hydraulic fluids are used extensively in the petroleum industry in subsea production systems. Hydraulic fluids are either petroleum or water-based blends with additives. The main properties required of a hydraulic control fluid are low viscosity, low compressibility, corrosion protection, resistance to microbiological attack, and compatibility with seawater. The potential impacts of hydraulic fluid discharges near the seabed are a localised reduction in water quality and potential toxicity to benthic marine fauna associated with bare sediments or attracted/attached to subsea infrastructure (e.g., fish, infauna and sessile filter feeding organisms). The largest release of hydraulic fluid is anticipated when the umbilical riser is disconnected from the DTM. This may result in a discharge of up to approximately 790 L of hydraulic fluid (**Table 2-6).** Any impacts to benthic fauna and water quality are expected to be localised to within the immediate vicinity of the release.

Hydraulic fluids behave similarly to MDO when discharged in the marine environment (information about MDO is provided in **Section 7.5** and **Section 7.6**). Hydraulic fluids are medium oils of light to moderate viscosity and have a relatively rapid spreading rate and, like MDO, will dissipate quickly, particularly in high sea states.

Acid Wash

Inorganic or organic acids used for removing the marine growth are expected to disperse quickly in the offshore marine environment. Since only small volumes of acid are discharged, any potential impacts on water quality and benthic fauna would be highly localised.

Treated seawater, MEG, methanol, scale inhibitor and umbilical demulsifier

Treated seawater will contain a biocide, likely to be similar to Hydrosure O-3670R, a common biocide used in the offshore oil and gas industry. Although biocides typically contain a substance (quaternary ammonium chloride) which is known to be very toxic to aquatic organisms, the concentration is typically very low less than 30%) within the biocide itself as a whole. MEG and methanol both have low toxicity, are readily biodegradable, are rated as PLONOR and E (non-CHARM) in the OCNS rankings. Scale inhibitor is not expected to biodegrade when released to the marine environment; however, scale inhibitor is not known to bioaccumulate. Scale inhibitor and umbilical dem both have low aquatic toxicity and the small volumes released will dilute rapidly when released to the marine environment. The largest release of scale inhibitor is anticipated when the umbilical riser is disconnected from the DTM. This may result in a discharge of up to approximately 1169 L of scale inhibitor and approximately 351 L of demulsifer (**Table 2-6**). Any impacts to sediments, benthic fauna and water quality are expected to be localised to within the immediate vicinity of the release.

Hydrocarbons

Residual hydrocarbon concentrations (crude oil) are expected to rapidly disperse in the water column. Maximum residual hydrocarbon volumes that could be released during floating asset removal are estimated to be 2.5 L for the two production risers and 1.25 L for the water injection riser (**Table 2-6).**

Historical monitoring of produced formation water discharges during Ningaloo Vision operations has demonstrated that total rapid dilution of hydrocarbons discharged as part of the PFW was occurring, with total recoverable hydrocarbons (TRH), BTEX and polycyclic aromatic hydrocarbons (PAHs) not detected outside of the PFW mixing zone (459 m form the FPSO) (Advisian 2023). The monitoring found that the water quality in the vicinity of the Ningaloo Vision FPSO was generally homogeneous. This indicates that the small volumes of residual hydrocarbon released are expected to rapidly disperse and are unlikely to impact sediments, benthic fauna and water quality outside of the immediate vicinity of the release. Any impacts to water quality are expected to be short-term and contained to within the operational area.

The recovery of the 910 m damaged section of production flowline B may result in the release of up to 4 m^3 of hydrocarbons (crude oil). However, seawater is expected to ingress into the flowline once it is cut, displacing production fluids away from the damaged section towards DC2 and DC3, limiting the potential for hydrocarbon release. The undamaged ends of flowline remaining wet parked until future decommissioning will be capped to prevent any ongoing discharge (Section 2.11.2). The ends of the damaged sections of flowline to be recovered will be crimped from the cutting activity and therefore, at ambient seabed temperature, the hydrocarbon (Van Gogh crude

oil) is not expected to flow freely, further limiting the potential for release. Should any residual hydrocarbon be released during the recovery of the damaged sections of production flowline B, this may result in a highly localised and small area of smothering of sediment and benthic habitat in a small area immediately near the cut locations. Given the one off and temporary nature of the discharge associated with the flowline removal, cumulative impacts are not considered credible. Lastly, the entire hydrocarbon content of the damaged section of flowline would not be released upon a single cut, but rather over a series of days as the section is cut into shorter lengths (10 m) on the seabed to allow recovery to the vessel. Therefore, potential hydrocarbon discharges will be localised, intermittent and temporary within the operational area.

Toxicity

On discharge to the marine environment, the low volumes of these types of chemicals and hydrocarbons are expected to rapidly disperse in the offshore marine environment. Hence, any potential impacts would be confined to a localised area immediately surrounding the discharge.

There may be a localised and temporary (hours) reduction in water quality in the immediate vicinity of the release. Toxicity impacts to marine fauna from the release of chemicals are unlikely to eventuate because:

- the chemicals will have been risk assessed for their suitability for discharge using Operations Chemical Selection Evaluation and Approval Procedure (EA-91-II-10001)
- the sensitivity of the receiving environment (operational area) is considered low
- volumes of discharges are relatively small
- strong ocean currents mean the discharge will become further diluted upon discharge, so the duration of exposure of chemicals to fauna will be minimal
- potential discharges will be localised, intermittent and temporary within the operational area.

Dry gas

Residual volumes of dry gas (approx. 70m3 at 15 bara) released subsea during the flushing campaign would result in the released gas would rising towards the sea surface. Given the low volume within a deep open ocean environment, and one-off temporary nature of the gas releases that could occur, continuous exposure to marine fauna at high concentrations is not expected as the bubbles rise towards the surface in a plume as well as dissolving in the water column before being released to atmosphere. The fraction of dissolved methane will be oxidised to carbon dioxide and water, resulting in low to non-existent toxicity on the water column.

Threatened or migratory fauna

As discussed in the sections above, the discharge extent for all planned discharges of chemicals and hydrocarbons is localised. Rapid dilution of chemicals and hydrocarbons is predicted to occur within the offshore waters. Marine fauna within the operational area are likely to be transient. If contact does occur with any marine fauna, it will be for a short duration due to the rapid dispersion of the plume and the transient fauna movement, such that any exposure is likely not of sufficient duration to cause a toxic effect.

Given the nature of discharged chemicals and hydrocarbons, the small volumes that could be released to the marine environment and the nature of the marine environment within the vicinity of the operational area, the planned discharges are not predicted to have ecologically significant effects. Discharges of chemicals and hydrocarbons may cause avoidance behaviour in marine fauna. Given the nature of the discharges (localised, rapid dilution, intermittent), any behavioural impacts are expected to be short term and minimal.

In relation to the dry gas discharge, the gas is approximately 90% Methane (classified as non-toxic and non-hazardous), 9% nitrogen and 1% carbon dioxide. Methane is not readily water soluble and so will not saturate the water column, instead rising rapidly to release to the atmosphere at the sea surface rather than being trapped at depth in the water column. Dry gas is not persistent on the surface.

Given the nature of the dry gas release as part of the flushing campaign, continuous exposure at high concentrations will not occur as the bubbles rise towards the surface in a localised plume as well as dissolving in the water column before being released to atmosphere. The fraction of dissolved methane will be oxidised to carbon dioxide and water, resulting in low to non-existent toxicity on the water column. Therefore, the gas would not saturate the water in the immediate vicinity of the release where the majority of potential receptors are concentrated (assuming fauna are present in the immediate area due to a possible attraction to the infrastructure). Rapid dissipation of the bubbles as they rise to the sea surface will also occur.

Therefore, toxicological impacts are not expected, but if toxic impacts did result, this would be to individuals in the immediate vicinity of the plume and would be no more than a minor impact. Given the transient nature of marine mammals through the deep water open ocean area, no significant impacts on marine mammals would be expected. Whilst behavioural impacts (avoidance of the area) may result from the release of bubbles, physiological impacts are not expected and the impact on behaviour is considered minor.

Cultural receptors

Given the nature of discharged chemicals and hydrocarbons, the small volumes that could be released to the marine environment and the nature of the marine environment within the vicinity of the operational area, the planned discharges are not predicted to have impact on cultural receptors located both within and outside of the operational area.

Socio-economic receptors

As discussed in the sections above, the discharge extent for all planned discharges of chemicals and hydrocarbons is localised. Rapid dilution of chemicals and hydrocarbons is predicted to occur within the offshore waters. Planned chemical and hydrocarbon discharges are not expected to impact fishery resources (demersal fish species) and are unlikely to result in changes in distribution and abundance of fish species outside the operational area.

6.7.3 Environmental Performance Outcomes and Control Measures

The EPOs relating to this event include:

- No unplanned objects, emissions or discharges to sea or air [NV-EPO-05]

The control measures considered for this event are shown in **Table 6-15**, and EPSs and measurement criteria for the EPOs are described in **Section 8.4**.

Table 6-15: Control measures evaluation for planned chemical and hydrocarbon discharge

CM Reference No.	Control Measure	Hierarchy of Control	Environmental benefit	Potential Cost/Issues	Evaluation
Standard Control Measures					
NV-CM-31	Chemical selection procedure	Administrative	Ensures planned discharges to sea meet the criteria for not being harmful to the marine environment according to MARPOL Annex V; or Gold/Silver/D or E rated through OCNS; or have a completed Santos ecotoxicological risk assessment so only environmentally acceptable products are used.	Personnel time associated with chemical selection, approval, and procurement as per chemical selection procedure.	**Adopted** – Benefits outweigh minor costs.
Additional Control Measures					
NV-CM-36	On deck cutting of risers will be conducted in a bunded area, with any discharge captured for onshore disposal.	Engineering	Helps prevent discharges to the marine environment.	Reduces risk of discharge to ocean but requires increased handling to end point.	**Adopted** – Benefits outweigh minor costs
NV-CM-37	Capping of ends of the undamaged sections of production flowline B	Engineering	Would eliminate or reduce the potential for hydrocarbon discharge to the marine environment from the removal of the damaged sections of production flowline B and the period of time between removal of the	Additional costs associated with capping activity	**Adopted –** Benefit outweighs the additional costs to Santos

CM Reference No.	Control Measure	Hierarchy of Control	Environmental benefit	Potential Cost/Issues	Evaluation
			damaged sections and future decommissioning of the undamaged sections of flowline.		
N/A	Reduce, capture, or eliminate use of chemicals and hydraulic fluid	Eliminate	Would eliminate or reduce the chemical and hydraulic fluid discharge to the marine environment.	Chemicals are assessed to ensure the discharge is environmentally acceptable in accordance with Operations Chemical Selection Evaluation and Approval Procedure (EA-91-II-10001). Excessive use of chemicals is restricted. Eliminating the use of chemicals and hydraulic fluid would cause safety and process issues.	**Rejected** – Safety and process considerations outweigh the environmental benefit, given small volumes and low toxicity of the discharges.
N/A	Do not cut risers, mooring lines, and tethers	Eliminate	Eliminates the potential discharge of any contaminants to the marine environment from risers.	Not performing cuts to risers, mooring lines and tethers would prevent the safe removal of the DTM and is not considered a feasible option.	**Rejected** – Safety and process considerations outweigh the environmental benefit, given small volumes and rapid dispersion of the discharges.
N/A	Capping risers prior to recovery to vessel	Engineering	Reduces the potential to discharge residual hydrocarbons to the marine environment during riser recovery.	Not feasible. The forces that the risers may be subject to during recovery to vessel are expected to be sufficient to blow caps off or rupture the risers resulting in the release of the contents to the marine environment.	**Rejected** – Not feasible
N/A	Contain and recover hydrocarbons from the damaged 910 m section of production flowline B that is to be removed and handle on vessel deck for	Engineering	Reduces the potential to discharge hydrocarbons to the marine environment during recovery of the damaged 910 m section of production flowline B.	Not feasible. The damaged section of production flowline B is flattened. Therefore, it is not possible to install a cap onto the cut section of damaged flowline.	**Rejected** – Not feasible

CM Reference No.	Control Measure	Hierarchy of Control	Environmental benefit	Potential Cost/Issues	Evaluation
	onshore disposal.			Given the current compromised state of the damaged section of the production flowline B it is also not feasible to recover hydrocarbons using a downline connected to a vessel on the sea surface.	

6.7.4 Environmental Impact Assessment

Receptor	Consequence Level
Operational Discharges	
Threatened, migratory or local fauna	Planned chemical and hydrocarbon discharges have the potential to cause a localised decrease in water quality and consequent alteration to marine fauna behaviour. Sensitive receptors that may be impacted include fish, cetaceans, marine turtles, mammals and seabirds. Given the distance from shorelines and that the activity will be for a relatively limited duration, impacts will be limited to short-term water and sediment quality impacts and temporary avoidance behaviour in fish, marine mammals, sharks, and seabirds. Impacts to water quality will be experienced in the discharge mixing zone which will be localised and will occur only as long as the discharges occur (i.e., no sustained impacts), therefore, recovery will be measured in hours to days. Discharges are not planned to occur simultaneously. Consequently, only short-term behavioural impacts are expected with no decrease in local population size, area of occupancy of species, loss, or disruption of habitat critical. disruption to the breeding cycle and introduction of disease. A release of residual dry gas during the flushing campaign will not result in exposure of marine fauna to high concentrations. Given the small volume of dry gas released, any plume is expected to be localised and temporary. Given the one off and short duration nature of the planned chemical, hydrocarbon and cutting discharges, the minor volumes that could be released to the marine environment (which have been risk assessed in accordance with the Santos Operations Chemical Selection, Evaluation and Approval Procedure (EA-91-II-10001) , the high levels of dilution and the nature of the marine environment in the vicinity of the operational area, impacts to the physical environment and habitat are expected to be II (Minor).
Physical environment or habitat	
Threatened ecological communities	Not applicable – No threatened ecological communities identified in the area over which planned chemical, or hydrocarbon discharges are expected.
Protected areas	Not applicable – No protected areas are identified in the area over which planned chemical, or hydrocarbon discharges are expected.
Socio-economic receptors	Negligible - planned chemical and hydrocarbon discharges are not expected to impact fishery resources (demersal fish species) and are unlikely to result in changes in distribution and abundance of fish species outside the operational area. EP stakeholder consultation did not raise any concerns regarding potential impacts to cultural features including sea country. In addition, no stakeholder concerns have been raised regarding this event.
Overall worst-case consequence	II-Minor

6.7.5 Demonstration of As Low As Reasonably Practicable

The use of chemicals to conduct testing on subsea infrastructure is a standard technique that is considered critical in determining the presence of leaks and infrastructure integrity. Alternatives to the use of chemicals include freshwater. The use of freshwater in the subsea system can result in hydrate formation and introduce integrity risks; therefore, it is not considered feasible. The use of treated seawater is also an industry standard and uses chemicals

that have been appropriately risk assessed under the Operations Chemical Selection Evaluation and Approval Procedure (EA 91 II 10001).

Marine growth removal may be required on the DTM and risers so that they can be safely removed from the operational area as required by legislation and regulations. Acid wash would only be used for marine growth removal if removal by mechanical means could not be achieved. Similarly, the release of small volumes of residual hydrocarbons during floating asset and damaged flowline removal cannot be avoided.

Cutting of subsea equipment, such as risers, the damaged section of production flowline B, mooring lines and tethers with subsea cuttings tools is an industry standard technique to allow removal of equipment, with no feasible alternatives. The cutting for removal of the damaged section of Production Flowline B is unavoidable, a short duration and one off activity type. The damaged section of production flowline B is currently holding pressure below ambient water pressure. The damaged section will initially be cut in a location that will allow seawater ingress into the section through pressure equalisation, pushing production fluids away for the opening towards DC2 and DC3. At ambient seabed temperature, hydrocarbons are not expected to flow readily but are expected to be congealed. Therefore, the estimated worst case conservative hydrocarbon discharge from the 910m damaged section of production B flowline is 4 m^3. Additionally, the estimated volume of 4 m^3 would not be released in a single event, but rather incrementally over days as the damaged section is cut into more safely manageable lengths (approx. 10m lengths) on the seabed and recovered to vessel.

An additional control measure of on deck cutting of risers will be conducted in a bunded area on deck, with any discharge captured for onshore disposal, and capping of the undamaged ends of production flowline B were considered and adopted.

An additional control of a HAZMAT Plan to manage any occurrence of NORMS or other contaminants has been considered and adopted. An additional control of reduce, capture, or eliminate use of chemicals and hydraulic fluid was considered; however, the significant additional safety and cost, as well as the related risk and impacts of additional vessels in the operational area, was found to be grossly disproportionate to the negligible environmental benefit gained.

The controls in place to manage the volume of treated seawater and chemicals used during the activities, manages the volumes released to the ocean in order to remove equipment off title, to ALARP. The release of dry gas is considered ALARP and there are no feasible controls to remove residual gas for safety reasons. The assessed residual consequence for this impact is minor and cannot be reduced further.

6.7.6 Acceptability Evaluation

Is the consequence ranked as I (Negligible) or II (Minor)	Yes – maximum consequence from planned chemical and hydrocarbon discharges is II (Minor).
Is further information required in the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – activity evaluated in accordance with Santos' Environmental Hazard Identification and Assessment Procedure (EA-91-IG-00004_5), which considers principles of ESD. The consequence against this aspect is II (Minor) and therefore does not affect the outcomes of the principles of ecologically sustainable development as per **Table 5-5**.
Are risks and impacts consistent with relevant legislation, international agreements and conventions, guidelines, and codes of practice (including species recovery plans, threat abatement plans, conservation advice and Australian Marine Park zoning objectives)?	Consistent with relevant species recovery plans, conservation management plans and management actions set out in **Table 3-9.**
Are risks and impacts consistent with Santos' Environmental, Health and Safety Policy?	Yes – aligns with Santos' Environmental, Health and Safety Policy.
Are risks and impacts consistent with stakeholder expectations?	Yes – A member of the Exmouth Community Liaison Group (ECLG) queried discharge from the damaged flowline and this is addressed in Table 4-9.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – see ALARP above.

The use of hydraulic fluids, acid wash, MEG, methanol and treated seawater is unavoidable as they are required to safely complete the activities and preserve subsea infrastructure. The release of residual hydrocarbons during floating asset and damaged flowline removal is also unavoidable during the activity. However, water quality and

benthic impacts will be highly localised to the immediate vicinity of the discharge. The operational area is not located nearby to any sensitive habitat.

The application of the chemical selection procedure is an important control for reducing the toxicity of any chemicals that may be discharged during the activities. In accordance with the procedure, CHARM-rated Gold/Silver and non-CHARM grouped E/D chemicals managed under the OCNS, or PLONOR substances listed by OSPAR, or chemicals risk assessed by Santos and deemed environmentally acceptable, will be selected.

With control measures in place to minimise the environmental impact of chemical and hydrocarbon discharges to allow for removal of infrastructure from title, the consequence was assessed as Minor (II) and ALARP. The managed discharges will not reduce the habitat values of the area potentially affected as described in relevant Recovery Plans or Approved Conservation Advice or be inconsistent with the strategies of these documents.A member of the Exmouth Community Liaison Group (ECLG) queried discharge from the damaged flowline and this is addressed in Table 4-9. . Therefore, the minor impacts expected from the proposed discharges are considered to be environmentally acceptable.

6.8 Spill Response Operations

The spill response strategies that may be adopted in the event of a hydrocarbon spill have been identified in the Ningaloo Vision CoPFAR OPEP (7750-650-EIS-0008) for worst credible loss of well control (LOWC) and marine diesel spills. Potential impacts arising from the implementation of the following spill response operations or actions were assessed.

Santos' environmental assessment identified potential sources of environmental impacts associated with contingency spill response operations for this activity. The results of the environmental assessment are summarised in Table 6-1. A comprehensive risk and impact assessment for each of the contingency spill response operations, and subsequent control measures proposed by Santos to reduce the risk and impacts to ALARP and acceptable levels, are detailed in the following sub-sections.

6.8.1 Description of Event

Event	In the event of a hydrocarbon spill, 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 and evaluation of response strategies outlined in this EP and the OPEP. Spill response will be under the direction of the relevant Controlling Agency, as defined in Section 4 of the OPEP, which may be Santos, another agency or both. In all instances, Santos will undertake a 'first-strike' spill response and will act as the Controlling Agency until the designated Controlling Agency assumes control. The response strategies considered to be appropriate for the worst-case oil spill scenarios identified for the activity are provided in Section 6 of the OPEP and comprise: • source control • monitor and evaluate • mechanical dispersion • chemical dispersant (surface) • offshore containment and recovery • shoreline protection and deflection • shoreline clean-up • oiled wildlife response • scientific monitoring • waste management. While response strategies are intended to reduce the environmental consequences of a hydrocarbon spill, poorly planned and coordinated response activities can result in a lack of or inadequate information being available upon which poor decisions can be made, exacerbating, or causing further environmental harm. An inadequate level of training and guidance during the implementation of spill response strategies can also result in environmental harm over and above that already caused by the spill. The greatest potential for impacts additional to those described for routine operations is from shoreline clean-up and oiled wildlife response operations where coastal and shoreline habitat damage and fauna disturbance may occur.
Extent	Extent of spill. Spill response could occur anywhere within the MEVA for the worst-case spill scenarios. Some strategies will be concentrated in the vicinity of sensitive receptors in coastal waters and along shorelines.
Duration	The spill response effort as a whole will exceed the duration of the worst-case spill, due to persistence of the oil in the environment and the requirement to remove this oil and/or monitor impacts and recovery to sensitive receptors. The OPEP provides further detail on the duration of specific response strategies.

6.8.2 Nature and Scale of Environmental Impacts and Risks for the Activities

Light Emissions	
Spill response activities will involve the use of vessels, which are required, at a minimum, to display navigational lighting. Vessels may operate in close proximity to shoreline areas during spill response activities. Spill response activities will also involve onshore operations, including the use of vehicles and temporary camps, which may require lighting.	
Potential Receptors:	Fauna (including threatened, migratory or local fauna) Protected areas
Lighting may cause behavioural changes to fish, mammals, birds, and marine turtles that can have a heightened consequence during key lifecycle activities, such as turtle nesting and hatching. Turtles and birds, which includes threatened	

Light Emissions

and migratory fauna (**Table 3-7**), have been identified as key fauna susceptible to lighting impacts. **Section 6.3** provides further detail on the nature of impacts to fish, birds, and marine turtles.

Spill response activities that require lighting may take place in protected areas important to turtle and birds, such as shoreline locations of the Ningaloo Coast North, Barrow Island, the Muiron Islands, and Montebello Islands which are seasonally important for turtles and include BIAs and critical habitats. This could result in indirect impacts on the values of the protected areas.

During nesting and hatching season (primarily over summer months), lighting may cause behavioural impacts to turtles, including aborted nesting attempts and disorientation of newly hatched turtles, which may increase the hatchling mortality rate.

Spill response activities may also occur on shorelines used by nesting and feeding birds, including seabirds and shorebirds. Lighting can cause disorientation in flying birds, disrupt nesting and breeding behaviours and impact on the ability of birds to forage. Disturbance to feeding migratory shorebirds may reduce their ability to replenish energy reserves and alter the timing and success of migratory flights.

Lighting impacts to fauna are not considered to have the potential to impact supported industries such as tourism.

Noise Emissions

Spill response activities will involve the use of aircraft and vessels, which will generate noise both offshore and in proximity to sensitive receptors in coastal areas.

Spill response activities will also involve the use of equipment on coastal areas during clean-up of shorelines (e.g., pumps, generators and vehicles), for accessing shoreline areas (e.g., vehicles) and for supporting temporary camps (e.g., diesel generators).

Potential Receptors:	Fauna (including threatened, migratory, or local fauna) Protected areas Socio-economic receptors

Underwater noise from the use of vessels may impact marine fauna, such as fish (including commercial species), marine reptiles and marine mammals, in the worst instance causing physical injury to hearing organs but more likely causing short-term behavioural changes, e.g., temporary avoidance of the area, which may impact key lifecycle processes (e.g., spawning, breeding, calving). Underwater noise can also mask communication or echolocation used by cetaceans. Section 6.4 provides further detail on these impacts from vessels and helicopters.

Cetaceans have been identified as the key concern for vessel noise within the MEVA and EMBA. There are numerous BIAs for cetaceans within the MEVA and EMBA as listed in **Table 3-8**.

Spill response activities using vessels have the potential to impact fauna in protected areas, which may impact on the conservation values of protected areas. There are numerous Australian and State marine parks within the MEVA and EMBA as listed in **Table 3-5**.

Noise and vibration from terrestrial activities on shorelines has the potential to cause behavioural disturbance to coastal fauna, including protected seabirds and turtles. Shoreline activities involving the use of noise-generating equipment may take place in important nesting areas for turtles and roosting and feeding areas for shorebirds.

As a consequence of impacts to fauna (including shorebirds, marine mammals, fish, and sharks), noise has the potential to impact supported industries such as tourism and commercial fishing and recreational values of marine parks.

Atmospheric Emissions

The use of fuels to power vessel engines, generators and mobile equipment used during spill response activities will result in emissions of greenhouse gases, such as carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), along with non-GHGs such as sulphur oxides (SO_X) and nitrogen oxides (NO_x). Emissions will result in a localised decrease in air quality.

Potential Receptors:	Fauna (including threatened, migratory, or local fauna) Physical environment or habitat (air quality) Socio-economic receptors

Atmospheric emissions from spill response equipment will be localised, and the use of mobile equipment, vessels and vehicles is not considered to create emissions on a scale where noticeable impacts would be predicted. Emissions may occur in protected areas and/or areas where tourism is important; however, the scale of the impact relative to potential oil spill impacts is not considered great.

Operational Discharges and Waste

Operational discharges include those routine discharges from vessels used during spill response, which may include:

- deck drainage
- putrescible waste and sewage
- cooling water from operation of engines
- bilge water
- ballast water
- brine discharge.

Light Emissions	
In addition, there are specific spill response discharges and waste creation that may occur**, including:** • cleaning of oily equipment, oiled wildlife response activities, vessels and vehicles • flushing water for the cleaning of shoreline habitats • sewage and putrescible and municipal waste at camp areas • creation, storage, transport and disposal of oily waste and contaminated organics.	
Potential Receptors:	Fauna (including threatened, migratory, or local fauna) Physical environment or habitat Protected areas Socio-economic receptors
Operational discharges from vessels may create a localised and temporary reduction in marine water quality. Effects include nutrient enrichment, toxicity, turbidity, and temperature and salinity increases, as detailed in **Section 6.6**. Vessel discharges may occur in shallower coastal waters during spill response activities than that described in **Section 6.6**. Discharge could potentially occur adjacent to marine habitats, such as corals, seagrass and macroalgae, and in protected areas (i.e., receptors anywhere within the MEVA and EMBA), which support a more diverse faunal community; however, discharges are still expected to be localised and temporary. Cleaning of oil-contaminated equipment, vehicles and vessels has the potential to spread oil from contaminated areas to areas not impacted by a spill, potentially spreading the impact area, and moving oil into a more sensitive environment. Flushing of oil from shoreline habitats is a clean-up technique designed to remove oil from the receptor that has been oiled and remobilise it back into the marine environment. It results in further dispersion of the oil. The process of flushing has the potential to physically damage shoreline receptors such as mangroves and rocky shoreline communities, increase levels of erosion, and create an additional and potentially higher level of impact than if the habitat was left to bioremediate. Sewage and putrescible and municipal waste will be generated from onshore activities at temporary camps, which may include toilet and washing facilities. These wastes have the potential to attract fauna, impact habitats, flora, and fauna, and reduce the aesthetic value of the environment, which may be within protected areas. Disturbance may also impact cultural values of an area. The creation, storage, transport and disposal of oily waste and contaminated organics has the potential to spread impacts of oil to areas, habitats, and fauna not previously contaminated. Sewage and putrescible and municipal waste generated onshore will be stored and disposed of at approved locations.	
Chemical Dispersant Application	
The application of chemical dispersants has the aim of enhancing oil dispersion and entrainment into the water column, thereby avoiding, or reducing the volume of oil that could reach the shoreline. By entraining oil into the water column, chemical dispersants can aid the natural processes of biodegradation but can also increase impacts to subsea receptors through an increase in concentration and exposure of entrained oil and dissolved oil components.	
Potential Receptors:	Fauna (including threatened, migratory, and local fauna) Physical environment or habitat Protected areas Socio-economic receptors
The application of dispersants will increase the amount of oil that is entrained and dissolved in the water column, reducing exposure of coastal ecosystems to floating weathered oil, as well as reducing the risk of exposure of seabird and marine mammal populations to floating oil (Bock et al. 2018; French-McCay et al. 2018; NRC 2005). It changes the distribution of the oil by removing it from the sea surface and dispersing it into the water column. This can increase the risk of toxic effects on planktonic, pelagic, demersal, and benthic organisms. The toxicity of dispersants and the toxicity of dispersed oil are dependent on a range of factors including oil type, dispersant composition and concentration, sensitivity of receptor species and their life history, making generalisations difficult. For the most studied dispersant formulations the increased risk for most taxa appears to come from the increased solubility (hence bioavailability) of the toxic components of the oil, not the dispersant itself (Negri et al. 2018). Adams et al. (1999), Brakstad et al. (2018), Clark et al. (2001), Fingas (2011, 2002), Hansen et al. (2014), and Mitchell & Holdway (2000) found current dispersants to be significantly less toxic than the oil alone or the dispersed oil. Gardiner et al. (2013) suggest that the chemical dispersant does not alter the toxicity of the oil or the underlying mechanism of toxicity in the spiked exposures, but rather enhances the absolute concentration of the dissolved hydrocarbons that contribute to toxicity. Adams et al. (2014) found chemically enhanced water-accommodated fractions (CEWAFs) to be more toxic to Atlantic herring than the water accommodated fractions (WAF); possibly reflecting the more effective dispersion due to chemicals. Contrary to this, Bejarano et al. (2014) reviewed dispersant toxicity studies and found that for Corexit 9500, the CEWAF was less toxic than the WAF. The NRC (2005) drew similar conclusions to Bejarano et al. (2014), reporting that evidence suggests that CEWAF is similar or less toxic than the WAF, depending on the basis of the study (measured TPH or nominal oil concentrations) (King & Dethier, 2017). Following application of chemical dispersants at the sea surface, the chemicals themselves are rapidly dispersed and diluted by oceanic water currents and buoyancy mixing. Therefore, while the aim of chemical dispersants is to provide a net benefit to the environment, the use of dispersants has the potential to increase the impact to receptors under the sea surface, including coral, seagrass and macroalgae, by increasing	

Light Emissions
entrained oil and dissolved aromatic hydrocarbon concentration. These sensitive receptors are generally located in shallow coastal areas of the mainland and offshore islands. The outer bounds of the Ningaloo Marine Park and Muiron Islands Marine Management Area, both situated in coastal waters, lie approximately 29 km to the south and 33 km to the south-east of the Ningaloo Vision DTM, respectively. The Management Plan for the Ningaloo Marine Park and Muiron Islands Marine Management Area indicates subtidal coral reef features and communities within 5-10 km of the high water line of the Exmouth coast. Similarly, macroalgal meadows are generally found on the shallow limestone lagoonal platforms (CALM, MPRA 2005). Increased entrained and aromatic hydrocarbon concentrations may also impact on marine fauna either directly or through impacts to subsea habitats. Direct impacts are most likely to be encountered by filter feeding invertebrates, fish, and sharks. Fish and sharks include threatened/migratory species, which may ingest oil or uptake toxic compounds across gill structures. As a result of increased impact to marine fauna and subtidal habitats, including those that represent values of protected areas, socio-economic impacts may be felt through industries such as tourism and commercial fishing. Chemical dispersants listed as approved in the National Plan for Maritime Environmental Emergencies Register of Oil Spill Control Agents (OSCA) are to be prioritised for use. The Australian Maritime Safety Authority National Plan Register of Oil Spill Control Agents for Maritime Response Use Policy, which describes the Efficacy Test Protocol for the Register (Australian Maritime Safety Authority, 2022) lists the toxicity testing requirements that ensure products meet the requirements of acceptable practice for the National Plan, and products with a high acute toxicity (LC50 <10 ppm, 96 hours) (NRC 1989) or containing prohibited substances are not permitted. If dispersant types additional to those on the Register of OSCA are required, Santos will use its Offshore Division Operations Chemical Selection, Evaluation and Approval Procedure (EA-91-II-10001) prior to application, which requires the dispersant to be risk assessed and deemed environmentally acceptable. The criteria used for environmental acceptability includes aquatic toxicity, biodegradation and bioaccumulation potential data. As such, impacts to the environment from the use of dispersants are acceptable and on application at the recommended dosage, dilution and dispersion will significantly reduce the concentrations to levels considered unlikely to have significant effects on protected species or marine biota and habitats. A detailed description of the impacts from entrained and dissolved oil, which may be exacerbated by the application of chemical dispersants, is provided in Table 7-15.
Physical presence and disturbance
The movement and operation of vessels, vehicles, personnel and equipment, the undertaking of clean-up activities, and the set-up of temporary camp areas during spill response activities have the potential to disturb the physical environment and marine and coastal habitats and fauna, which may occur within protected areas. Disturbance may also impact cultural values of an area. Vessel movement and transportation could potentially introduce to nearshore areas invasive marine species attached as biofouling, while vehicle and equipment movement could spread non-indigenous flora and fauna. Oiled wildlife response activities may involve deliberate disturbance (hazing), capture, handling, cleaning, rehabilitation, transportation, and release of wildlife, which could lead to additional impacts to wildlife.

Potential Receptors:	Fauna (including threatened, migratory, and local fauna) Physical environment or habitat Protected areas Socio-economic receptors

The use of vessels may disturb benthic habitats in coastal waters, including corals, seagrass, macroalgae and mangroves. Impacts to habitats from vessels include damage through the deployment of anchors, chains, and nearshore booms and from grounding. Vessel uses in shallow coastal waters also increases the chance of contact with or physical disturbance of marine megafauna such as turtles and dugongs. Booms create a physical barrier on the surface waters that has the potential to injure or entangle passing marine fauna that are either surface breathing or feeding.

Vehicles, equipment, personnel, and cleaning activities during shoreline response activities have the potential to damage coastal habitats, such as dune vegetation, mangroves, and habitats important to threatened and migratory fauna, including nests of turtles and birds and bird roosting and feeding areas. Shoreline clean-up may involve the physical removal of substrates that could cause impact to habitats and coastal hydrodynamics and alter erosion or accretion rates.

The presence of camp areas, although relatively short term, may disrupt normal behaviour of coastal species, such as shorebirds and turtles, and could potentially interfere with nesting and feeding behaviours.

Oiled wildlife response may include the hazing, capture, handling, cleaning, rehabilitation, transportation, cleaning, and release of wildlife susceptible to oiling, such as birds and marine turtles. While oiled wildlife response is aimed at having a net benefit, poor responses can potentially create additional stress and exacerbate impacts from oiling, interfere with lifecycle processes, hamper recovery and, in the worst instance, increase levels of mortality.

Impacts and risks from invasive marine species are described in **Section 7.2** and are not described further in this section. Impacts from invasive terrestrial species are similar in that the invasive species (e.g., weeds) can outcompete local species and interfere with ecosystem processes. Non-native species may be transported attached to equipment, vehicles, and clothing. Such an introduction would be especially detrimental to wilderness areas or protected terrestrial reserves, which may have a relatively undisturbed flora and fauna community.

The disturbance to marine and coastal natural habitat, as well as the potential for disruption to culturally sensitive areas, may occur in specially protected areas and may have flow on impacts to socio-economic values and industry (e.g., tourism, fisheries).

Light Emissions	
Disruption to Other Users of Marine and Coastal Areas and Townships	
Spill response activities may involve the use of vessels, equipment and vehicles and the establishment of temporary camps in areas used by the general public or industry. The mobilisation of spill response personnel into an affected area may also place increased demands on local accommodation and other businesses.	
Potential Receptors:	Socio-economic receptors
The use of vessels in the nearshore and offshore environment and the undertaking of spill response activities at shoreline locations may exclude the general public and industry use of the affected environment. As well as impacting leisure activities of the general public, this may impact on revenue with respect to industries such as tourism and commercial fishing. The mobilisation of personnel to small communities has the potential to affect the local community through demands on local accommodation and business, reducing the availability of services to members of the public.	

6.8.3 Environmental Performance and Control Measures

The control measures considered for this activity are shown in Table 6-16. However, EPOs, EPSs and measurement criteria for these spill response control measures are provided within the relevant strategy sections of the OPEP.

Table 6-16: Control measures evaluation-Spill Response Operations

Control Measure	Environmental Benefit	Potential Cost/Issues	Evaluation
Competent Incident Management Team (IMT) and oil spill responder personnel	Ensures that spill response strategy selection and operational activities consider the potential for additional environmental impacts.	Personnel and operational costs associated with maintaining competent IMT team and responder personnel.	**Adopted** – Considered a standard spill response control.
Use of competent vessel crew and personnel	Reduces potential for environmental impacts from vessel usage.	Personnel and operational costs associated with maintaining contracts with competent vessel crew and personnel.	**Adopted** – Considered a standard spill response control.
Spill response activities selected on basis of a NEBA	Provides a systematic and repeatable process for evaluating strategies with net least environmental impact.	No cost/issue associated with this control measure.	**Adopted** – Considered a standard spill response control.
Noise and Atmospheric Emissions			
Vessels and aircraft compliant with Santos' Protected Marine Fauna Interaction and Sighting Procedure (EA-91-11-00003)	Reduces potential for behavioural disturbance to cetaceans.	No cost/issue associated with this control measure.	**Adopted** –Ensures compliance with Part 8 of the EPBC Regulations 2000, which is considered a standard spill response control (regulatory requirement).
International Air Pollution Prevention Certificate	Reduces level of air quality impacts.	Personnel and operational costs associated with maintaining Air Pollution Certificate.	**Adopted** – Considered a standard spill response control (regulatory requirement).
Operational Discharges and Waste			
Vessels meet applicable sewage disposal requirements	Reduces potential for water quality impacts.	No cost/issue associated with this control measure.	**Adopted –** Considered a standard spill response control (regulatory requirement).
Vessel meets applicable requirements for oily water (bilge) discharges	Reduces potential for water quality impacts.	No cost/issue associated with this control measure.	**Adopted –** Considered a standard spill response control (regulatory requirement).
Ballast Water Management Plan	Improve quality of water discharged to marine environment to ALARP.	No cost/issue associated with this control measure.	**Adopted –** Considered a standard spill response control

Control Measure	Environmental Benefit	Potential Cost/Issues	Evaluation
	Reduce risk of introduced marine species.		(regulatory requirement).
Compliance with controlled waste, unauthorised discharge and landfill regulations	Ensures correct handling and disposal of oily wastes.	No cost/issue associated with this control measure.	**Adopted –** Considered a standard spill response control (regulatory requirement).
Chemical Dispersant Application			
Chemical Dispersant Plan	Additional impacts from dispersant application are reduced to ALARP.	No cost/issue associated with this control measure.	**Adopted** – A standard control adopted by industry.
Physical Presence and Disturbance			
Vessels and aircraft compliant with Santos' Protected Marine Fauna Interaction and Sighting Procedure (EA-91-11-00003)	Reduces potential for behavioural disturbance to cetaceans.	No cost/issue associated with this control measure.	**Adopted** –Ensures compliance with Part 8 of the EPBC Regulations 2000, which is considered a standard spill response control (regulatory requirement).
Use of shallow draft vessels for shoreline and nearshore operations	Reduce seabed and shoreline disturbance.	Operational costs associated with operating shallow draft vessels for shoreline and nearshore operations.	**Adopted** – Considered a standard control.
Oil Spill Response Team Leader assesses and selects vehicles appropriate to shoreline conditions	Reduce coastal habitat and fauna disturbance.	No cost/issue associated with this control measure.	**Adopted** – Considered a standard control.
Conduct shoreline, nearshore habitat, bathymetry assessment	Reduce shoreline habitat disturbance.	Operational costs associated with conducting shoreline nearshore habitat assessment.	**Adopted** – Considered a standard control.
Establish demarcation zones for vehicle and personnel movement considering sensitive vegetation, bird nesting and roosting areas and turtle nesting habitat	Reduce coastal habitat and fauna disturbance.	No cost/issue associated with this control measure.	**Adopted** – Considered a standard control.
Operational restriction of vehicle and personnel movement to limit erosion and compaction	Reduce coastal habitat erosion and compaction.	No cost/issue associated with this control measure.	**Adopted** – Considered a standard control.
Prioritise use of existing roads and tracks	Reduce coastal habitat and fauna disturbance.	No cost/issue associated with this control measure.	**Adopted** – Considered a standard control.
Select temporary base camps in consultation with DoT and DBCA	Reduce coastal habitat and fauna disturbance.	No cost/issue associated with this control measure.	**Adopted** – Considered a standard control to be adopted by the relevant Control Agency.
Soil profile assessment prior to earthworks	Reduce habitat disruption and erosion.	Operational costs associated with soil profile assessment.	**Adopted** – Considered a standard control.
Pre-cleaning and inspection of equipment (quarantine)	Prevent introduction of invasive species.	Operational costs associated with response plan.	**Adopted** – Considered a standard control.
Use of Heritage Advisor if spill response activities overlap with potential areas of cultural significance	Reduce disturbance to culturally significant sites.	No cost/issue associated with this control measure.	**Adopted** – Considered a standard control to be adopted by the relevant Control Agency.
Adhere to WA Oiled Wildlife Response Plan and Pilbara Regional Oiled Wildlife Response Plan	Oiled wildlife hazing, capture, handling, and rehabilitation meet minimum standards as	Operational costs associated with response plan.	**Adopted** – Considered a standard control to be adopted by the relevant Control Agency.

Control Measure	Environmental Benefit	Potential Cost/Issues	Evaluation
	outlined within the WA Oiled Wildlife Response Plan.		
Disruption to Other Users of Marine and Coastal Areas and Townships			
Stakeholder consultation	Promotes awareness and reduces potential impacts from response to socio-economic activities.	Minimal cost in relation to overall effort/costs in managing incident.	**Adopted** – Considered a standard control for incident management.
Utility resource assessment and support to be conducted if activity is of significant size in comparison to the size of the coastal community	Reduces potential impact due to higher utility demands causing disruptions to local community.	No cost/issue associated with this control measure.	**Adopted** – Considered a standard control.
Accommodation assessment	Reduces strain on accommodation.	No cost/issue associated with this control measure.	**Adopted** – Considered a standard control.
Transport Management Plan	Reduces potential for traffic disruptions.	No cost/issue associated with this control measure.	**Adopted** – Considered a standard control for large scale deployment in highly populated areas.

6.8.4 Environmental Impact Assessment

Receptor	Consequence Level
Spill Response Operations- Light Emissions	
Threatened, migratory or local fauna Physical environment or habitat Threatened ecological communities Protected areas Socio-economic receptors	The receptors considered most sensitive to lighting from vessel and shoreline operations are seabirds, shorebirds, and marine turtles, particularly over summer months with respect to marine turtles where emerging hatchlings are sensitive to light spill onto beaches. Following restrictions on night-time operations by spill response vessels, which will demobilise to mooring areas offshore with safety lighting only, impacts from vessels are considered to be Negligible (I). Temporary camps will be positioned at the direction of DoT or DBCA and control measures on lighting colour and direction will be followed, therefore, the consequence of shoreline lighting is considered Negligible (I). These species are likely to be values of the protected area they occur in (e.g., Ningaloo Coast, Muiron Islands, Barrow Island, Montebello Islands, Dampier Archipelago), and the impact to the protected area from light is also considered Negligible (I). As a consequence of impacts to fauna, lighting has the potential to impact supported industries, such as tourism; however, as impacts to fauna are considered negligible, any indirect impacts on tourism will also be Negligible (I).
Overall worst-case consequence level	I -Negligible
Spill Response Operations- Noise Emissions	
Threatened, migratory or local fauna Physical environment or habitat Threatened ecological communities Protected areas Socio-economic receptors	The receptors considered most sensitive to vessel noise disturbance is the pygmy blue whale and humpback whale during migration season, when these whales come close to the operational area during their peak migration (July to October), as well as populations of marine turtles, whale sharks and blue whales. However, following the adoption of control measures to limit close interaction with protected fauna (i.e., Protected Marine Fauna Interaction and Sighting Procedure (EA-91-II-00003)), a temporary behavioural disturbance is expected only with a consequence of Negligible (I). With respect to noise from onshore operations (mobile equipment and vehicles), nesting, roosting, or feeding birds are considered to be the most sensitive to noise, in particular shorebirds that may be aggregating at Ningaloo Coast, Muiron Islands, Montebello Islands. The equipment used is not considered to have excessive sound levels and, following direction by DoT and DBCA on the location of temporary camp areas, the consequence to birds from noise is expected to be Negligible (I). Shorebirds may be official values of the protected area they occur in, and the impact to the protected area from noise is also considered Negligible (I).
Overall worst-case consequence level	I – Negligible

Receptor	Consequence Level
Spill Response Operations- Atmospheric Emissions	
Threatened, migratory or local fauna	Atmospheric emissions from spill response equipment will be localised, and impacts to even the most sensitive fauna, such as birds, are expected to be Negligible (I). Because of the emissions will be localised and low level, impacts to protected area values, physical environment and socio-economic receptors are predicted to be Negligible (I).
Physical environment or habitat	
Threatened ecological communities	
Protected areas	
Socio-economic receptors	
Overall worst-case consequence level	I - Negligible
Spill Response Operations- Operational Discharges and Waste	
Threatened, migratory or local fauna	Operational discharges from vessels may create a localised and temporary reduction in marine water quality, which has the potential to impact shallow coastal habitats in particular. However, following the adoption of regulatory requirements for vessel discharges, which prevent discharges close to shorelines, discharges will have a negligible impact to habitats, fauna, or protected area values. Furthermore, washing of vessels and equipment will take place only in defined offshore hot zones preventing impacts to shallow coastal habitats. As a consequence of impacts to fauna, operational discharges from vessels has the potential to impact supported industries, such as tourism and commercial fishing; however, as impacts to fauna are considered Negligible (I), any indirect impacts on socio-economic receptors will also be Negligible (I). Onshore, the use of flushing water has the potential to damage sensitive shoreline and intertidal habitats, e.g., mangroves. However, low-pressure flushing only will be used, preventing further damage to habitats or erosion of sediments. For sensitive habitats, the deployment of booms will be considered to retain flushed hydrocarbons, if this presents a net benefit. Following these control measures, the use of flushing to clean shorelines and intertidal habitats is seen to have a Negligible (I) additional impact to habitats, fauna, or protected area values. The cleaning of contaminated vehicles and equipment onshore has the potential to spread oily waste and damage habitats if not contained. Decontamination units will be in used during the spill response, thus containing waste, and preventing any secondary contamination. The consequence of cleaning discharges is therefore ranked as Negligible (I) in terms of impacts to habitats, fauna, or protected area values. Sewage, putrescible waste, and municipal waste generated onshore will be stored and disposed of at approved locations. The storage, transport and disposal of hydrocarbon-contaminated waste arising from spill response operation actions, such as containment and recovery and shoreline clean up, will be managed by Santos' appointed waste management contractor, and dedicated waste containment areas will prevent the spreading or leaching of hydrocarbon contamination. The consequence of sewerage discharges is therefore ranked as Negligible (I) in terms of impacts to habitats, fauna, or protected area values.
Physical environment or habitat	
Threatened ecological communities	
Protected areas	
Socio-economic receptors	
Overall worst-case consequence level	1 - Negligible
Spill Response Operations- Chemical Dispersant Application	
Threatened, migratory or local fauna	Use of chemical dispersants has the potential to increase the distribution and concentration of entrained oil and dissolved aromatic hydrocarbons within the water column. Entrained oil and dissolved aromatic hydrocarbons are expected to be elevated adjacent to the dispersant release site with the potential for increased impacts to benthic and pelagic fishes, sharks, and invertebrates. The effect of increased entrained oil and dissolved aromatic hydrocarbon concentration from surface dispersant application is likely to be most noticeable within approximately 100 km of the release site. The effects of surface dispersant application are commonly observed within the top few metres of the water column, where dispersed oil droplets are concentrated. This 'cloud' of dispersed oil quickly fades from sight as it is rapidly diluted to low oil concentrations by the turbulence in the upper water column. The dispersed oil then continues to naturally disperse through biodegradation processes (IPIECA-IOGP, 2015). The generic impacts to receptors from entrained oil and dissolved aromatic hydrocarbons described in Table 7-15 are considered to apply. For impacts to the benthic habitat around the well location and beyond from surface dispersant application, the additional
Physical environment or habitat	
Threatened ecological communities	
Protected areas	
Socio-economic receptors	

Receptor	Consequence Level
	consequence is considered to be Minor (II), that is, there could be a detectable increase in impact from chemical dispersant operations, but a significant additional increase is not expected. Similarly, the additional consequence to plankton, benthic invertebrates, fish, and sharks in the vicinity of dispersant operations is expected to be minor with a significant reduction in population size, attributable to dispersant use, not expected. Significant impacts on the key subtidal coral and macroalgal features of the Ningaloo Marine Park and Muiron Islands Marine Management Area are not expected. These areas are located in shallow sensitive zones where dispersant application will not occur, as per the general industry restrictions on dispersant use, which include no application of dispersant application in State Marine Parks and Habitat Protection Zones (refer to the Ningaloo Vision CoPFAR OPEP [7750-650-EIS-0008] Section 12.1.2). Potential indirect impacts on the Ningaloo Marine Park and Muiron Islands Marine Management Area therefore only have the potential to occur through the use of dispersant in adjacent Commonwealth waters. The metocean conditions in the operational area indicate that general surface current directions are predominantly towards the south-west due to the influence of the Leeuwin Current (RPS, 2023), and winds typically blow from the south-west during the summer months, while directions are more varied during the winter months (south-south-west to east-south-east) (RPS, 2023); these prevailing metocean conditions generally do not encourage surface waters to drift towards the coast. Potential indirect impacts to sensitive receptors will be assessed through operational monitoring, as per the Joint Industry Operational and Scientific Monitoring Framework (Australian Petroleum Production & Exploration Association, 2021). For surface dispersant application operational monitoring, this involves implementation of the Operational Monitoring Plan (OMP): Surface Chemical Dispersant Effectiveness and Fate Assessment, which calls for monitoring as per the Special Monitoring of Applied Response Technologies (SMART) monitoring protocol which employs both visual observations (Tier I) and on-water monitoring (Tier II and III) using fluorometry techniques; Outputs and observations from dispersant operational monitoring will feed back into the operational NEBA process. For longer-term Scientific Monitoring, potential impacts from the use of dispersants can be gauged through a combination of water quality, sediment quality and benthic habitat monitoring. Refer to the Ningaloo Vision CoPFAR OPEP [7750-650-EIS-0008] Section 17 for full details of Santos Operational and Scientific Monitoring Programme. The primary controls for reducing impacts to these receptors from dispersant use is in the selection of approved or environmentally risk assessed chemical dispersants and through the careful assessment of application areas, with due regard to restricted areas, such that potential sensitive receptor impacts are reduced to ALARP. It is important to note that dispersants will only be applied if the response is seen as having a net environmental benefit as per the overarching NEBA analysis of spill response strategies. It should be noted that the oil spill modelling results (RPS, 2023) indicated there was no probability of floating oil ≥50 g/m^2 for the LOWC scenario, which is the actionable minimum floating oil threshold for applying dispersants. However, surface dispersant has been selected as a secondary response strategy in case there are areas observed at suitable thickness in the event of an actual spill. Due to the low flow rates from the LOWC scenario and the depth of the release (~362 metres), any such areas are likely to be highly limited, if present at all. In the event dispersants are used there is the potential for a Minor (II) additional impact, noting that even in the absence of dispersant use, a greater volume of hydrocarbons may load onto shorelines adding to the level of impact on shoreline receptors. Natural dispersion of the oil into the water column will occur in the event of a spill; the application of dispersant merely enhances and accelerates this dispersion process (IPIECA-IOGP, 2015). The above assessment has considered only the potential negative effects of chemical dispersants on marine fauna and habitats from entrained oil and dissolved aromatic hydrocarbons. Chemical dispersant may lead to a reduction in the spatial extent of floating oil above 10 g/m^2, a reduction in the maximum concentration of floating oil arriving at shorelines, and a reduction in the volume of oil stranded on shorelines. These widespread positive effects to shoreline habitats and marine and coastal fauna are considered to outweigh the potential localised negative impacts outlined above. Thus, from an overall environment perspective, the surface dispersant strategy is predicted to have a net benefit based on the available evidence, noting that this would be confirmed or otherwise prior to and during any dispersant operations by an operational NEBA using situational data gathered from both monitor and evaluate strategies, and through surface dispersant operational monitoring.
Overall worst-case consequence level	II - Minor

Receptor	Consequence Level
Spill Response Operations- Physical Presence and Disturbance	
Threatened, migratory or local fauna	The use of vessels and nearshore booms has the potential to disturb benthic habitats, including sensitive habitats in coastal waters, such as corals, seagrass, macroalgae and mangroves. A review of shoreline and shallow water habitats and of bathymetry and the establishment of demarcated areas for access and anchoring will reduce the level of impact to Negligible (I). The use and movement of vehicles, equipment and personnel during shoreline response activities has the potential to disturb coastal habitats, such as dune vegetation, samphire and mangroves, and important habitats of threatened and migratory fauna, including nests of turtles and birds and bird roosting areas. Furthermore, clean-up can involve physical removal of substrates that could impact habitats and fauna and alter coastal hydrodynamics. As with vessel use, an assessment of appropriate vehicles and equipment to reduce habitat damage, along with the establishment of access routes, demarcation zones, and operational restrictions on equipment and vehicle use, will limit sensitive habitat damage and damage to important fauna areas. The establishment of temporary camp areas will be done under direction of DoT and DBCA with suitable advice sought if access is needed to culturally significant areas. Following these and other control measures, the resultant consequence to the physical environment and habitat is assessed as Minor (II), indicating that there may be a detectable reduction in habitat area from response activities (as separate from spill impacts), but recovery will be relatively rapid once spill response activities cease. As with all spill response activities, this disturbance will only occur if there is a net benefit to accessing and cleaning shoreline areas.
Physical environment or habitat	
Threatened ecological communities	
Protected areas	
Socio-economic receptors	
Overall worst-case consequence level	II - Minor
Spill Response Operations- Disruption to Other Users of Marine and Coastal Areas and Townships	
Socio-economic receptors	The use of vessels in the nearshore and offshore environment and spill response activities at shoreline locations and within townships may exclude general public and industry use. Note that this is distinct from the socio-economic impact of a spill itself, which would have a far greater detrimental impact to industry and recreation. Following the application of control measures, it is considered that the additional impact of spill response activities on affected industries would be Minor (II).
Overall worst-case consequence level	II - Minor

6.8.5 Demonstration of As Low As Reasonably Practicable

With the controls in place, as detailed in **Section 6.8.3**, potential impacts to from spill response operations are ALARP as demonstrated below:

A NEBA is the primary tool used during spill response to evaluate response strategies and has the goal of selecting strategies that result in the least net impact to key environmental sensitivities. The NEBA process will identify and compare net environmental benefits of alternative spill response options. The NEBA will effectively determine whether an environmental benefit will be achieved through implementing a response strategy or by undertaking no response. The NEBA will be undertaken by the relevant Controlling Agency for the activity. For those activities under the control of Santos, the IMT Environmental Team Leader will be responsible for reviewing the priority receptors and selected response strategies identified in this EP and coordinating the NEBA for each operational period. This will demonstrate that, at the strategy level, the response operations reduce additional environmental impacts to ALARP.

Spill response activities will be conducted in offshore and coastal waters using vessels and aircraft. The greatest potential for additional impacts from implementing spill response is considered to be on wildlife in offshore waters from oiled wildlife response activities and to shoreline habitats and fauna receptors within shallow waters or on shorelines from nearshore booming and shoreline clean-up activities.

Given the types of activities considered appropriate for responding to a worse-case spill and the scale of operations, standard control measures adopted by Santos for spill response to reduce the level of additional impacts are considered to reduce these impacts to ALARP. This includes working with the relevant Controlling Agency for spill response and applying the appropriate processes and standards, e.g., for oiled wildlife response as included within the WA Oiled Wildlife Response Plan and Pilbara Regional Oiled Wildlife Response Plan.

Santos considers the actions prescribed in the Recovery Plan for Marine Turtles in Australia 2017 to 2027 and approved conservation advice for other threatened fauna (Table 3-9) relevant to spill responses for the activities to minimise noise and light impacts on cetaceans, sharks, marine turtles, seabirds, and shorebirds. The proposed event will not result in significant impacts on these species, and implementation of identified control measures is in line with

the relevant conservation advice and recovery plans. Pollution events (such as hydrocarbon spills) could impact on fauna (as described in **Section 7**), and the use of vessels and equipment during the spill response could result in potential impacts as described in this EP. Control measures in place for vessel and planes/ helicopter use will reduce potential impacts to marine fauna, and these are consistent with current conservation advice. The assessed residual consequence for this impact is minor and cannot be reduced further without disproportionate costs. It is considered therefore that the impact of the activities conducted are acceptable and ALARP.

6.8.6 Acceptability Evaluation

Is the consequence ranked as I or II?	Yes – maximum consequence is II (Minor) from planned events.
Is further information required in the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – activity evaluated in accordance with Santos' Environmental Hazard Identification and Assessment Procedure (EA-91-IG-00004_5) which considers principles of ecologically sustainable development. The consequence against this aspect is II (Minor) and therefore does not affect the outcomes of the principles of ecologically sustainable development as per **Table 5-5.**
Are risks and impacts consistent with relevant legislation, international agreements and conventions, guidelines, and codes of practice (including species recovery plans, threat abatement plans, conservation advice and Australian Marine Park zoning objectives)?	Yes – IUCN principles and strategic objectives of nearby reserves (Montebello and Dampier AMPs and the North-west MPNMP) are met. Controls implemented will minimise the potential impacts from the activity to species identified in recovery plans and conservation advice as having the potential to be impacted by spill response operations. Relevant species recovery plans, conservation management plans and management actions are detailed in **Table 3-9**. Management is also consistent with the zoning of the Australian marine parks, in that risks have been reduced to ALARP, e.g., implementation of spill response activities will limit impacts, thereby conserving the marine park values. Management consistent with *EPBC Act* Regulations (Part 8), Marine Orders (91, 96 and 97) and Australian Ballast Water Requirements.
Are risks and impacts consistent with Santos' Environment, Health, and Safety Policy?	Yes – aligns with Santos' Environment, Health, and Safety Policy.
Are risks and impacts consistent with stakeholder expectations?	Yes – During any spill response, a close working relationship with relevant regulatory bodies (e.g., DoT, DBCA, AMSA) will occurs. As such, there will be ongoing consultation with relevant stakeholders on the acceptability of response operations. Wildlife response will be conducted in accordance with the WA Oiled Wildlife Response Manual (DBCA, 2022), Oiled Wildlife Response Manual Plan (DBCA, 2022b) and Pilbara Regional Oiled Wildlife Response Plan (DPAW, 2014).
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – see ALARP above.

The implementation of spill response activities to reduce the potential impacts from a spill are required by legislation. The spill response options selected have been demonstrated to show a net environmental benefit, are standard industry practice and are consistent with relevant standards and guidelines, including the National Plan for Maritime Environmental Emergencies (AMSA, 2020). No concerns from stakeholders have been raised regarding response activities, and the controls proposed reduce the consequences of the potential impacts to Minor (II) and ALARP. The controls used during spill response activities are therefore considered to reduce additional impacts to an acceptable level.

7. Environmental Risk Assessment for Unplanned Events

OPGGS(E)R 2023 Requirements
Section21. Environmental assessment.
Evaluation of environmental impacts and risks 21(5) The environment plan must include: a) details of the environmental impacts and risks for the activity; and b) an evaluation of all the impacts and risks, appropriate to the nature and scale of each impact or risk; and c) details of the control measures that will be used to reduce the impacts and risks of the activity to as low as reasonably practicable and an acceptable level. 21(6) To avoid doubt, the evaluation mentioned in paragraph (5)(b) must evaluate all the environmental impacts and risks arising directly or indirectly from: a) all operations of the activity; and b) potential emergency conditions, whether resulting from accident or any other reason

An ENVID workshop for the unplanned events held on 14 December 2023 and a revision on 28 October 2024 in relation to the amended LOWC and dry gas scenario (**Section 7.5.1** and **Section 7.9**) identified seven potential sources of environmental risks associated with unplanned events for this activity. The results of the environmental assessment are summarised in **Table 7-1**. A comprehensive risk and impact assessment for each of the unplanned events and subsequent control measures proposed by Santos to reduce the risk and impacts to ALARP are detailed in the following subsections.

The unplanned events that were considered to not be a credible scenario and are not discussed further in this section are:

- hydrocarbon spill due to vessel grounding.

Vessel grounding can occur due to a loss of propulsion or navigational error resulting in the vessel running aground in shallow areas. Vessel grounding and subsequent fuel tank rupture were not considered a credible scenario for this activity because the operational area is situated in deep water and there are no charted reefs or islands that could pose a grounding hazard in the operational area.

Table 7-1: Summary of risk assessment ranking for unplanned activities

EP Section Reference	Event	Consequence	Likelihood	Residual Risk Level
7.1	Release of solid objects	II Minor	B- unlikely	Very low
7.2	Introduction of invasive marine species	IV-Major	A-Remote	Low
7.3	Marine fauna interaction	II-Minor	C-Possible	Low
7.4	Non-hydrocarbon and chemicals release (liquids)	I-Negligible	C-Possible	Very low
7.6	Hydrocarbon spill-1,519m^3 of Marine Diesel Oil (MDO)	II-Minor	B-Unlikely	Very low
7.7	Loss of well control-1,225 m^3 of Van Gogh crude	III-Moderate	A-Remote	Very low
7.8	Minor hydrocarbon release (surface and subsea)	I-Negligible	D-Occasional	Low

7.1 Release of Solid Objects

7.1.1 Description of Event

Event	Solid objects, such as those listed below, can be accidentally released to the marine environment, and potentially impact the sensitive receptors: • non-hazardous solid and liquid wastes such as paper, packaging, and non-hazardous liquid waste containers • hazardous solid and liquid wastes such as batteries, fluorescent tubes, hazardous liquid waste containers and aerosols cans • equipment and materials such as hard hats, tools, or infrastructure parts • dropped equipment to the seabed during IMMR activities, floating asset recovery or damaged flowline recovery • loss of DTM, or dropping of mooring lines to the seabed post FPSO sail away, in the period prior to DTM removal. The DTM does not contain any residual hydrocarbons, foams (e.g.plastics) or chemicals (e.g. PFAS). • DTM, riser/umbilical loss or flowline section (910 m) loss during recovery, or towing of the DTM (operational area to port).
Extent	The event will only potentially occur within the operational area (with the exception of towing the DTM from the operational area to port), and all non-buoyant material or dropped objects are expected to remain within the vicinity of their release location. Buoyant dropped objects could potentially move beyond the vicinity of the operational area.
Duration	An unplanned release of solid objects may occur during activities in the operational area and impacts may occur until the solid degrades. The DTM and risers will be recovered and removed from the operational area as part of the activity.

7.1.2 Nature and Scale of Environmental Impacts

Potential receptors: Physical environment (benthic habitat and water quality), marine fauna (cetaceans, turtles, sharks, fish, rays, seabirds, and benthic fauna), socio-economic receptors (commercial fishing, tourism, and recreation) and cultural receptors.

Physical environment

Objects can be accidentally dropped to the seabed during activities such as the transfer and lifting of objects and equipment. Factors such as crane failure, adverse weather, human error, rigging failure, and vessel motions can result in equipment and other items being lost at sea. This can potentially lead to changes or loss of benthic habitats. In the event of a non-buoyant dropped object, the disturbance would be limited to the area where it was dropped. If the dropped object or equipment being recovered reaches the seabed, it would cause disturbance to the benthic habitat, but this disturbance would be confined to the footprint of the equipment.

In the rare event that the DTM is lost to the seabed prior to removal or during towing, Santos would assess the risks and determine the best recovery options according to applicable legislative requirements. Recovery may involve cutting the equipment into smaller pieces on the seabed for surface recovery. A tow plan will be developed with consideration for Environmentally Sensitive Sea Areas (ESSA) and Areas to be Avoided (ATBA), eliminating the potential for impacts to sensitive habitats or protected areas.

The operational area primarily consists of soft sediments with minimal epifauna, and while the soft sediment benthic habitats will not be destroyed, the communities on and within them (epifauna) will experience disturbance in the case of a dropped object. Depressions on the seabed may remain even after the removal of the object as they gradually fill over time. Although the operational area includes the Continental Slope Demersal Fish Communities KEF, no sensitive features associated with the KEF have been observed within the operational area, a therefore, impacts to the KEF are unlikely.

Small buoyant dropped objects have the potential to be transported by marine currents and may impact on reefs, islands, shoals, and banks within the region. Accidentally dropped objects, such as plastics, have the potential to smother benthic environments, and the release of hazardous solids (e.g., wastes such as batteries) could also impact water quality through pollution of the immediate receiving environment.

Impacts from accidentally released liquids (non-hydrocarbon and chemical) are discussed in Section 7.4.

Threatened, migratory or local fauna

Plastics and other solid objects have the potential to harm marine fauna through entanglement or ingestion. The operational area overlaps migration BIA for the pygmy blue whale and migration BIA for the humpback whale. Other

threatened and migratory marine fauna such as marine turtles and seabirds may also be present in low numbers within the operational area.

Marine turtles are at risk of entanglement and may mistake plastic for jellyfish when feeding (Mrosovsky *et al.*, 2009). The Recovery Plan for Marine Turtles in Australia 2017-2027 highlights ingestion of marine debris as a threat to all turtle species. Seabirds foraging on plankton at the sea surface may consume floating plastic, causing internal damage, and potentially leading to fatality (Derraik, 2002). Marine debris has been identified as a threat to marine turtles, humpback whales, and whale sharks in the relevant recovery plans and approved conservation advice. The Threat Abatement Plan for the Impacts of Marine Debris on the Vertebrate Wildlife of Australia's Coasts and Oceans (DoEE, 2018) also addresses this issue and provides recovery actions to combat the threat. It is important to adhere to legislation for the prevention of garbage disposal from vessels to mitigate this risk.

Release of hazardous solid objects (e.g., wastes such as batteries) may result in the pollution of the immediate receiving environment, leading to very localised detrimental health impacts to marine flora and fauna. Physiological damage through ingestion or absorption may occur to individual fish, cetaceans, marine reptiles, or seabirds.

There is potential for DTM/mooring lines, 910 m flowline length/riser strike to marine fauna in the event of loss to the seabed during recovery process or while towing of the DTM from the operational area to the port. The recovery plans and approved conservation advice have specified a number of recovery actions to help combat this threat. Of relevance to this activity is the legislation for the prevention of garbage disposal from vessels, which Santos implements through adherence to MARPOL.

Socio-economic receptors

Tourism activities, such as snorkelling, diving, surfing and recreational fishing are not expected to occur in the operational area, given the water depth, lack of seafloor features and distance from shore. Although dropped solid objects have potential to float to nearby areas used for tourism or recreational purposes solid non-hydrocarbon releases are not expected to occur frequently or to a scale that may cause significant pollution that would impact the socio-economic values of these areas. Impacts to socioeconomic receptors could occur should debris interfere with other marine users or their equipment (for example, fishing nets).

Cultural receptors

Given the nature of activities occurring in the operational area that could lead to a release of a dropped object, the risk on cultural receptors located the operational area is considered very low.

7.1.3 Environmental Performance Outcomes and Control Measures

The EPOs relating to this event include:

- No unplanned objects, emissions or discharges to sea or air [NV-EPO-05]

The control measures for this event are shown in **Table 7-2**, and the EPSs and measurement criteria for the EPOs are described in Section 8.4.

Table 7-2: Control measure evaluation for the unplanned release of solid objects

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
Standard Control Measures					
NV-CM-38	Dropped object prevention procedure	Administrative	Preventing and recovering dropped objects help mitigate environmental impacts, except in cases where the consequences are insignificant, or safety risks exist. Minimises drop risk during lifting operations. Ensures lifting equipment is certified and inspected.	Personnel costs involved in implementing procedures and in incident reporting.	**Adopted** – Benefits of ensuring procedures are followed and measures implemented outweigh cost to Santos.
NV-CM-28	Waste (Garbage) Management Procedure	Administrative	Reduces probability of garbage being discharged to sea,	Personnel cost of premobilisation	**Adopted** – Benefits of ensuring vessels

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
			reducing potential impacts to marine fauna. Stipulates putrescible waste disposal conditions and limitations. Marine Order 95 (Marine pollution prevention – garbage).	audits and inspections and in reporting discharge levels.	are compliant outweighs the minimal costs of personnel time and it is a legislated requirement.
NV-CM-11	DTM tow and offloading procedure	Administrative	Tow procedure for towing of the DTM from the operational area to port of landing will minimise the potential of objects being dropped to seabed.	Cost associated with implementing procedures.	**Adopted** – Benefit of implementing procedure outweighs the minimal costs.
NV-CM-12	Recovery procedure/s	Administrative	Assists with recovering assets in a manner to prevent them drifting away during recovery (removal from operational area)	Cost associated with implementing procedure/s.	**Adopted** – Benefit of developing and implementing procedure outweighs the minimal costs.
NV-CM-22	Marine assurance	Administrative	Reduces the probability of release of solid objects due to vessel failure.	Cost associated with implementing procedures.	**Adopted** – Benefit of implementing procedure outweighs the minimal costs.
Additional Controls					
NV-CM-39	Install a cabled data linked depth sensor/monitor to the DTM	Engineering	Provides regular status updates of the DTM's location and depth and therefore an early warning to any integrity issues with the DTM between departure of the FPSO and the floating asset removal. Also allows for verification that the DTM is still in place submerged in water column.	Cost associated with obtaining and installing a data linked surface buoy, cabled subsea sensor and monitoring	**Adopted** – Benefits of outweighs the costs.
NV-CM-40	Third party DTM mooring analysis / buoyancy study	Administrative	Provides a further means of assessing whether the disconnection of some of the DTM mooring lines helps to reduce weight on the DTM, and therefore reduces the risk of buoyancy loss.	Cost associated with undertaking study and potentially implementing results	**Adopted –** benefits outweigh the costs
NV-CM-41	DTM Disconnection Procedure	Administrative	Details the DTM disconnection steps to minimise the potential for loss of the DTM to the seabed during	Cost associated with implementing procedures.	**Adopted –** benefits outweigh the costs

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
			disconnection of the FPSO from the DTM.		
NV-CM-42	DTM Recovery Procedure will be developed to recover DTM from an actual unplanned loss of buoyancy (potentially to seabed)	Administration	Demonstrates that measures are in place prior to FPSO disconnection and sailaway to react if the DTM was to lose buoyancy in the period between FPSO disconnection and its planned removal, reducing the potential for impacts to the environment.	Cost associated with developing the procedure.	**Adopted** – Benefits of outweighs the costs.
N/A	Obtain weekly satellite imagery to confirm ongoing presence of the surface marker buoy attached to the DTM.	Engineering	Allows for visual verification that the DTM is still in place (submerged in water column) through confirmation of presence of buoy at surface. Is limited by weather, so cloud cover could result in less reliable imagery.	Cost associated with obtaining satellite imagery	**Rejected** – Satellite imagery not as reliable as a data linked surface buoy, especially if cloud cover is over the operational area and location of the buoy.
NA	Vessel based DTM surveys to confirm location/depth of DTM post FPSO removal.	Engineering	Confirms the integrity and condition of the DTM and suitably for recovery and tow.	Costs associated with conducting survey	**Rejected –** real time monitoring provides optimal capabilities to observe DTM location/depth and response to any adverse changes**.** Santos has purchased two monitoring systems so there is already redundancy in our monitoring approach of the DTM in location.
N/A	Dosing of DTM immediately prior to FPSO departure	Engineering	Provide further dosing of chemicals to the DTM such as biocide as a corrosion inhibitor.	Cost associated with implementing the dosing and also safety considerations of handling of chemical drums / pumping spread in restricted area (top of DTM buoy)	**Rejected** – The tank internal corrosion threat has been appropriately managed through dosing to avoid internal corrosion for the period between FPSO removal and DTM removal. Additionally, the tanks will be filled with nitrogen and pressurised to 2 bar.
NV-CM-13	Engagement of independent Marine Warranty Surveyor for verification of the tow	Administrative	It provides assurance of the DTM being suitable for towing	Cost associated with	**Adopted –** benefits outweigh the costs

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
	connection points or primary structural members for towing or lifting of the buoy.		safely from the operational area.	implementing procedures.	
N/A	Visual vessel based inspection of the surface buoy attached to the DTM to enable visual monitoring of DTM being in position.	Engineering	Provides a visual warning/caution for interaction with other marine users. Also allows for visual verification that the DTM is still in place (submerged in water column) through confirmation of presence of buoy at surface.	Cost associated with implementing procedures.	**Rejected** –Costs are high at approximately $25k/day for a vessel. e.g $50k for a 2 day trip each month. In addition, this option carries safety risks associated with mobilising a vessel frequently for monitoring that can be done by an unmanned data linked surface buoy.
N/A	Connect the DTM to a floating barge	Engineering	Provides greater support of the DTM within the water column to prevent sinking.	Costs and contracting limitations to contracting suitable barge in a timely manner. May not completely prevent sinking, The barge itself has potential to become a navigational hazard if other marine users ignore or proceed into the 500m PSZ.	**Rejected –** Costs of hiring a suitable barge for up to 12 months is grossly disproportionate to the environment benefit to be gained given other feasible options available such as a surface buoy.
N/A	Eliminate lifting in operational area	Eliminate	Reduces the risk of release of non-hydrocarbon solid to the marine environment due to dropped object.	Eliminating lifting would require vessels storing more equipment and supplies on-board, and/or additional trips to shore. Vessels will not have enough deck space to store all required equipment, materials, supplies needed for the duration of the activity. Lifting is also required to	**Rejected** – Not feasible to eliminate lifting in the operational area.

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
				recover equipment for removal from the operational area.	
N/A	Do not recover floating assets or damaged section of production flowline B from the operational area	Eliminate	Eliminates the potential impacts due to dropping recovered assets or sinking of the DTM during recovery and tow.	Santos has committed to recovering and removing all floating assets and the damaged section of production flowline B from the operational area. Floating assets may sink at a later date if not removed and cause seabed disturbance.	**Rejected** – Santos is committed to recovering and removing the floating assets and damaged section of production flowline B from the operational area. Removal of floating assets reduces the risk of them sinking to seabed in the operational area at a later date.
N/A	Early recovery and removal of the DTM from the operational area as part of FPSO sail away	Engineering	Reduces the risk of the DTM suffering an unplanned loss of buoyancy prior to removal.	Costs associated with extra days in field, completely different vessel spread to the vessels supporting FPSO disconnect and permanent departure from the operational area.	**Rejected** – There is sufficient integrity for the buoy to remain onsite until the proposed FAR campaign. And there is potential opportunity for the FAR campaign to align with another Santos decommissioning scope, which provides safety, cost and operational and efficiencies. Safety risks are reduced by mobilising a vessel once for two purposes, rather than additional safety exposure for personnel to an additional mobilisation. The DTM location and depth will have been monitored live, using remote real time monitoring by a sensor attached post FPSO

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
					disconnection (NV-CM-39). Given that the DTM has remained in a floating condition since its installation, and based on recent IMMR campaigns and independent third party DTM mooring analysis / buoyancy study to confirm condition and integrity, Santos is confident in the DTM integrity. If the DTM was to sink to the seabed for other reasons prior to recovery, Santos will conduct a survey to assess condition of the DTM and develop a suitable recovery methodology based on outcomes of the survey (NV-CM-42.

7.1.4 Environmental Impact Assessment

Description	
Receptors	Physical environment (benthic habitat and water quality) marine fauna (cetaceans, turtles, sharks, fish, rays, seabirds, and benthic fauna) Marine flora Socio-economic receptors (commercial fishing, tourism, and recreation) Cultural receptors.
Consequence	II-Minor
Physical environment The impacts of the non-buoyant dropped objects are expected to be limited to the size of the dropped object and given the size of the standard materials transferred, any impact is expected to be small and limited to within the operational area in which it was dropped. In the unlikely event the DTM loses buoyancy and descends to the seabed or equipment being recovered is dropped to the seabed, disturbance to benthic habitat would occur, the area of which will be confined to the footprint of the dropped equipment. Any area of the seabed impacted through dropped objects is expected to recover. Buoyant dropped objects could smother benthic habitats and wash up on beaches, but management measures can prevent significant impacts. Therefore, the impacts due to release of solid objects on the physical environment is Minor (II). Threatened or migratory fauna Dropped objects would only be in small quantities and could cause localized impacts on water quality and the benthic environment.	

Description	
Marine fauna may ingest small amounts of solid waste, but the volumes generated during the activity would be small, minimizing any accidental loss to the environment. Recovery plans and conservation advice address the potential threat of marine debris. Any impacts would be limited to a small number of individuals, with no consequences for conservation status or reproductive success of certain species. The risk of DTM/riser/ flowline section (10 m) striking marine fauna due to loss to seabed during recovery process or while towing the DTM to the port from the operations area is highly unlikely considering the appropriate controls in place. The worst-case release of solid waste would result in limited fauna fatalities (if any), not affecting the population size significantly. Therefore, the consequence is Negligible (I) Socio-economic receptors (tourism and recreation) Impacts to tourism and recreation have the potential to occur through buoyant objects floating into areas used for these activities, adversely impacting tourism and recreation values, and creating poor aesthetics. Given the limited quantities associated with this unplanned event, even a worst-case release of solid waste is unlikely to have flow-on effects significant enough to impact the tourism and recreation industries. Therefore, the consequence is Negligible (I) EP stakeholder consultation did not raise any concerns regarding potential impacts to cultural features including sea country.	
Likelihood	B-Unlikely
Santos acknowledges that there is recent industry history with the loss of integrity of other operators riser turret mooring (RTM) resulting in low of buoyancy. However, with the control measures in place, the likelihood of releasing solid objects (including the DTM) to the environment is considered unlikely (e.g. not expected to occur, but known to have occurred elsewhere) (B).	
Residual risk	The residual risk associated with this event is **Very Low**

7.1.5 Demonstration of As Low As Reasonably Practicable

Solid waste will be produced during the activities, and the lifting operations and vessel operations are necessary for the activity. Equipment loss and dropped objects that may occur during the recovery of equipment or transfer of vessels in the operational area will be addressed through lifting and transfer procedures and equipment management.

The potential loss of the DTM whilst on station (post FPSO sailaway and until its planned removal) or during the in field recovery or towing, will be minimised through live monitoring of DTM position from FPSO depart through to DTM removal, DTM survey prior to removal, a recovery procedure, a DTM tow and offloading procedure, as well as a recovery procedure for an unplanned loss of buoyancy on site.

Santos has undertaken a number of studies performed by third party consultants which conclude that the highest risk period for the DTM is between post FPSO removal and between the planned removal date but this can be managed with appropriate controls as outlined in this EP. The potential risk at different times of DTM status are outlined below.

DTM Status	Perceived Risk	Assessment & Controls	Associated Contingencies
FPSO disconnected from DTM with all mooring lines and risers still connected.	Sinking of the DTM on title	Multiple tank voids would need to become flooded to lower the DTM through the water beyond its design depth (~90m at chain table) where the risk of a major structural failure increases. A live monitoring buoy is to be installed to provide live feedback of DTM depth with any significant increase in depth indicating either excessive marine growth or a tank void becoming flooded. Live monitoring will allow for a faster response to any perceived risk to the DTM to initiate contingency control measures.	Reduce the load on the DTM to increase the required number of flooded tank voids to push the DTM beyond its design depth, namely: • Implement the Removal of 3 of the 9 mooring legs if recommended by third party study (NV-CM-37) • Implement additional weight shedding of redundant items (e.g. mooring chain tails hanging beyond the DTM chain stoppers) if recommended by third party study (NV-CM-37). Removal of excessive marine growth (**Section 2.8)**
DTM recovery operations (FAR campaign)	Sinking of the DTM on title	As the recovery operation involves the removal of the 5x risers and 9x mooring lines, the load on the DTM is progressively reduced with each removal activity. As such, the number of tank voids that would need to flood to sink the buoy beyond the design depth increases so the risk reduces with each activity.	No additional contingencies are required as the risk is considered ALARP and the high risk time will have passed. The removal vessel and its associated spread are onsite to prevent this risk from being credible and has means of minimising the risk through progressive removal of risers and mooring lines (i.e. reducing weight further) and the activity is of short duration.

		Once all mooring lines and risers have been removed, the DTM buoy is expected to sit at a draft of 8m to the chain table (unless additional ballast is added to the DTM's current state). In order to sink the DTM once on surface in its current condition, approximately 260te of ballast (equivalent to flooding the 10 largest tanks) would need to be applied which is not seen as a credible risk.	It is noted that considerable increase to buoy draft on surface beyond current state does not prevent tow. The original tow out of the DTM buoy was at a draft of 11.5m to the chain table (approximately 140te more ballast to the DTM's current state). (Refer to control measures within **Table 7-2**)
Buoy Tow and offloading operations (FAR campaign)	Sinking of the DTM off title during tow	DTM buoy is expected to sit at a draft of 8m (unless additional ballast is added to its current state). In order to sink the DTM once in this condition, in excess of 260te of ballast would need to be applied which equates to approx. the 10 largest tank voids. The flooding of 10 tanks is not considered credible during the tow, noting the existing tow points sit in way of 4 tanks, so in the unlikely event of localised cracking in way of the tow points the buoy will not sink. Original tow out of the DTM buoy was at a draft of 11.5m to the chain table (approximately 140te more ballast to the DTM's current state) so the DTM is towable at deeper drafts	Standard tow operation contingencies: • Which will be outlined within the plan required by NV-CM-12 such as carrying an emergency tow bridle which utilises different tow points to the main bridle. • Navigation lights (NV-CM-06).

The proposed control measures aim to minimise the risk of dropped objects to a low level that cannot be further reduced. No feasible additional control measures have been identified that would further reduce the likelihood of solid objects being lost. As a result, the impact of the activities conducted is considered ALARP.

7.1.6 Acceptability Evaluation

Is the risk ranked between Very Low to Medium?	Yes – residual risk is ranked Very Low.
Is further information required in the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – activity evaluated in accordance with Santos' Environmental Hazard Identification and Assessment Procedure (EA-91-IG-00004_5), which considers principles of ESD. The residual risk for this aspect is Very Low and therefore does not affect the outcomes of the principles of ecologically sustainable development as per **Table 5-5**.
Are risks and impacts consistent with relevant legislation, international agreements and conventions, guidelines, and codes of practice (including species recovery plans, threat abatement plans, conservation advice and Australian Marine Park zoning objectives)?	Yes – management consistent with Marine Order 95. Controls implemented will minimise the potential impacts from the activity to species identified in recovery plans and approved conservation advice as having the potential to be impacted by solid objects. Specific actions that contribute to the long-term prevention of marine debris (Objective 1 of the Threat Abatement Plan for the Impacts of Marine Debris on the Vertebrate Wildlife of Australia's Coasts and Oceans (DoEE, 2018)) have been adopted, including compliance with applicable legislation in relation to the improvement of waste management practices. Consistent with relevant species recovery plans, conservation management plans and management actions set out in **Table 3-9**.
Are risks and impacts consistent with Santos' Environment, Health, and Safety Policy?	Yes – aligns with Santos' Environment, Health, and Safety Policy.
Are risks and impacts consistent with stakeholder expectations?	Yes – Exmouth CLG asked about decommissioning in general and prevention of the DTM sinking. Santos replied that controls were in place with a proposed study being done. Santos also has real time monitoring proposed (refer Table 8-2, Control measures and performance standards).
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – see ALARP above.

The handling of solid objects and towing of infrastructure such as the DTM is standard industry and maritime practice and the potential impacts are well understood. This aspect will be managed consistent with relevant legislation, regulations and guidelines and the residual risks are very low and ALARP. The buoyancy of the DTM is considered acceptable and will be appropriately monitored in real time in the water column. A further commitment has also been made to undertake a further third-party study in relation to the potential disconnection of mooring lines from the DTM to reduce weight following the disconnection of the FPSO.

The control measures proposed are consistent with applicable actions described in the relevant Recovery Plans and Approved Conservation Advice and no stakeholder concerns have been raised regarding this event.

With the control measures in place to prevent accidental releases or loss of assets during recovery of assets and towing of the DTM and the negligible impacts predicted from these types of solids, the very low risk of solid objects dropped to the environment is considered environmentally acceptable.

7.2 Introduction of Invasive Marine Species

7.2.1 Description of Event

Event	Introduction of invasive marine species (IMS) may occur due to matters such as: • biofouling on vessels and external/internal (e.g., sea chests, seawater systems) niches • biofouling on equipment that is routinely submerged in water (e.g., ROVs, cutting and recovery tooling) • discharge of high-risk ballast water • marine growth removal (on deck or subsea) off DTM/flowline section/risers as a part of asset removal • towing/transport of the DTM and FPSO out of the operational area to port. Once established, IMSs have the potential to out-compete indigenous species and affect overall native ecosystem function.
Extent	Localised (seabed within the operational area) to widespread if successfully translocated to new areas via ocean currents or project equipment transit.
Duration	Temporary to long-term (in the event of successful translocation and establishment).

7.2.2 Nature and Scale of Environmental Impacts

Potential receptors: Physical environment (benthic habitats), threatened/migratory fauna (marine mammals, marine reptiles, sharks, fish, and rays), protected areas, socio-economic receptors (fisheries, tourism, and recreation) and cultural aspects (sea country, potential for totemic species).

IMS are marine plants, animals and algae that have been introduced into a region beyond their natural range but have the ability to survive and potentially thrive. The majority of IMS compatible with the NWS~~W~~ are found in countries in southeast Asia. Some IMS impose a significant risk to the environment, biodiversity, ecosystem health, human health, fisheries, aquaculture, shipping, ports, and tourism (Wells et al., 2009). IMS can cause various adverse impacts in the receiving environment, including:

- over predation of native flora and fauna
- displacement of native marine species
- outcompeting of native flora and fauna for food
- depletion of viable fishing areas and aquaculture stock
- reduction of coastal aesthetics.
- The above impacts can result in flow-on detrimental effects to fisheries, tourism, and recreation.

IMS of concern are those that are not native to the region, are likely to survive and establish in the region, and are able to spread by human mediated or natural means. Species of concern vary from one region to another depending on various environmental factors, such as water temperature, salinity, nutrient levels, and habitat type. These factors dictate their survival and invasive capabilities.

It is recognised that artificial, disturbed and/or polluted habitats in tropical regions are susceptible to invasive marine species introductions, which is why ports are often areas of higher IMS risk (Neil et al., 2005). However, in Australia there are limited records of detrimental impact from IMS compared to other tropical regions (such as the Caribbean). Following their establishment, eradication of IMS populations is difficult, limiting management options to ongoing control or impact minimisation. Case studies in Australia indicate that, from detection to eradication, this can take around four weeks (Bax et al., 2003). However, this depends on the environmental conditions and species. For this reason, increased management requirements have been implemented in recent years by Commonwealth and State regulatory agencies. Ballast water is responsible for 20 to 30% of all marine pest incursions into Australian waters. However, research indicates that biofouling (the accumulation of aquatic micro-organisms, algae, plants and animals on vessel hulls and submerged surfaces) has been responsible for more foreign marine introductions than ballast water (DAFF, 2003). The potential biofouling risk presented by vessels will relate to:

- the length of time that these vessels have already been operating in Australian waters or, if they have been operating outside Australian waters
- the locations of the operations they have been undertaking
- the length of time spent at these locations
- whether the vessels have undergone hull inspections, cleaning, and application of new anti-foulant coating prior to returning to operate in Australia.

The risk of introducing limited by the operational area occurring in relatively deep, offshore waters that are not directly adjacent to any shoals or banks. IMS are generally unable to establish in deep water ecosystems (Geiling, 2014), most likely due to a lack of light or suitable habitat to sustain their growth and survival. Most IMS are found in tidal and subtidal zones, with only a few species known to extend into deeper waters of the continental shelf (Bax et al., 2003). Further, it is known that highly disturbed environments (such as marinas and jetties) are more susceptible to colonisation than open-water environments where the number of dilutions and the degree of dispersal are high (Paulay et al., 2002).

The DTM is located approximately 20 to 30 m below the sea surface and is considered to pose a very low risk of IMS. IMS are unlikely to establish at these water depths. Additionally, the DTM has not routinely come into contact with vessels other than the FPSO, limiting the potential for IMS transmission from a vessel to the DTM. The DTM will be subject to marine growth removal prior to being rigged for towing or lifted on vessel/barge for removal from the operational area. Santos engaged Biofouling Solutions Limited to undertake a desktop-based assessment of the likelihood of IMS species of concerns on the DTM. The assessment found that the DTM was exceptionally clean of marine growth and concluded that there were no species of concern present on the DTM (Biofouling Solutions, 2024).

7.2.3 Environmental Performance Outcomes and Control Measures

The EPO relating to this event is:

- No introduction of marine pest species [NV-EPO-08]

The control measures for this event are shown in Table 7-3 and the EPSs and the measurement criteria for the EPOs are described in Section 8.4.

Table 7-3: Control measure evaluation for unplanned introduction of invasive marine species

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
Standard Controls					
NV-CM-43	Implementation of the management controls in the Santos Invasive Marine Species Management Plan (IMSMP)	Administrative	The risk of introducing IMS is reduced due to assessment procedure and management of ballast water.	Personnel costs involved in risk assessing vessels in accordance with the Invasive Marine Species Management Plan. Costs associating with reducing the vessel risk to 'low' (for example, dry docking, hull cleaning or additional costs due to inspections). Could lead to potential delays and therefore costs in vessel contracting process due to unavailability of vessels.	**Adopted** – Minimal personnel costs and potential delays or costs to project are considered outweighed by the benefits of reducing the risk of IMS.
NV-CM-44	Anti-foulant system	Protective	The risk of introducing IMS is reduced due to anti-foulant systems.	Could lead to potential delays and therefore costs, in vessel contracting process due to availability of vessels with appropriate anti foulant systems.	**Adopted** – Minimal potential delays or costs to project are considered outweighed by the benefits of reducing the risk of IMS.
Additional Controls					
N/A	Mandatory dry docking of vessels prior to entering field to clean vessel or equipment and remove biofouling	Eliminate	Ensure no IMS are present on vessel or associated equipment.	Significant cost (grossly disproportionate to the risk) would lead to scheduling delays.	**Rejected** – Costs disproportionately high compared to environmental benefit, given other controls in place already reduce the risk.
N/A	Utilise an alternative ballast system to avoid	Substitute	Eliminate need for ballast water exchange, therefore	Vessels suitable for the activity may not have options for alternative	**Rejected** – Cost disproportionately high compared to

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
	uptake and discharge of water in vessels		decreasing risk of introducing IMS through ballast water.	ballast, therefore would require modification at significant cost.	environment benefit.
N/A	Zero discharge of ballast water	Eliminate	Would reduce the potential for IMS by implementation of no ballast water exchange policy on vessels.	Ballast water exchange required on the vessels for stability.	**Rejected** – On the basis that ballast water exchange is a safety critical activity for marine operations.
N/A	Contract vessels only operating in local, State or Commonwealth waters to reduce potential for IMS	Administrative	Reduce potential for IMS to be transported into area since vessels would not have originated elsewhere.	Vessels and equipment suitable for the activity may not be available in State/Commonwealth waters. Potential significant costs and delay in activity schedule by only contracting vessels working in State/National waters.	**Rejected** – Not feasible.
N/A	No removal of marine growth from floating assets	Eliminate	May reduce the potential for IMS dispersal in the highly unlikely event IMS were present on floating assets and marine growth removal transferred IMS to an area where they could colonise (i.e., out of the operational area).	Marine growth removal is required in order for floating assets to be inspected, maintained, and removed safely.	**Rejected** – Marine growth removal is required for the safe inspection, maintenance, and removal of floating assets.

7.2.4 Environmental Impact Assessment

Consequence Level	
Receptors	Physical environment (benthic habitats) Threatened, migratory and local fauna (marine mammals, marine reptiles, sharks, fish, and rays) Socio-economic receptors (fisheries, tourism, and recreation) Cultural aspects (Sea Country, potential for totemic species)
Consequence	IV-Major
Ballast water is responsible for 20 to 30% of all marine pest incursions into Australian waters. However, research indicates biofouling (the accumulation of aquatic micro-organisms, algae, plants and animals on vessel hulls and submerged surfaces) has been responsible for more foreign marine introductions than ballast water (DAFF, 2003). IMS, if successfully established, can outcompete native species for food or space, prey on native species or change the nature of the environment and can subsequently impact on fisheries or aquaculture. If an IMS is introduced, the species has been known to colonise areas outside of the areas to which it is introduced. In the event an invasive marine species is introduced into the operational area, given the lack of diversity and extensiveness of similar benthic habitat in the region, there would only be a minor reduction in the physical environment. No threatened ecological communities are present in the area that could be affected. The overall consequence level was assessed as Moderate, this also takes into consideration the distance of the activity to protected areas and the requirements of the North-West MPNMP which applies adjacent to the operational area which requires that vessel ballast water exchange is completed in accordance with the Australian Ballast Water Management Requirements. EP stakeholder consultation did not raise any concerns regarding potential impacts to cultural features including sea country.	
Likelihood	A-Remote
The pathways for IMS introduction are well known, consequently, standard preventive measures are proposed. The ability for invasive marine species to colonise a habitat depends on a number of environmental conditions. It has been found that highly disturbed environments (such as marinas) are more susceptible to colonisation than open water	

Consequence Level	
environments where the number of dilutions and the degree of dispersal are high (Paulay et al., 2002). Given the depth of the operational area (340 m to 400 m) creating an unfavourable habitat for colonisation (i.e., light limiting and low habitat biodiversity with sparse epibiota) and distance from shallow coastal habitats, there is a very low likelihood IMS would be able to survive translocation and subsequently establish and colonise. Given the dispersive open-ocean environment of the operational area, the successful translocation to surrounding shallower habitats of an IMS introduced to the operational area is unlikely. With controls in place to reduce the risk of IMS introduction, the likelihood is considered Remote (A).	
Residual Risk	The residual risk associated with this event is Low.

7.2.5 Demonstration of As Low As Reasonably Practicable

There are no alternatives to the use of vessels in order to undertake the activity. The risks from IMS are well understood with the additional desktop-based assessment undertaken by Biofouling Solutions for the likelihood of presence of IMS on the DTM, and with the proposed control measures, the activities are considered to comply with relevant regulations and guidelines. The proposed management controls are considered appropriate to manage the risk of introduction of IMS to ALARP.

Ballast water exchange will be managed through Ballast Water Management actions consistent with the Australian Ballast Water Management Requirements, and a vessel biosecurity risk assessment in accordance with the Invasive Marine Species Management Plan (EA-00-RI-10172) will be undertaken to demonstrate the vessels are low risk so IMS are not introduced.

Santos has adopted a risk-based approach to managing biofouling, given it is not practicable or reasonable to inspect and/or clean every vessel before each voyage. Such an approach is consistent with other petroleum operators on the NWS and is beyond that enforced on the majority of commercial and recreation vessels that regularly transit the same bioregion. International vessels are given the highest priority to prevent the introduction of IMS into Australian waters. However, domestic vessels (interstate and locally sourced) are also risk-assessed to reduce the likelihood of spreading marine pest species already established in Australian waters. The biofouling risk assessment approach adopted by Santos will ensure the *Aquatic Resources Management Act 2016* and associated regulations prohibiting the introduction of non-endemic fish species will be met.

With adherence to the proposed management controls, the risk to the environment from IMS has been reduced to ALARP.

7.2.6 Acceptability Evaluation

Is the risk ranked between Very Low to Medium?	Yes – introduction of IMS residual risk ranking is Low.
Is further information required in the consequence assessment?	No – potential impacts and risks well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – activity evaluated in accordance with Santos' Environmental Hazard Identification and Assessment Procedure (EA-91-IG-00004_5), which considers principles of ESD. The residual risk for this aspect is Low and therefore does not affect the outcomes of the principles of ecologically sustainable development as per **Table 5-5**.
Are risks and impacts consistent with relevant legislation, international agreements and conventions, guidelines, and codes of practice (including species recovery plans, threat abatement plans, conservation advice and Australian Marine Park zoning objectives)?	Yes – management consistent with Biosecurity Act 2015, National Biofouling Management Guidance for the Petroleum Production and Exploration Industry (Marine Pest Sectoral Committee, 2018) and the Aquatic Resources Management Act 2016.
Are risks and impacts consistent with Santos' Environment, Health, and Safety Policy?	Yes – aligns with Santos' Environment, Health, and Safety Policy.
Are risks and impacts consistent with stakeholder expectations?	Yes – No concerns raised. Santos will follow advice of DAFF to ensure vessels present low level biosecurity risk.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – see ALARP above.

The mobilisation of vessels and equipment to undertake offshore petroleum activities is industry standard practice, and the IMS risks are well understood and subject to regulation. The vessels and equipment that are internationally mobilised will meet Australian biosecurity requirements, and proposed management is consistent with National

Biofouling Management Guidance for the petroleum Production and Exploration Industry (Marine Pest Sectoral Committee, 2018) and Australian Biofouling Management Requirements (DAFF, 2023).

Application of the proposed control measures and adherence to legislation and regulations reduce the likelihood of introducing IMS into the operational area, and the dispersive offshore location in the operational area reduces the probability of successful establishment in the unlikely event of introduction.

No stakeholder concerns have been raised regarding this aspect, and the proposed controls will reduce the residual level of risk to low and ALARP. Therefore, the residual risk associated with IMS is considered by Santos to be environmentally acceptable.

7.3 Marine Fauna Interactions

7.3.1 Description of Event

Event	There is the potential for vessels (including the FPSO) or equipment from the vessels involved in the activities to interact with marine fauna, including potential strike or collision, potentially resulting in severe injury or mortality. There is the potential for fauna to become entangled in the trailing lines/chains of the DTM if it is being towed. Fauna strike may also occur from helicopters during take-off and landing until the FPSO has sailed away.
Extent	Within the operational area and in the immediate vicinity of the vessels and helicopters, while moving.
Duration	Intermittent, when vessels are in the operational area completing general inspection activities or floating asset and damaged flowline removal activities.

7.3.2 Nature and Scale of Environmental Impacts

Potential receptors: Threatened or migratory fauna (marine mammals, marine turtles, sharks and rays, fish, and birds).

Movement of the vessels in the operational area, FPSO disconnection and sail away and towing of the DTM out of the operational area (if the option of lifting these onto a vessel or barge is not feasible), introduces the potential for interaction with marine fauna present at the same location during the activity. Although up to four vessels may be present in the operational area at any one time, typically only two vessels will be within the operational area – the primary vessel and the support vessel. All vessels will either be stationary or slow moving, thereby reducing potential for marine fauna interaction with vessels. Vessels will adhere to Santos procedures for interacting with marine fauna (Section 7.3.3). Santos has routinely carried out operational activities involving multiple vessels within the operational area since Ningaloo Vision operations began (2010), with no marine fauna interaction incidents reported or recorded involving activity vessels during this time. However, Santos acknowledges that there is potential for marine fauna interactions with activity vessels, as described below.

Marine fauna in surface waters that could be most at risk from vessel collision or entanglement include marine mammals, marine turtles, and whale sharks. As summarised in **Table 3-8**, the operational area overlaps BIAs for humpback whales (migration) and pygmy blue whale (migration).

Vessel strike and vessel disturbance are identified as potential threats to a number of marine fauna species in relevant recovery plans and conservation advice (Table 3-10).

Marine fauna may become entangled within the DTM pickup line once the FPSO has departed the operational area. Species more likely to be at risk of entanglement are larger marine fauna (e.g. whales, turtles). Allowing for the pickup line to 'stream' with the prevailing current reduces the potential for the rope to become entangled on itself creating a 'bird-nest' like structure. It is considered that a tangled rope on the sea surface is a higher risk of whale entanglement compared to a single streaming strand. A birds-nest within the rope arrangement is also considered to create a higher risk to prop/vessel snagging compared to a single length of floating line.

Incidents with marine fauna are recorded and reported by Santos as described in Section 8.9.

Marine mammals and Sharks/rays

The Conservation Management Plan for the blue whale (Commonwealth of Australia, 2015b) recognises vessel strike as a threat to their recovery. The operational area overlaps the migration BIA for the pygmy blue whale. The northern migration for pygmy blue whales off Northwest Cape occurs coast between May and August, and the south bound migration in November and December. Pygmy blue whales are at risk from vessel strikes when feeding near the surface or coming to the surface to breathe. The operational area overlaps the eastern (nearshore) edge of the migration BIA and therefore individuals may be encountered during operational activities in the operational area. However, Thums et al. (2022) suggest that the pygmy blue whale migration corridor may extend much further west from the shelf edge, into waters deeper than the migration BIA established by DCCEEW and deeper than those of the operational area. Consequently, pygmy blue whales are unlikely to occur in the operational area in significant numbers, with observed and modelled distributions of pygmy blue whales occurring further offshore in deeper water (Double et al., 2014; Thums et al., 2022). Their presence is not expected to be significant as there is no main aggregation area. The operational area does not have any constraints that would prevent pygmy blue whales from moving away from vessels.

Humpback whales are seasonally present in the NWS region during their annual migrations to and from breeding areas in northern Western Australia. The migration BIA for humpback whales overlaps the operational area. Aerial surveys and tagging studies of humpback whales indicate that most migrating humpbacks occur in shallower water than the operational area (ranging from approximately 95 m – 125 m), but considerable numbers of humpback whales have been observed in the region in water depths similar to the operational area (Double et al., 2012, 2010; RPS

Environment and Planning, 2010; Thums et al., 2018). However, their presence within the operational area is not expected to be significant as there is no main aggregation area. The operational area does not have any constraints that would prevent humpback whales from moving away from vessels.

Other species such as whale sharks may also pass through the operational area, although it is outside the whale shark foraging BIA. Presence of whale sharks is expected to be limited to individuals passing through the area.

The most severe impact from vessel collision or entanglement would be the death or serious injury of an individual. Collisions between vessels and cetaceans are more common in areas where high vessel traffic and cetacean habitats overlap (WDCS, 2006). There have been recorded instances of cetacean deaths in Australian waters due to vessel collisions (e.g., a Bryde's whale in Bass Strait in 1992) (WDCS, 2006), although these are primarily associated with container ships and fast ferries. The Whale and Dolphin Conservation Society also indicates that some cetacean species, such as humpback whales, can detect and change course to avoid a vessel (WDCS, 2006). The reaction of whales to the approach of a ship is quite variable. Some species remain motionless when in the vicinity of a ship while others are known to be curious and often approach ships that have stopped or are slow-moving, although they generally do not approach and sometimes avoid faster-moving ships (Richardson et al., 1995).

Vessel speed has been demonstrated to be a key factor in relation to collision with marine fauna, particularly cetaceans, with faster-moving vessels posing a greater collision risk than slower vessels (Laist et al., 2001; Jensen & Silber, 2003). Laist et al. (2001) suggest the most severe and lethal injuries to cetaceans are caused by vessels travelling at 14 knots or faster.

Marine turtles

Increased vessel traffic is recognized as a key threat to marine turtles in the Recovery Plan for marine turtles (Commonwealth of Australia, 2017). It is expected that only a small number of turtles may pass through the operational area given the water depth (340 m to 400 m) and distance to the nearest internesting BIA (approximately 7 km).

Vessel strike has been identified as an issue for marine turtles in Queensland waters (Commonwealth of Australia, 2017), primarily in areas with high urban population and pleasure craft activity. The lower human population density along the NWS coastline suggests that WA turtle populations are not as affected by vessel strikes.

Turtles will generally dive to avoid vessels, but their ability to respond depends on the speed of the vessel. Turtles are also sensitive to sound underwater (Popper et.al., 2014) and will typically move away from noise-generating sources like vessels within their detection range.

Birds

The operational area is distant from any important areas for birds, but there are potential habitats or migratory routes for protected marine bird species.

The number of helicopter flights needed for the activities is minimal, and they occur during daylight hours, reducing the potential for bird interactions. The risk of helicopter strikes is low because birds will typically avoid collision in response to helicopter noise, and helicopters will be flying at relatively low speeds during take-off or landing.

7.3.3 Environmental Performance Outcomes

The EPO relating to this event is

- No injury or mortality to *Environment Protection and Biodiversity Conservation Act 1999* and the WA *Biodiversity Conservation Act 2016* listed fauna during activities [NV-EPO-04]

The control measures for this event are shown in Table 7-4 and the EPSs and measurement criteria for this EPO are described in Section 8.4.

Table 7-4: Control measure evaluation for marine fauna interaction

CM Reference No	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
Standard Controls					
NV-CM-20	Procedures for interacting with marine fauna	Administrative	Reduces risk of physical and behavioural impacts to marine fauna from vessels and helicopters. If marine fauna is sighted, vessels can slow down or	Operational costs to adhere to marine fauna interaction restrictions, such as vessel and helicopter speed and direction, are based on legislated	**Adopted** – Benefits in reducing impacts to marine fauna outweigh the costs incurred by Santos. Control measure ensures compliance with Part 8 of the EPBC Regulations.

CM Reference No	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
			move away, and helicopters can increase distances from sighted fauna if required.	requirements and must be accepted.	
NV-CM-09	Constant bridge watch on vessels	Administrative	Monitoring of surrounding marine environment to identify potential collision risks (and reducing harm) to cetaceans and other marine fauna.	No additional cost for constant bridge watch as it is industry practice and regulated by AMSA.	**Adopted** – No additional cost, Industry practice.
NV-CM-11	DTM tow and offloading procedure	Administrative	The tow plan will identify a tow route that considers avoidance of environmentally sensitive sea areas (ESSA) and designated areas to be avoided (ATBA), reducing the potential for interaction with marine fauna.	Costs associated with developing and implementing the tow plan.	**Adopted** – Benefits in reducing impacts to marine fauna outweigh the costs incurred by Santos.
NV-CM-14	DTM pick up line removed, once the FPSO has departed the operational area.	Engineering	Removal of the DTM pickup line arrangement from the DTM once the FPSO has departed, reduces the risk of interference with other vessels (not withstanding they should not be within the 500m safety exclusion zone around the DTM) and also eliminates potential for entanglement with marine fauna.	Organisational costs associated with vessel to limit the length of attachment (rope or otherwise) from the DTM.	**Adopted** – Benefits considered to outweigh negligible costs to Santos.
NV-CM-45	NOPSEMA accepted NV Field Safety Case Addendum	Administrative	Shortening the trailing ropes, lines, chains, and risers to as short as practicable on the DTM prior to towing out of the operational area reduces the potential for fauna entanglement	Costs associated with developing and implementing the Safety Case Addendum. Additional costs associated with ROV tooling to shorten trailing lines, chains, and risers on the DTM.	**Adopted** – Benefits considered to outweigh minor costs.
NV-CM-23	Vessel bridge crew receive induction in marine fauna observations, marine fauna interaction procedure	Administrative	Reduces risk of physical and behavioural impacts to marine fauna from vessel, because if they are sighted, then the vessel can slow	Minor additional costs associated with induction/training material and time.	**Adopted –** Benefits in reducing noise impacts**.**

CM Reference No	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
	requirements procedure requirements		down or move away.		
Additional Controls					
N/A	Restrict the timing of activities to operate outside of sensitive periods only	Administrative	Reduce risk of collisions (causing harm) during environmentally sensitive periods for listed marine fauna.	High cost in moving or delaying schedule while the risk to all listed marine fauna cannot be reduced due to variability in timing of migration periods and unpredictable presence of some species.	**Rejected** – Grossly disproportionate to low incremental environmental benefit, given existing low level of risk. The operational area does not overlap the water depths (500m+) that pygmy blue whales are known to use during their migration. Potential for impacts to migrating whales from vessel strikes is limited to the operational area. Therefore, the activities are not inconsistent with the objectives of the Pygmy Blue Whale Management Plan.
N/A	Dedicated MMO on vessels (EPBC Policy Statement 2.1 Part B)	Administrative	Improved ability to spot and identify marine fauna at risk of collision (that may cause harm).	Additional cost of contracting MMO.	**Rejected** – Cost disproportionate to increase in environmental benefit when vessels in the operational area will be either stationary, or moving very slowly due to the nature of activities they perform. An MMP would limit operational safety in particular for when actual cut and lifting/towing operations are occurring and cannot stop for safety reasons. .
N/A	Activities will only occur during daylight hours	Administrative	Reduced potential for a vessel-fauna collision occurring as activities only undertaken during daylight hours when visibility highest.	Lengthens duration of the activity as operations only continue for around ten hours per day. Increased cost due to increased activity time (more than double the cost). Lengthened schedule results in increased impacts	**Rejected** – Substantial additional cost due to doubling of activity duration. No overall environmental benefit as results in increased impacts and risks.

CM Reference No	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
				and risks (e.g., planned emissions and discharges, interference with other marine users).	
N/A	Adopt further measures to those outlined in 'EPBC Regulations 2000 – Part 8 Division 8.1 during peak periods of ecological sensitivity, for example, additional management considerations for vessels outlined in the Australian National Guidelines for Whale and Dolphin Watching (DoEE, 2017)	Administrative	Potentially provide an additional level of protection of marine fauna.	Administrative costs to update existing procedure. Operational costs through interruption to activities through implementation of controls developed for an industry trying to get close to marine fauna, when Santos' activities aim to avoid fauna.	**Rejected** – The existing control 'procedure for interacting with marine fauna' has been written in accordance with the EPBC Act other relevant guidelines. A review of this procedure against the Australian National Guidelines for Whale and Dolphin watching (DoEE, 2017) found there are no additional relevant controls in the Australian National Guidelines for Whale and Dolphin Watching. Therefore, adopting this control is not ALARP.
N/A	Complete removal of the DTM pickup line arrangement when the FPSO departs the operational area.	Eliminate	Removes the potential for marine fauna entanglement with the DTM pickup line.	This control removes the ability to undertake cost-effective maintenance activities on the DTM once the FPSO has departed, as the presence of the rope allows a smaller less expensive vessel (non- DP) to perform ROV integrity inspections on the DTM. If the pick-up line is not present then any vessel-based maintenance activities which did occur would be required to be completed under Dynamic Positioning (DP). Additionally, the presence of the pickup line allows the attachment of a marker buoy to	**Rejected** Costs, safety risk and the removal of the ability to undertake hook-up maintenance activities on the DTM once the FPSO has departed, outweigh the environmental benefit.

CM Reference No	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
				inform other users of the DTM location.	

7.3.4 Environmental Impact Assessment

Description	
Receptors	Threatened or migratory fauna (marine mammals, marine turtles, sharks and rays, fish, and birds) Cultural receptors (totemic species)
Consequence	II-Minor
In the event of a collision or entanglement with marine fauna, there is the potential for injury or death to an individual. The number of receptors present in the operational area during the short duration of the activity is expected to be limited to a small number of transient individuals. Given the presence of pygmy blue whale migration BIAs and the humpback whale migration BIA, there may be more of these species in the vicinity, however, significant numbers are not expected. The risk of entanglement of marine fauna due to entanglement is considered minor considering the appropriate controls in place (e.g. DTM pick up line will be removed, and the floating buoy line to surface from DTM will be taught to hold buoy in place). Boat strike and vessel disturbance are identified as potential threats to a number of marine fauna species in relevant Recovery Plan and Conservation Advice. The above information demonstrates that with control measures in place the activity will be conducted in a manner that reduces potential impacts to ALARP and of acceptable level. There is the potential for death or injury of EPBC Act and listed individual species. However, as they would represent a small proportion of the local population it is not expected that it would result in a decreased population size over what would usually occur due to natural variation, at a local or regional scale, it is expected that the loss of an individual would be a minor consequence.	
Likelihood	C-Possible
Marine turtles, marine mammals and birds, receptors are expected to be present in the operational area at various times of the year. Given the presence of pygmy blue whale migration BIAs and the humpback whale migration BIA, there may be more of these species in the vicinity, however, significant numbers are not expected. Vessels will be stationary or moving very slowly while conducting activities inside the operational area, posing a low risk of collision with marine fauna. In addition, the noise generated from vessel operations will deter marine fauna from coming close to vessels. Whilst helicopter strike is a credible risk, it is considered negligible to minor given controls in place and the fact that the safe operation (i.e. landing or take-off) takes precedence. Once the FPSO has departed the operational area, the DTM pickup line will be removed eliminating the potential for marine fauna entanglement. With controls in place ensuring the vessels are compliant with EPBC Regulations, the likelihood of a collision or entanglement with marine fauna resulting in a low consequence is considered to be Possible (C).	
Residual Risk	The residual risk associated with this event is Low.

7.3.5 Demonstration of As Low As Reasonably Practicable

There are no alternatives to the use of vessels or helicopter support to undertake the activities and the use of vessels for marine based activities is well known with a high level of certainty on potential for impacts and risks. Further limiting or reducing the potential number of vessels could introduce a disproportionate operational safety risk. The inherent likelihood of encountering fauna in the operational area and along the tow route is limited by the short duration of the activities and the separation from areas of high surface fauna density. With relatively low vessel speeds and compliance with fauna interaction procedures, including Regulation 8 of the EPBC Regulations 2000, and floating assets tow plan which will include the avoidance of ESSAs such as aggregation areas and protected areas, fauna collision or entanglement is considered very unlikely.

In the event vessels come close to EPBC Act listed marine fauna, such as whales and whale sharks, EPS have been implemented for limiting vessel operations, as well as for ensuring that the crew are aware through inductions of the risk posed by conducting the activity, in order to reduce the likelihood of a marine fauna collision to ALARP. Inductions for the crew of support vessels will include information about how to interact with cetaceans and whale sharks in accordance with the EPBC Regulations, as well as bridge watch crew responsibilities and requirements regarding marine fauna observations and reporting.

Upon FPSO departure from the operational area, the DTM pick up line will be removed and a marker buoy attached eliminating entanglement risk which also aligns with the NOPSEMA Entanglement Alert (October 2024).

With the control measures adopted, the assessed residual risk for this impact is Low and cannot be reduced further. Additional control measures were considered but rejected since the associated cost or effort was grossly

disproportionate to any benefit, as detailed in **Section 7.3.3**. Therefore, it is considered the impact of the activities conducted is ALARP.

7.3.6 Acceptability Evaluation

Is the risk ranked between Very Low to Medium?	Yes – marine fauna interaction residual risk ranking is Low.
Is further information required in the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – activity evaluated in accordance with Santos' Environmental Hazard Identification and Assessment Procedure (EA-91-IG-00004_5), which considers principles of ESD. The residual risk for this aspect is Low and therefore does not affect the outcomes of the principles of ecologically sustainable development as per **Table 5-5.**
Are risks and impacts consistent with relevant legislation, international agreements and conventions, guidelines, and codes of practice (including species recovery plans, threat abatement plans, conservation advice and Australian Marine Park zoning objectives)?	Yes – management consistent with Part 8 of the EPBC Regulations. Controls implemented will minimise the potential impacts to species identified in recovery plans and conservation advice. Consistent with relevant species recovery plans, conservation management plans and management actions set out in **Table 3-9**.
Are risks and impacts consistent with Santos' Environment, Health, and Safety Policy?	Yes – aligns with Santos' Environment, Health, and Safety Policy.
Are risks and impacts consistent with stakeholder expectations?	Yes – No concerns raised by stakeholders for this event.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – see ALARP above.

Movement of vessels is unavoidable to undertake the activities. The possibility of vessel or helicopter strike and entanglement is a well understood risk for maritime operations, including for commercial shipping and fishing.

Vessel movements will comply with all relevant maritime standards and regulations, including EPBC regulations to minimise risks to marine fauna. Application of the proposed management controls and adherence to Commonwealth and maritime regulations reduces the likelihood of vessel interactions with marine fauna. While the potential exists for a collision or entanglement to occur, it is considered unlikely, there have been no recorded or reported marine fauna interactions with vessels associated with Ningaloo Vision operations activities since the beginning of operations in 2010. As part of Santos' reporting requirements for the activity, in the unlikely event an impact did occur in the operational area, it will be reported in the National Ship Strike Database (refer to Table 8-4).

With application of the proposed control measures, the potential impacts, and risks to threatened fauna will be managed consistent with relevant recovery plans and approved conservation advice. No stakeholder concerns have been raised regarding this event. Therefore, the impact is considered to be ALARP and environmentally acceptable.

7.4 Non-hydrocarbon and Chemical Releases

7.4.1 Description of Event

Event	Non-hydrocarbon liquids including miscellaneous chemicals and waste streams (brine, cleaning, and cooling agents, stored or spent chemicals and leftover paint materials) are used or stored on-board the vessels during the activities. The presence of non-hydrocarbons liquids and chemicals represents a potential spill risk during chemical storage and handling e.g., due to tank /hose damage, or human error. Rupture of the pumping hose and equipment used to transfer these chemicals may occur due to dropped object, vessel motion or hose failure. An accidental release of chemicals and other non-hydrocarbon liquids into the marine environment has the potential to occur from: • vessel operations • transferring, storing, or using chemicals • mechanical failure of equipment • handling and storage spills and leaks • hose or hose connection failure or leak • lifting – dropped objects damaging liquid vessels (containers). • accidental loss of umbilical contents (small volumes of scale inhibitor, hydraulic fluid and methanol, max discharge approx. 633 L of scale inhibitor) • accidental loss of treated seawater during the additional flushing of production flowlines A and B between DC2 and DC4. The worst-case credible scenario is the loss of containment from the high pressure downline from the vessel to production flowline A could result in a release of up to 10 m^3 of treated seawater containing preservation chemicals such as biocide and oxygen scavenger. These chemicals will be subject to the Santos Operations Chemical Selection, Evaluation and Approval Procedure (EA-91-II-10001). Accidental loss of non-hydrocarbon liquids or chemicals to the marine environment may result in impacts to water quality and hence sensitive environmental receptors.
Extent	The maximum volume of non-hydrocarbon liquids or chemicals that could be released during routine vessel operations is likely to be small and realistically limited to the volume of individual containers (e.g., drums) stored on deck of vessels. Accidental loss of umbilical contents (small volumes of scale inhibitor, hydraulic fluid, and methanol) could result in the loss of up to approx. 633 L of scale inhibitor. The worst-case credible scenario, however, would be the accidental loss of contents of the flushing downline form the vessel to production flowline A resulting in the release of up to 10 m^3 of treated seawater containing preservation chemicals such as biocide and oxygen scavenger. Dilution from discharges in open waters is rapid, with 1 in 1000 dilution usually occurring within 30 minutes (Costello and Read, 1994). Therefore, the relative low volumes are expected to rapidly disperse into the marine environment. Below toxic/harmful threshold concentrations are expected to occur at short distances from the chemical / hydrocarbon spill / release point. Impacts beyond the operational area are not expected to occur.
Duration	The duration of the impact is limited to the time the released chemical/liquid takes to disperse to below toxic/harmful threshold concentrations. In the ocean, this is expected to be in the order of hours.

7.4.2 Nature and Scale of Environmental Impacts

Potential receptors: Physical environment (water quality and benthic habitats), Threatened migratory or local fauna (cetaceans, turtles, sharks, fish (pelagic), rays, seabirds and shorebirds, benthic fauna, plankton), socio-economic receptors (commercial and recreational fishing, shipping, indigenous heritage), cultural receptors.

Physical environment

The release of non-hydrocarbon liquids or chemicals into the marine environment may contaminate the water in the area where the release occurs. However, these impacts are expected to be limited to the immediate surrounding area and will disperse quickly to concentrations below the level of concern in the open ocean.

Due to the small volumes and expected rapid dispersal to concentrations below impact thresholds, impacts to water quality are not expected to cause flow-on effects to sediment quality or benthic habitats, including reefs, and offshore islands. There is no emergent or intertidal habitat that could be impacted by a surface or subsea spill. Owing to the water depth and location offshore, any spilled material is unlikely to reach land or affect any of benthic habitats.

Threatened or migratory species

Changes in water quality could potentially have short-term effects on marine animals such as pelagic fish, sharks, marine mammals, marine reptiles, and seabirds. The operational area overlaps with BIAs for pygmy blue whale (distribution) and humpback whales (migration).

Recovery plans and conservation advice for numerous bird species identify marine pollution and contamination impacts as a threat to the species. In addition, the Recovery Plan for Marine Turtles in Australia 2017 to 2027 (Commonwealth of Australia, 2017) identifies deteriorating water quality as a threat to all species of marine turtles in Australia. These species have been identified as potentially transiting through the operational area from time to time. However, the small volumes and nature of the chemicals on board, along with the open-ocean environment, make widespread ecological effects on these threatened or migratory species unlikely. The physical coating of marine fauna, especially those at the sea surface like seabirds, by hazardous liquids and the toxic effects of chemicals are also unlikely due to the low concentrations and short exposure times.

Socio-economic receptors

The localised and temporary impacts of an unplanned spill of hazardous liquids make it unlikely to have a significant impact on commercial fishing, tourism, and recreational activities. Additionally, there are no cultural receptors within the operational area.

7.4.3 Environmental Performance Outcomes and Control Measures

The EPO relating to this event is:

- No unplanned objects, emissions or discharges to sea or air [NVCoPFAR-EPO-05]

The control measures for this event are shown in Table 7-5 and the EPSs and the measurement criteria for this EPO are described in Section 8.4.

Table 7-5: Control measure evaluation for hazardous liquid release

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
Standard Controls					
NV-CM-38	Dropped object prevention procedure	Administrative	Minimises dropped object risk during vessel lifting operations that may cause secondary spill resulting in reduction in water quality. Ensures lifting equipment certified and inspected.	Cost to maintain lifting equipment and implement procedure.	**Adopted** – Benefits of ensuring procedures are followed and measures implemented outweighs costs.
NV-CM-46	Hazardous chemical management procedures	Administrative	Reduces the risk of spills and leaks (discharges) to the sea by controlling the storage, handling, and clean-up of hazardous chemicals.	Cost associated with permanent or temporary storage areas.	**Adopted** – Benefits of ensuring procedures are followed and measures implemented outweigh the costs of personnel time.
NV-CM-29	Deck cleaning and product selection	Administrative	Improves water quality discharge (reduced toxicity) to the marine environment. Those deck cleaning products planned to be released to sea meet the criteria for not being harmful to the marine environment according to MARPOL Annex V.	Personnel costs of implementing, potential additional cost, and delays of chemical substitution.	**Adopted –** Benefits of ensuring vessels are compliant and those deck cleaning products planned to be released to sea meet MARPOL criteria.

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
NV-CM-31	Chemical selection procedure	Administrative	Improves water quality discharge (reduced toxicity) to the marine environment in the event of an unplanned release.	Cost associated with implementation of procedure. Range of chemicals reduced but potentially higher costs. Potential additional cost and delays of chemical substitution.	**Adopted** – Benefits of ensuring procedures are followed and measures implemented outweigh the costs of personnel time.
NV-CM-30	General chemical management procedures	Administrative	Potential impacts to the environment are reduced through following correct procedures for the safe handling and storage of chemicals.	Personnel costs associated with ensuring procedures are in place and implemented.	**Adopted –** Benefits of ensuring procedures are followed and measures implemented outweigh the costs of personnel time.
NV-CM-47	Vessel spill response plans (OPEP/SMPEP)	Administrative	Effective management of an accidental spill (discharge to sea) to reduce impact to the environment.	Personnel cost associated with ongoing management (spill response exercises) and implementation of plans.	**Adopted** – Benefits of ensuring response plans in place, are followed and measures implemented and that the vessels are compliant outweighs costs.
NV-CM-21	Vessel Planned Maintenance System to maintain vessel DP, engines, and machinery	Engineering	Reduces potential for unplanned releases of chemicals from the vessels because equipment is operating within its parameters.	Costs are standard for routine PMS.	**Adopted** – Benefits outweigh the cost.
NV-CM-22	Marine assurance	Administrative	Reduces probability of unplanned release of chemicals as a result of failure of vessel equipment because equipment operating within its parameters.	Costs are expected as part of standard procedure.	**Adopted –** Benefits outweigh the costs.
NV-CM-48	Contractor flushing procedure	Administrative	Limits the concentration of preservation chemicals in the treated seawater for flushing activities.	Cost of implementing procedure	**Adopted –** Benefits outweigh the costs.
Additional Controls					
N/A	Scupper plugs continuously in place to prevent deck drainage	Protective	Would eliminate potential impacts of contaminants being discharged to sea in rainwater.	Increased health and safety risks from wet deck not draining. Large amounts of water on a vessel's deck can also cause stability issues (free-surface effect).	**Rejected-** Safety considerations outweigh the benefit, given small volumes of contaminants.

7.4.4 Environmental Impact Assessment

Description	
Receptors	• Physical environment (water quality and benthic habitats) • Threatened migratory or local fauna (cetaceans, turtles, sharks, fish (pelagic), rays, seabirds and shorebirds, benthic fauna, plankton) • Socio-economic receptors (commercial and recreational fishing, shipping, indigenous heritage) • State and Commonwealth marine reserves and Australian Marine Parks.
Consequence	I-Negligible
In the event of a non-hydrocarbon liquid or chemical spill, the quantities of a worst-case liquid release are unlikely to be greater than 10 m³ (leak from a downline during additional flushing activities of the production flowlines as outlined in Section 2.11). The small volumes, dilution, and dispersion from natural weathering processes such as ocean currents indicate the extent of exposure will be limited in area and duration. The susceptibility of marine fauna to non-hydrocarbon liquids and chemicals depends on the type and exposure duration; however, given exposures would be limited in extent and duration, exposure to marine fauna from this hazard is not expected to result in a fauna fatality. Impacts from discharges to the marine environment to water quality would be short-term and localised, due to the nature and behaviour of the chemicals identified as being at risk of spilling, only pelagic fauna present in the immediate vicinity of the spill would likely be at risk of impact. Habitat degradation, deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species (that may be present in the operational area) in relevant recovery plans and conservation advice and to matters of national environmental significance (MNES) (DoE, 2013). However, the potential non-hydrocarbon releases of liquids or chemicals are not expected to significantly impact the receiving environment with control measures proposed to prevent releases. EP stakeholder consultation did not raise any concerns regarding potential impacts to cultural features including sea country. Given a non-hydrocarbon or chemical spill would not result in a decreased population size at a local or regional scale, it is expected a spill of this nature would result in a Negligible (I) consequence.	
Likelihood	C-Possible
A small non-hydrocarbon liquid release is unlikely to have widespread ecological effects, given the nature of the chemicals on board, the small volume that could be released, the depth and transient nature of marine fauna in this area, and the prevention and management procedures in place to clean up a spill. Santos reviewed non-hydrocarbon liquid spills and leaks from equipment and machinery in recent history (due to split hoses, small leaks, or handling errors). Most of the spills and leaks reported that occurred within bunded areas, were less than 100 L, did not reach the marine environment and were cleaned up immediately. The likelihood of release of non-hydrocarbon and chemical release is possible, however, given the set of mitigation and management controls in place, the consequence is negligible.	
Residual Risk	The residual risk associated with this event is Very Low.

7.4.5 Demonstration of As Low As Reasonably Practicable

Non-hydrocarbon liquids and chemicals will be required to undertake the activities, so their removal is not viable. Procedures are in place for the transfer of bulk liquids, reducing the risk of unplanned releases to sea due to equipment failure, operational error, or overflows and leaks.

Control measures in place will ensure correct lifting, storage and handling procedures are followed as well as ensuring the maintenance of equipment is undertaken according to preventative management systems. No beneficial additional control measures were identified to further reduce the risk of this hazard.

In addition, administrative controls, such as all vessels being required to have a Garbage Management Plan that describes the on-board controls for preventing unplanned discharges, will minimise the risk of the hazardous liquid being accidentally discharged through mishandling or poor storage.

Other management controls that have been implemented include vessel maintenance systems, chemical management procedures, spill clean-up equipment and Shipboard Marine Pollution Emergency Plan (SMPEP)/OPEPs not only to minimise the risk of an accidental release, but also to reduce the impact in the event a release does occur.

Containment of small spills from bunding, inherent in the design of vessels and from spill containment kits onboard these vessels (detailed in the SMPEP) provides a barrier to any spills reaching the marine environment. The inspection and maintenance of bunding and drainage systems and of spill response kits provides assurance that these are available to contain spills in the event of a small leak. It is considered that barriers in place to contain spills would prevent spills from reaching the marine environment and thus it is considered that there are no further controls that would offer a further benefit to the environment.

A thorough set of controls has been proposed to ensure the risks of minor hazardous liquid spills and leaks occurring and subsequent impacts are minimised. The resulting impacts to marine fauna that could potentially result from a spill of this size would be negligible, with impacts restricted to a small number of individuals within a localised area.

The controls proposed are in line with applicable actions described in relevant recovery plans and conservation advice to reduce the risk of habitat degradation and deteriorating water quality (for example, from pollution) to a level considered to be ALARP by Santos. The assessed residual risk for this impact is very low and cannot be reduced further. And is therefore, considered ALARP.

7.4.6 Acceptability Evaluation

Is the risk ranked between Very Low to Medium?	Yes – maximum hazardous liquid release residual risk is ranked Very Low.
Is further information required in the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – activity evaluated in accordance with Santos' Environmental Hazard Identification and Assessment Procedure (EA-91-IG-00004_5), which considers principles of ESD. The residual risk for this aspect is Very Low and therefore does not affect the outcomes of the principles of ecologically sustainable development as per **Table 5-5**.
Are risks and impacts consistent with relevant legislation, international agreements and conventions, guidelines, and codes of practice (including species recovery plans, threat abatement plans, conservation advice and Australian Marine Park zoning objectives)?	Yes – management consistent with Marine Order 94 (Marine pollution prevention – packaged harmful substances) and with relevant recovery plans and conservation advice for species that may occur in the operational area. Consistent with relevant species recovery plans, conservation management plans and management actions set out in **Table 3-9**.
Are risks and impacts consistent with Santos' Environment, Health, and Safety Policy?	Yes – aligns with Santos' Environment, Health, and Safety Policy.
Are risks and impacts consistent with stakeholder expectations?	Yes – No concerns raised by stakeholders for this event.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – see ALARP above.

With the controls in place to prevent an accidental release of small volumes of non-hydrocarbon liquids and chemicals and the negligible impacts predicted from an unplanned release of such material, the risk to the marine environment is considered very low. Potential risks are unlikely to be greater than those caused by other commercial marine vessels or offshore petroleum activities in deep water. The materials will be managed in accordance with relevant legislation and standards and Santos' procedures. The small volumes negate the need for any further contingencies to be in place that are included for some of the larger spill scenarios associated with the activity.

With the controls in place to prevent accidental spills and the low impacts predicted from a spill of this size, the environmental risk of using and handling the required chemicals is considered ALARP and environmentally acceptable.

7.5 Overview of Unplanned Release of Hydrocarbons

There is the potential for loss of well control (subsea) resulting in a loss of crude oil, in addition to loss of containment of marine diesel due to a vessel collision event or refuelling activities within the operational area. Crude oil and diesel spill trajectory modelling were used to predict the potential extent of a worst-case spill event for both the MDO spills and LOWC scenarios within the operational area (RPS, 2023).

7.5.1 Spill Scenario Selection

7.5.1.1 Loss of Well Control

Santos has identified a LOWC as the worst-case type of credible crude oil release scenario that could potentially occur during the cessation of production phase. Since the submission of Rev 0, Santos has undertaken further engineering review of the worst case credible LOWC for the Cessation of Operations phase of the EP. The worst-case discharge scenario quantifies worst-case liquid hydrocarbon discharge and applies to all wells drilled and completed in the Van Gogh, Coniston and Novara reservoirs. Specifically, the estimates apply to:

- Oil producers.
- Dual purpose wells (gas injectors / oil producers).
- Gas injection well VGA-4H (G1).

The worst-case discharge scenarios described here are applicable during the cessation of production period once the FPSO has permanently sailed away, up until the plug and abandonment of the wells.

It is possible that a discharge to the environment could occur from a well barrier failure as a result of either an *external impact* (e.g. anchor / anchor chain impact on the subsea XT) or as a result of *internal failure* modes (corrosion, erosion, fatigue, cement bond degradation). The revised discharge volumes as a result of external impact or internal failure are provided in Table 7-6:

Table 7-6 Credible well release scenarios

Scenario	Release Rates	Applies to
External impact - Anchor / Chain drag over wellhead and subsea tree. (Oil wells) **This is the worst-case scenario for oil (Section 7.7)**	Oil: 3.6 stb/d (0.57 m^3/day)	All oil producers
External Impact - Anchor / Chain drag over wellhead and subsea tree. (Gas wells)	Oil: 0 stb/d Gas: 0.0216 MM scf/d	Applies to all wells that were operated in gas injection or gas production mode (G1 and all oil producers operated as gas injectors)
Internal impact – corrosion / failure of primary and secondary barriers, flow behind casing.	Oil: 1.54 stb/d (0.245 m^3/day)	All oil producers
Internal impact – corrosion / failure of primary and secondary barriers, flow behind casing. **This is the worst case for dry gas (Section 7.9)**	Oil: 0 stb/d Gas: 1.1 MM scf/d (dry gas release)	Applies to all wells that were operated in gas injection or gas production mode (G1 and all oil producers operated as gas injectors)

The revised worst case credible LOWC is caused by an *external impact* on an oil producer resulting in a subsea release of 43.89 m^3 over 77 days. However, Santos has retained the previous NV CoPFAR EP (Rev 0) release volume of 1,225 m^3 crude oil released at the seabed over 100 days which was modelled **(Section 7.5.2**.), and used to inform the EMBA (**Section 3.1**), and the risk and impacts assessment **Section 7.7**. This means that the risk and impact assessment is highly conservative for what is the worst-case credible spill volume.

The revised worst-case credible subsea LOWC is from *external impact*, and summarised as follows:

- That during extreme cyclonic conditions it is possible that a mobile offshore drilling unit (MODU) working for an operator of an adjacent field breaks loose from its mooring and drifts over the location of the Van Gogh, Coniston and Novara subsea wells
- As a result, the well conductor could suffer a catastrophic failure resulting in loss of subsea tree and wellhead from the well, and subsequent failure of internal strings, including the completion tubing above surface controlled subsurface safety valve (SCSSV).
- The loss of subsea wellhead and tree from a well would remove primary and secondary barriers to loss of containment, however uncontrolled release of well fluids through a full-bore blowout is not considered credible as discharge up the production tubing will be limited by surface controlled subsurface safety valve (SCSSV) which have been installed in upper completion of every well in the field.

There is also a smaller liquid hydrocarbon leak scenario. In this scenario, the small leak (Internal impact – corrosion / failure of primary and secondary barriers, flow behind casing) could occur undetected for up to 167 days (maximum time between proposed satellite imagery being taken of the title (**Section 7.7.4)** plus 77 days to fix the leak). For an estimate of leak duration, this type of leak would be detected by 1/4ly satellite imagery (e.g. approximately every 90 days) and given that remediation/intervention is assessed to take approximately 77 days, then this leak could occur for approximately 167 days. Total discharge volume is estimated as being 40.91m^3 over 167 days.

7.5.1.2 Vessel Collision

It is considered credible that a release of MDO to the marine environment could occur from a collision between the FPSO and an errant third-party vessel. Such events could have sufficient impact to result in the rupture of a diesel bunker tank on the FPSO leading to a loss of integrity. This scenario is considered credible, given that fuel tank ruptures resulting in a hydrocarbon release have occurred before within the maritime industry.

The AMSA (2015) Technical Guidelines for Preparing Contingency Plans for Marine and Coastal Facilities recommend that the spill scenario for modelling and impact assessment should be based on the largest single fuel tank volume. A review of the FPSO layout determined that the largest MDO bunker tank has a capacity of 1,519 m^3 and this has been used as the worst case volume for this EP.

An additional credible scenario that could result in the release of MDO to the marine was also identified. This scenario involves a collision between a vessel in the operational area and an errant third party vessel resulting in the rupture of a diesel tank leading to a loss of integrity. Although the specific vessel to undertake these activities is yet to be confirmed, a review of available vessels indicates that the largest single fuel tank is likely to be approximately 325 m^3. Consequently, the FPSO collision scenario resulting in a release of 1,519 m^3 described above is considered the worst case MDO scenario for this EP.

Refuelling

A minor spill (around 37.5 m^3) of MDO could occur during vessel refuelling resulting in a discharge of hydrocarbons to the marine environment at the sea surface. Spills during refuelling can occur through several pathways, including fuel hose breaks, coupling failure or tank overfilling.

Spills resulting from overfilling will be contained within the vessel drains and slops tank system. In the event the refuelling hose is ruptured, the fuel bunkering activity will cease by turning off the pump, the fuel remaining in the transfer line will escape to the environment as well as fuel released prior to the transfer operation being stopped. The AMSA (2015) Technical Guidelines for Preparing Contingency Plans for Marine and Coastal Facilities provides guidance for calculating a maximum credible spill volume for a refuelling spill. The guidance provided by AMSA (2015) for a refuelling spill under continuous supervision is considered appropriate, given refuelling will be constantly supervised. The maximum credible spill volume during refuelling is calculated as: transfer rate (150 m^3/hr) × 15 minutes of flow. The detection time of 15 minutes is seen as conservative but applicable following failure of multiple barriers, followed by manual detection and isolation of the fuel supply.

7.5.2 Spill Modelling Overview

To determine the spatial extent of impacts from potential hydrocarbon spills, modelling was completed for the original LOWC scenarios (RPS, 2023) and vessel collision scenario involving the FPSO (GHD, 2020). As outlined in **Section 7.5.1**, the revised LOWC has not been remodelled.

7.5.2.1 LOWC (RPS, 2023)

In the study, oil spill modelling was undertaken using a three-dimensional oil spill trajectory and weathering model, SIMAP (Spill Impact Mapping and Analysis Program), which is designed to simulate the transport, spreading and

weathering of specific oil types under the influence of changing meteorological and oceanographic forces. For the subsea release near-field subsurface discharge, modelling was undertaken using OILMAP, which predicts the centreline velocity, buoyancy, width, and trapping depth (if any) of the rising gas and oil plumes. One hundred spill simulations per season (3) totalling 300 simulations made up the full stochastic simulation foe the subsea LOWC scenario.

For each set of stochastic realisations, SIMAP spatially tracked the surface oil, entrained oil in the water column, dissolved oil, and oil on shorelines.

The outputs of this modelling showed a number of different possible outcomes of a spill, which were then analysed to determine the concentrations of hydrocarbon at each grid cell of the model, providing information about the probability of contact and concentration at contact of hydrocarbons across the EMBA.

7.5.2.2 FPSO Vessel Collision (GHD, 2020)

Oil spill modelling was carried out with SINTEF's Oil Spill Contingency and Response (OSCAR) system (version 10.0.1). OSCAR is a system of integrated models to quantitatively assess the fate and transport of hydrocarbons in the marine environment, as well as evaluate the efficacy of response measures. OSCAR provides an integrated hydrocarbon transport and weathering model that accounts for hydrocarbon advection, dispersion, surface spreading, entrainment, dissolution, biodegradation, emulsification, volatilisation and shoreline interaction.

Three-dimensional (3D) OSCAR modelling was undertaken in stochastic mode (total of 150 realisations per scenario) with start dates spaced approximately fortnightly over a five year period. Inputs into the model were sourced from HYCOM (regional ocean currents, temperature and salinity profiles), TPXO7.2 (tidal currents) and NCEP/NCAR (regional winds).

A summary of the modelled maximum credible spill scenarios is provided in **Table 7-7**.

Table 7-7: Summary of maximum credible spill scenarios

Worst-case credible spill scenario	Approx. depth of spill	Hydrocarbon type	Maximum credible volume released (m^3)	Release duration	Time of year
Surface diesel release	Surface	MDO	1,519 m^3	1 hour	All
LOWC-subsea release	362	Van Gogh Crude	43.89*	77 days	All

* This volume is the worse-case credible LOWC but as explained in **Section 7.5.1**, an overly conservative volume of 1,225m^3 was modelled over a 100 day period.

7.5.3 Hydrocarbon Characteristics

The physical properties and boiling point distributions of the MDO for input in Scenario 1 and Van Gogh crude properties for scenario 2 is as presented in **Table 7-8.**

Table 7-8: Properties of MDO and Van Gogh crude

Parameter	MDO	Van Gogh Crude
API Gravity	36.4	15.7
Density at 15°C	843.0	961.0
Wax content (%)	0.05	<5
Pour point (°C)	-36	-15
Dynamic viscosity	3.9 (at 20°C)	662.9 (at 20°C)

7.5.3.1 Marine Diesel Oil

Marine Diesel (IKU) was selected from SINTEF's oil library to represent Marine Diesel Oil (MDO). The results of the weathering analyses are presented in **Figure 7-1** . MDO is a moderately heavy, moderately persistent oil in the marine environment. Under low winds (1 m/s), 60% of the surface slick is predicted to remain after 120 hours (5 days). Under moderate winds (5 m/s), 40% of the initial surface slick is predicted to remain after 24 hours, decreasing further to ~10% after 48 hours and ~1% after 72 hours. With high winds (10 m/s), the surface slick is predicted to be almost entirely evaporated and dispersed after 12 hours. Marine Diesel (IKU) has a very low tendency for emulsion formation, with only ~1% water content entrained into the surface slick after 120 hours for all wind conditions assessed.

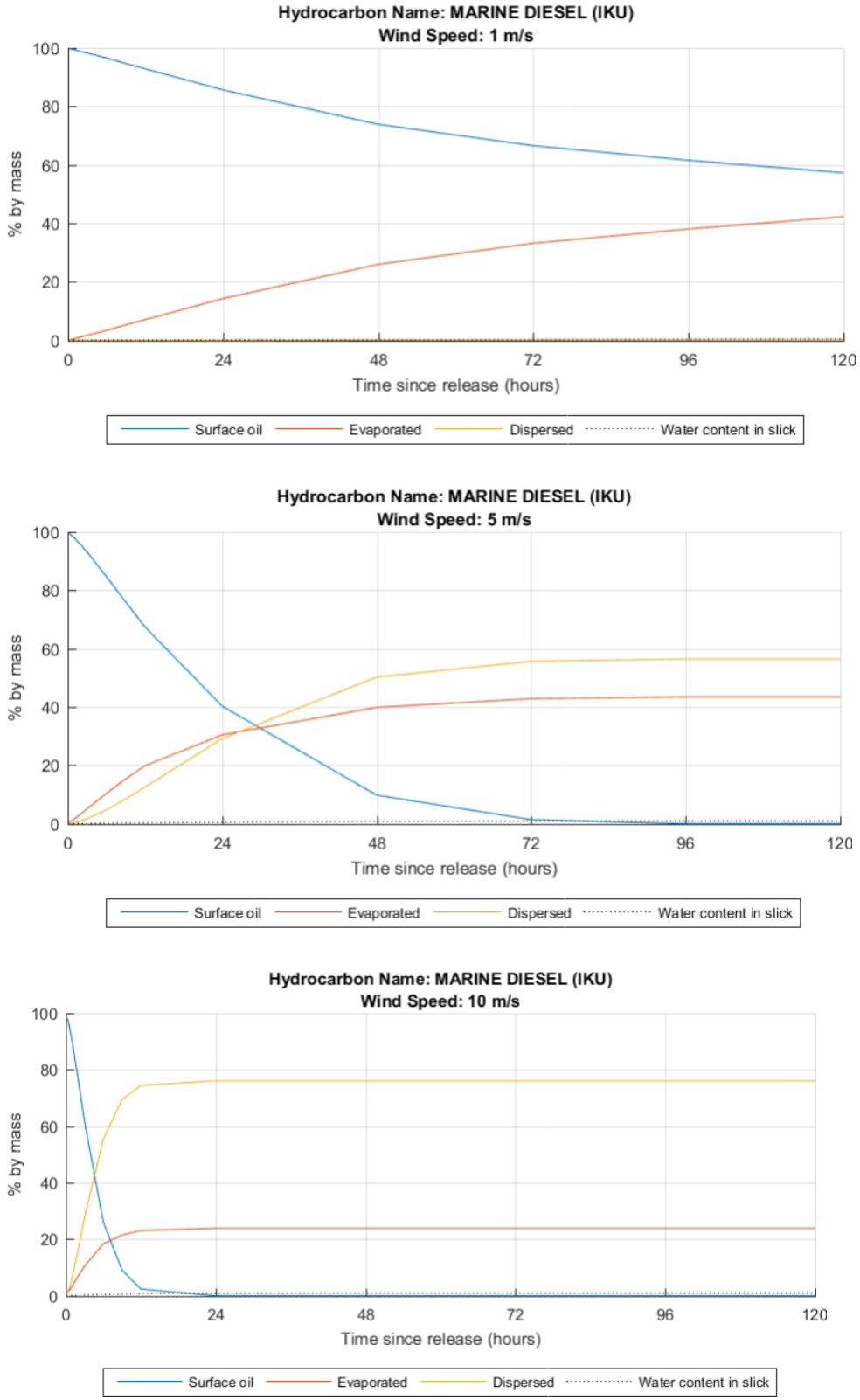

Figure 7-1: Simulated weathering of the SINTEF Marine Diesel (IKU) hydrocarbon for constant wind speeds of 1 m/s (top), 5 m/s (middle) and 10 m/s (bottom)

7.5.3.2 Van Gogh Crude

The mass balance expected for Van Gogh Crude under the two weathering tests are shown in **Figure 7-2** and **Figure 7-3.** The two weathering curves show only subtle differences despite the different wind conditions. The oil is forecast to be highly persistent with the majority of the volume remaining as surface oil irrespective of the environmental

conditions. The mass on the surface is predicted to drop to approximately 74% after 7 days, and the decrease evenly balanced between evaporation and decay.

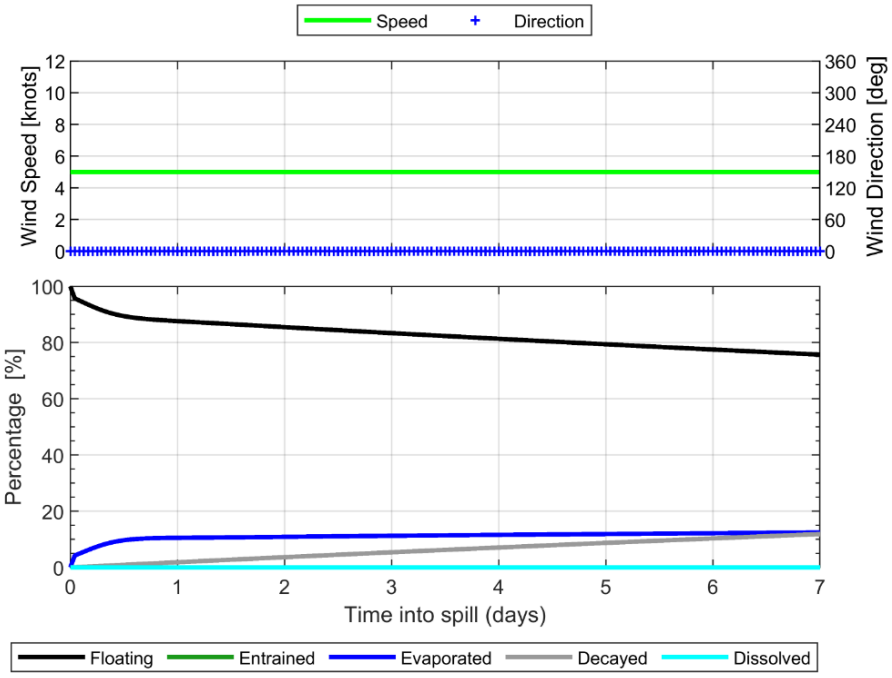

Figure 7-2: Mass balance plot for an instantaneous 50 m3 surface release of Van Gogh crude subjected to a constant 5 knot wind, currents, and 27°C water temperature.

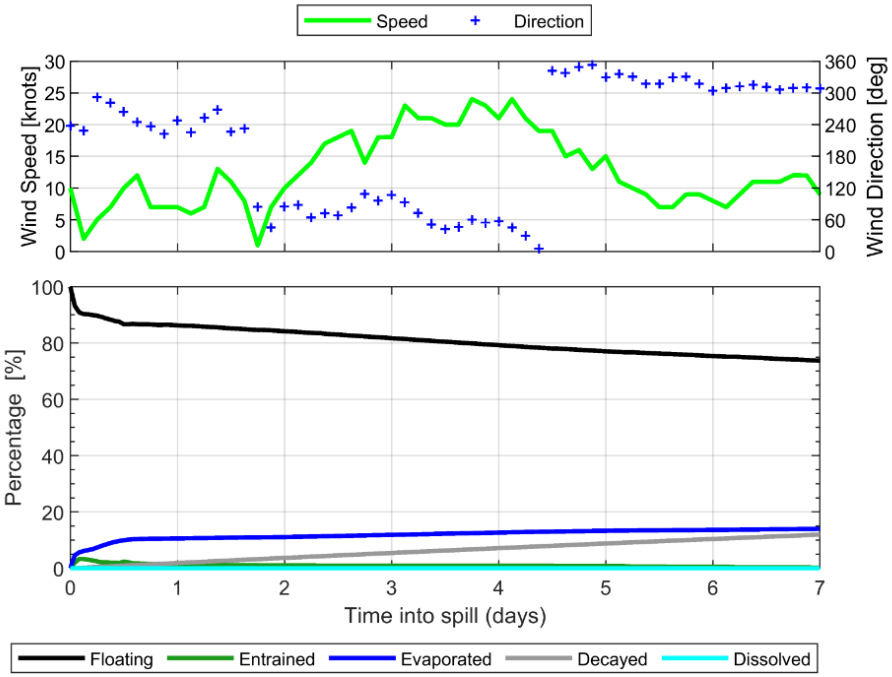

Figure 7-3: Mass balance plot for an instantaneous 50 m3 surface release of Van Gogh crude subjected to variable wind speeds (1 to 24 knots), currents and 27°C water temperature.

7.5.4 Hydrocarbon Exposure Values

To inform the impact assessment it is important to understand the profile of the concentrations of hydrocarbons after a spill. To do this NOPSEMA recommends identifying hydrocarbon exposure values that broadly reflect the range of consequences that could occur at certain concentrations (NOPSEMA, 2019a). The exposure values that have been applied to this EP are described below.

The EMBA shown in **Figure 3-1** was developed using low exposure values. These low exposure values are not considered to be representative of a biological impact, but they are adequate for identifying the full range of

environmental receptors that might be contacted by surface and/or subsurface hydrocarbons (NOPSEMA, 2019a) and a visible sheen.

To inform impact assessment, exposure values that may be representative of biological impact have also been identified. These are called 'moderate exposure values' (defined by the MEVA) and 'high exposure values' (defined by the high exposure value area) and are shown in **Figure 7-5**. Moderate and high exposure values are modelled for each fate of hydrocarbon to identify what contact is predicted for surface (floating oil), subsurface (entrained oil and dissolved aromatic hydrocarbons), and shoreline accumulation of hydrocarbon at sensitivities.

Determining exposure values that may be representative of biological impact is complex since the degree of impact will depend on the sensitivity of the receptors contacted, the duration of the exposure and the toxicity of the hydrocarbon type making the contact. The toxicity of a hydrocarbon will also change over time, due to weathering processes altering the composition of the hydrocarbon. To identify appropriate exposure values Santos has considered the advice provided by NOPSEMA Bulletin #1 Oil Spill Modelling (NOPSEMA, April 2019) and scientific literature. The selected hydrocarbon exposure values are discussed in **Table 7-9** to **Table 7-12**. These tables explain how the exposure value is relevant to the risk evaluation and provides context on how that exposure value is used to inform response planning (which is addressed further in the OPEP).

Table 7-9 : Floating hydrocarbons exposure values

Surface oil concentration (g/m^2)	Exposure value	Description
1	Low	**Risk Evaluation** It is recognised that a lower floating oil concentration of 1 g/m^2 (equivalent to a thickness of 0.001 mm or 1 ml of oil per m^2) is visible as a rainbow sheen on the sea surface. Although this is lower than the exposure value for ecological impacts, it may be relevant to socio-economic receptors and has been used as the exposure value to define the spatial extent of the environment that might be contacted (EMBA) from floating oil. **Response Planning** Contact at 1 g/m^2 (as predicted by oil spill trajectory modelling) is used as a conservative trigger for activating scientific monitoring plans as detailed in the OPEP.
10	Moderate	**Risk Evaluation** There is a paucity of data on floating oil concentrations with respect to impacts to marine organisms. Hydrocarbon concentrations for registering biological impacts resulting from contact of surface slicks have been estimated by different researchers at about 10 to 25 g/m^2 (French et al., 1999; Koops et al., 2004). The impact of floating oil on birds is better understood than on other receptors. A conservative exposure value of 10 g/m^2 has been applied to impacts from surface hydrocarbons (floating oil) in this EP. Although based on birds, this hydrocarbon exposure value is also considered appropriate for turtles, sea snakes and marine mammals (NRDAMCME, 1996). This value has been used to define the MEVA. **Response Planning** Contact at 10 g/m^2 is not specifically used for spill response planning.
50	High	**Risk Evaluation** At greater thicknesses the potential for impact of surface oil to wildlife increases. All other things being equal, contact to wildlife by surface oil at 50 g/m^2 is expected to result in a greater impact. **Response Planning** Containment and recovery effectiveness drops significantly with reduced oil thickness (McKinney et al., 2017; NOAA, 2014). McKinney et al. (2017) tested the effectiveness of various oil skimmers at various oil thicknesses. Their results showed that the oil recovery rate of skimmers dropped significantly when oil thickness was less than 50 g/m^2 (less than Bonn Agreement Code 4). Hence, 50 g/m^2 has been set as a guide for planning effective containment and recovery operations. Similarly, surface oil greater than 50 g/m^2 (Bonn Agreement Code 4/5 and equivalent to oil observed as discontinuous or continuous true colour) is considered to be a lower limit for effective dispersant operations and is therefore considered for planning.

Table 7-10:Shoreline hydrocarbons accumulation exposure values

Shoreline oil concentration (g/m^2)	Exposure value	Description
10	Low	**Risk evaluation** An accumulated concentration of oil above 10 g/m^2 on shorelines is considered to represent a level of socio-economic effect (NOPSEMA, 2019). For example, reduction in visual amenity of shorelines. This value has been used in previous studies to represent a low contact value for interpreting shoreline accumulation modelling results (French-McCay, 2005a, 2005b). **Response planning** Not specifically used for response planning because below the limit that can be effectively cleaned.
100	Moderate	**Risk evaluation** The impact exposure value for exposure to hydrocarbons stranded on shorelines is derived from levels likely to cause adverse impacts to marine or coastal fauna and habitats. These habitats and marine fauna known to use shorelines are most at risk of exposure to shoreline accumulations of oil, due to smothering of intertidal habitats (such as mangroves and emergent coral reefs) and coating of marine fauna. Environmental risk assessment studies (French-McCay, 2009) report that an oil thickness of 0.1 mm (100 g/m^2) on shorelines is assumed as the lethal exposure value for invertebrates on hard substrates (rocky, artificial or man-made) and sediments (mud, silt, sand or gravel) in intertidal habitats. Therefore, a conservative exposure value for impacts of 100 g/m^2 has been applied to impacts from shoreline accumulation of hydrocarbons. This value has been used to define the MEVA. **Response planning** A shoreline concentration of 100 g/m^2, or above, is likely to be representative of the minimum limit that the oil can be effectively cleaned according (AMSA, 2015; NOPSEMA, 2019) and is therefore used as a guide for shoreline clean-up planning. This exposure value equates to approximately ½ a cup of oil per square metre of shoreline contacted.
1,000	High	**Risk evaluation** At greater thicknesses, the potential for impact of accumulated oil to shoreline receptors increases. All other things being equal, accumulation of oil above 1,000 g/m^2 is expected to result in a greater impact. **Response planning** As oil increases in thickness the effectiveness of oil recovery techniques increases. This value can therefore be used to prioritise oil recovery efforts, assuming oil recovery is deemed to have an environmental benefit.

Table 7-11: Dissolved hydrocarbon exposure values

Dissolved Hydrocarbons (ppb)	Exposure value	Description
10	Low	**Risk evaluation** Dissolved aromatic hydrocarbons (DAH) include the monoaromatic hydrocarbons (compounds with a single benzene ring such as benzene, toluene, ethyl benzene, and xylenes) and polycyclic aromatic hydrocarbons (PAHs) (compounds with multiple benzene rings such as naphthalenes and phenanthrenes). These compounds have a greater bioavailability that other components of oil and are considered to be main contributors to oil toxicity. The toxicity of DAHs is a function of the concentration and the duration of exposure by sensitive receptors with greater concentration and exposure time causing more severe impacts. Typically tests of toxicity done under laboratory conditions measure toxicity as proportion of test organisms affected (for example, 50% mortality or LC50) at the end of a set time period, often 48 or 96 hours. French-McCay (2002) in a review of literature, reported LC50 for dissolved PAHs with 96-hour exposure, range between 30 ppb for sensitive species (2.5th percentile species) and 2260 ppb for insensitive species (97.5th percentile species), with an average of about 250 ppb. The range of LC50s for PAHs obtained under turbulent conditions (this includes fine oil droplets) was 6 ppb to 410 ppb with an average of 50 ppb (French McCay, 2002). More recently, French-McKay (2018) described in-water thresholds as 10 to 100 µg/L (equivalent to ppb). Regarding the effect of UV on PAH toxicity, French-McKay et al. (2018) uses the findings of Deepwater Horizon Natural Assessment (DWH NRDA) Trustees (2016) to adjust for this affect by reducing the water column exposure thresholds by ten times in the top 20 m of the water column. The dissolved hydrocarbon 10 ppb exposure value has been used to inform the EMBA within **Section 3.1**. An exposure value of 10 ppb is appropriate as it is concentration that could have some potential negative effect. **Response planning** Contact at 10 ppb (as predicted by oil spill trajectory modelling) is used as a trigger for activating scientific monitoring plans as detailed in the OPEP. Establishes planning area for scientific monitoring based on potential for exceedance of water quality triggers (NOPSEMA, 2019).
50	Moderate	**Risk evaluation** Approximates potential toxic effects, particularly sublethal effects to sensitive species (refer to above text). Consistent with NOPSEMA (2019). This value has been used to define the MEVA. **Response planning** Encompassed by response to 10 ppb. There is nothing different for higher exposure values.
400	High	**Risk evaluation** Approximates toxic effects including lethal effects to sensitive species (NOPSEMA, 2019). **Response planning** Encompassed by response to 10 ppb. There is nothing different for higher exposure values.

Table 7-12: Entrained hydrocarbon exposure values

Entrained hydrocarbons (ppb)	Exposure value	Description
1,000	Low	**Risk Evaluation** Entrained hydrocarbons, as opposed to dissolved aromatic hydrocarbons (DAHs), are oil droplets suspended in the water column. Factors including bioavailability of constituents in the oil, changing composition of the oil as it weathers, and likelihood and duration of exposure all contribute to the dynamic nature of entrained and dissolved oil aquatic toxicity at any given time in an oil spill scenario. In relatively fresh oil, some of the hydrocarbons in entrained oil droplets are soluble/semi-soluble that may later dissolve and become bioavailable. Polycyclic aromatic hydrocarbons (PAHs) and related compounds present in fresh oil are the most toxic components. However, entrained oil droplets weather rapidly because of their high surface area relative to their volume. As oil weathers, the potentially toxic components diminish (via volatisation, dissolution and biodegradation) to the point where entrained droplets are effectively non-toxic (French-McCay et al. 2023; Parkeron et al. 2023: French-McCay 2024). Therefore, effects levels for the bioavailable, soluble and semi-soluble components should not be applied to whole oil entrained droplets, particularly for weathered entrained oil droplets. Entrained hydrocarbons still have potential effects on marine organisms through direct contact with exposed tissues and ingestion (NRC 2005). However, research has not definitively demonstrated direct effects of whole-oil droplets as separable from the effects of toxic components dissolved from the oil (Parkerton et al. 2023), and the level of exposure causing effects is considered to be significantly higher than for DAHs (NASEM, 2020; French-McCay 2024). A review by French-McCay (2024) on considerations for the development of entrained oil thresholds for oil spill risk assessments, recommends entrained thresholds based on total hydrocarbon content (THC) and related compounds. However, given the variable composition of entrained oil as it weathers, the development of effects levels or thresholds based on THC is acknowledged to be problematic (French-McCay 2024). Crude oils typically contain about 1% PAHs by mass (French-McCay 2002; Forth et al. 2017), therefore the sublethal concentration threshold (predicted no-effect concentration [PNEC]) expressed as THC based on the most toxic components would be ~100 ppb (100 µg/L) for fresh oil (French-McCay 201). However, as oil weathers, PAHs are lost to volatisation, dissolution and biodegradation, thus making application of this threshold to entrained oil droplets overly conservative (as described above). In addition, exposure durations in the sea are brief, order of minutes to hours, not days or longer as used in most bioassay studies (Bejarano et al. 2017). Effects levels are orders of magnitude higher for exposure durations of less than 24 hours (French-McCay 2002). Given these considerations, French-McCay (2024) suggests 1,000 ppb to be sufficiently conservative for entrained oil droplets of all oil types and all weathering states. This is supported by a number of toxicity studies including a review by Bejarano et al. (2017), which identified THC lethal effects levels of 3-28 mg/L (3,000 – 28,000 ppb) for a range of oils and states of weathering for aquatic species from all geographical areas globally. An exposure concentration of 1,000 ppb of measurable Total Petroleum Hydrocarbon (TPH) was deemed a low level of concern for sensitive life stages in marine organisms by Kraly et al. (2001). In reviews by NRC (2005) and NASEM (2020), 1,000 ppb was similarly found to be at the low end of the range where sub-lethal impacts from acute exposure have been observed. Correcting for the fact that TPH measurements are on a portion of the oil and not the full oil (i.e. THC), this indicates a threshold of 3,000 ppb would be appropriate for modelled entrained oil. Thus, French-McCay concludes that a THC threshold of 3,000 ppb is an appropriate threshold for crude oils and 1,000 ppb for light distillates and condensates for use in risk assessments and for use in defining an EMBA with other oil phases. Negri *et al*. (2024) of AIMS reviewed the paper written by French-McCay (2024) and consider the 1,000 ppb THC to be a conservative threshold for defining an area that may be affected by entrained oil, particularly given short open ocean exposure durations and the reduction in oil droplet toxicity through weathering. Santos has therefore adopted the use of a low entrained oil threshold of 1,000 ppb for use in risk assessments and for defining an EMBA. **Response planning** Contact at 1000 ppb (as predicted by oil spill trajectory modelling) is used as a trigger for activating scientific monitoring plans as detailed in the OPEP.

7.5.5 Spill Risk Assessment Approach

The spill risk assessment approach is adopted based on Santos' Oil Spill Risk Assessment and Response Planning Procedure (SO-91-II-20003).

The Santos spill risk assessment approach provides a comprehensive risk assessment of all environmental values potentially contacted by an oil spill. In addition, it also considers environmental values combined with the severity of the spill impact to identify receptors for a more focussed risk assessment. The spill risk assessment process is as below and illustrated in **Figure 7-4**:

1. Identify the spatial extent of the environment that may be affected (the EMBA). This has been completed for this EP as part of the assessment of the existing environment and receptors that are known to occur or may occur within the EMBA are described in **Section 3.2** and **Appendix C**.
2. Identify and priority rank the environmental values (EV) of the receptor areas within the EMBA.
3. Identify areas of high environmental value (HEV) within the EMBA (Priority ranks 1-3). High environmental value (HEVs) are described in **Section 7.5.5.2.**
4. Identify and risk assess the hotspots. Hotspots are effectively a subset of the HEVs, and their determination is described in **Section 7.5.5.3**
5. Identify protection priority areas (PPAs) based on the hotspots (refer **Section 7.5.6**) for spill response strategies.

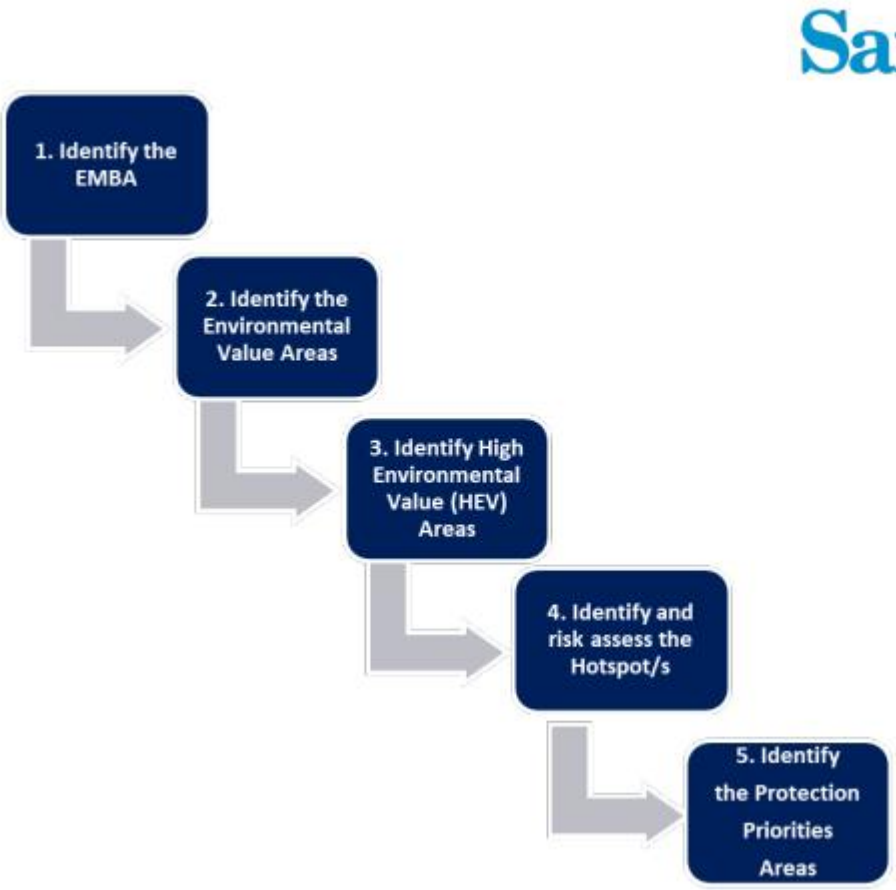

Figure 7-4: Santos oil spill risk assessment approach

7.5.5.1 Spill Environment that May be Affected

Defining the EMBA by an oil spill is the first step in oil spill risk and impact assessment. For activities where there is the potential for multiple spill scenarios, the spill scenario, or combination of spill scenarios, resulting in the greatest spatial extent is used to define the overall EMBA for the activity. The EMBA is further described in **Section 3.1**. To determine the potential impact to receptors within the EMBA, the MEVA is used to determine them as described in **Section 3.1.**

7.5.5.2 Areas of High Environmental Value

Santos has predetermined areas of HEV along the Western Australian coastline by ranking these areas based on:

- Protected area status – This is used as an indicator of the biodiversity values contained within that area, where a World Heritage Area, RAMSAR Wetland and Marine Protected Area will score higher than areas with no protection assigned.
- BIAs of listed threatened species – These are spatially defined areas where aggregations of individuals of a species are known to display BIBs, such as production, feeding, resting or migration. Each one of these within the predefined areas contributes to the score.

Further input to determine areas of HEV included:

- Sensitivity of habitats to impact from hydrocarbons in accordance with the guidance document Sensitivity Mapping for Oil Spill Response produced by IPIECA, the International Maritime Organisation and International Association of Oil and Gas Producers
- Sensitivities of receptors with respect to hydrocarbon-impact pathways
- Status of zones within protected areas (IUCN (1A) and sanctuary zones compared to IUCN (VI) and multiple use zones) listed species status and predominant habitat (surface versus subsurface)
- Social values, socio-economic and heritage features (such as commercial fishing, recreational fishing, amenities, aquaculture).

Tallied scores for each predefined area along the Western Australian coastline were then ranked from 1 to 5, with an assignment of 1 representing areas of the highest environmental value and those with 5 representing the areas of the lowest environmental value. HEVs for the worst-case oil spill EMBA, MEVA and HEVA are shown in **Figure 7-5.**

7.5.5.3 Hotspots

While the entire MEVA will be considered during risk assessment and spill response planning, it is best practice to concentrate greatest effort and level of detail on those parts of the EMBA that have the:

- greatest intrinsic environmental value – considered by Santos to be HEV areas ranked 1 to 3.
- highest probability of contact by oil (either floating, entrained, or dissolved aromatic).
- greatest potential concentration or volume of oil arriving at the area.

These areas are termed hotspots. Defining hotspots is typically the first step in undertaking detailed spill risk assessment and spill response planning. Hotspots are a subset of HEV areas that:

- have the highest probability of contact (at least higher than 5%) above the impact assessment exposure value for surface hydrocarbons and shoreline accumulation based on modelling results.
- receive the greatest concentration or volume of oil, either floating or stranded oil, entrained oil or DAH above contact exposure values described in **Section 7.5.4**. During the workshop, additional hotspots may be included through discretion of workshop attendees where they do not strictly meet all of the above criteria. For example, an HEV ranked 1 to 3 with <5% probability, or an HEV ranked 4 or 5, with >5% probability, depending on the concentrations and volumes presented in the modelling report.

Table 7-13 shows the hotspots identified and the rationale behind the selection of the hotspots from the list of contacted receptors from the surface MDO and subsea LOWC scenarios.

Table 7-13: Hotspot selection

Hotspots	Type	HEV Ranking	Hotspot	PPA	Rationale
Ningaloo - Outer NW	Submerged	3	Y	N	MDO Only • Within EMBA for dissolved and surface hydrocarbons • Submerged receptor
Ningaloo Offshore	Submerged	2	Y		MDO Only • Within EMBA for dissolved and surface hydrocarbons • Submerged receptor
Ningaloo– Outer Coast North	Submerged	1	Y	N	MDO Only • Within EMBA for dissolved and surface hydrocarbons • Submerged receptor

Hotspots	Type	HEV Ranking	Hotspot	PPA	Rationale
Ningaloo Coast North	Emergent	1	Y	Y	MDO • Predicted accumulation of 176.3 m^3 and 19.8 km of shoreline oiled • 2 days to contact and is the receptor with the largest volume onshore. LOWC • Predicted accumulation volume of 38 m^3 and 25 km length of shoreline oiled. • 16 days to contact and is the receptor with the largest volume ashore.
Muiron Islands	Emergent	2	Y	Y	MDO • Predicted accumulation of 19.2 m^3 and 11.3 km of shoreline oiled • 2 days to contact LOWC • Worst case Predicted accumulation volume of 6 m^3 and worst case4 km length of shoreline oiled 4 km. • 19 days and 18 hours to contact
Barrow Island	Emergent	3	Y	Y	LOWC • Predicted accumulation volume of 15 m^3 and 10 km length of shoreline oiled. • 16 days and 19 hours to contact and is the second largest volume ashore
Montebello Islands	Emergent	3	Y	N	LOWC • Predicted accumulation volume of 10 m^3 and worst case7 km length of shoreline oiled • Not considered a protection priority –24 days to contact, allowing for sufficient response mobilisation time

7.5.5.4 Priorities for Protection

For the purposes of a spill response preparedness strategy, it is not necessary for all hotspots to have detailed planning. For example, wholly submerged hotspots may only be contacted by entrained oil, and the response would be largely to implement scientific monitoring to determine impact and recovery. Hotspots with features that are not wholly submerged (emergent features) should have specific spill response planning conducted. This final determination of 'Priority for Protection' sites, for the oil spill response strategy, is based on the worst-case estimate of floating oil concentration, shoreline loading and minimum contact time at exposure value concentrations.

Further detail on selection of Protection Priority Areas process is detailed in the Oil Spill Risk Assessment and Response Planning Procedure (SO-91-II-20003).

The following hotspot locations have been identified as Priorities for Protection areas for oil spill response planning for the NV CoPFAR activities within the activity OPEP and are based on the worst-case estimate of surface oil concentration, shoreline loading and minimum contact time at exposure value concentrations:

- Ningaloo Coast North
- Barrow island
- Muiron islands

The oil spill response strategies for Priority for Protection areas are undertaken within the activity OPEP.

Each protection priority will be assessed to determine the most appropriate spill response strategies based on the type of oil and the values of the protection priority area. This can be done through a strategic NEBA approach.

7.5.5.5 Potential Hydrocarbon Impact Pathways

To help inform the hydrocarbon spill risk assessment receptors within the EMBA and potential impact pathways have been defined (**Table 7-14**). The potential impact pathways consider physical and chemical pathways. Physical pathways include contact from floating oil, accumulated shoreline oil, or entrained oil droplets. Chemical pathways include ingestion, inhalation or contact from any hydrocarbon phase. These are summarised in **Table 7-14**and the information is drawn upon within the hydrocarbon risk assessment for the spill scenario. **Table 7-15**further describes the nature and scale of the hydrocarbon spills for this activity on marine fauna and socio-economic receptors found within the MEVA.

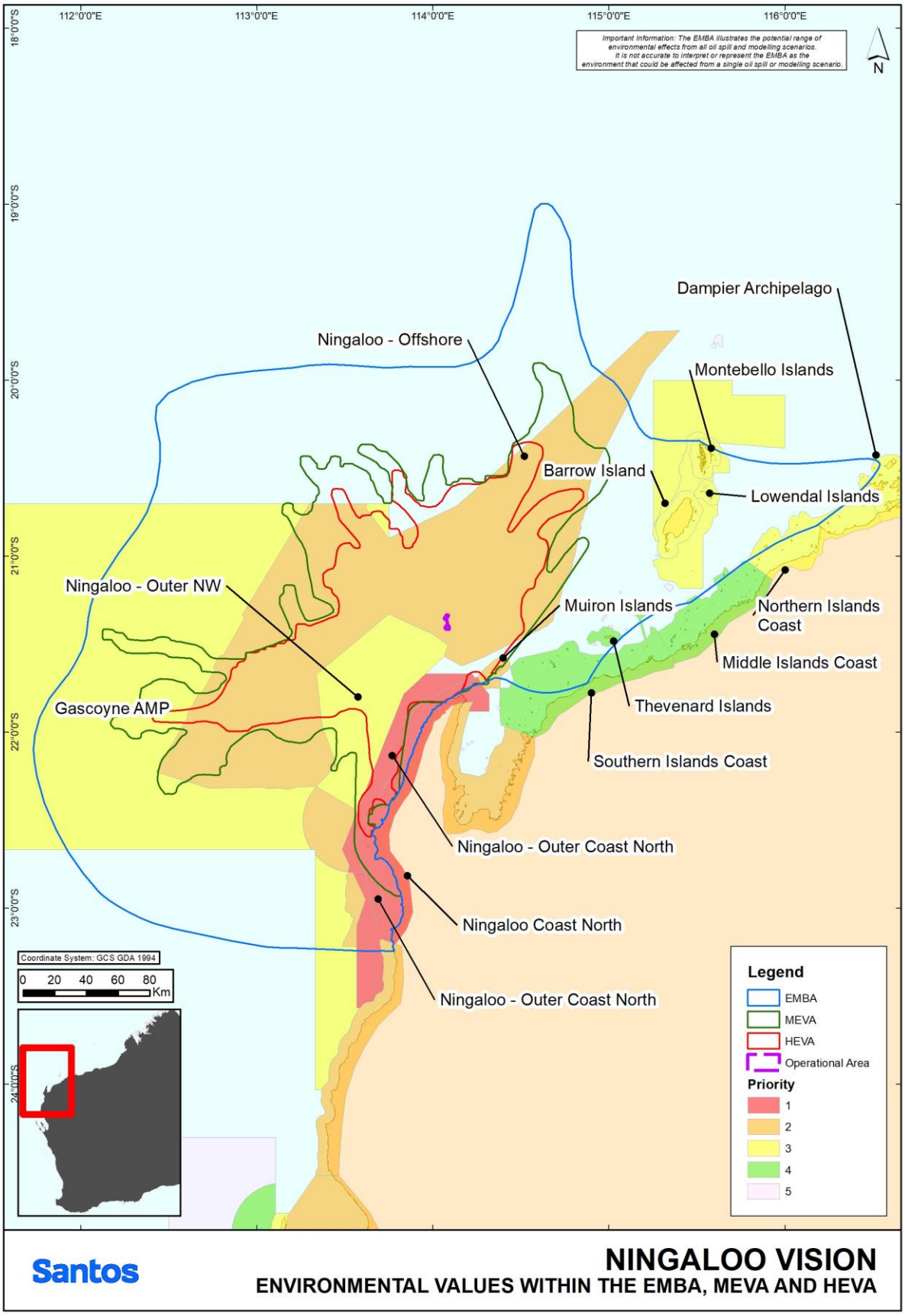

Figure 7-5: HEV areas within the EMBA, MEVA and HEVA area

Table 7-14: Physical and chemical pathways for hydrocarbon exposure and potential impacts to receptors

Receptor	Physical Pathway	Potential Impacts	Chemical Pathway	Potential Impacts
Rocky shorelines	Shoreline loading and attachment may result in thin and sporadic coating of hydrocarbon residues. Degree of oil coating is dependent upon the energy of the shoreline area, the type of the rock formation and continual biodegradation of the oil.	Impacts to flora (mangroves) and fauna further described below.	Chemical pathway to fauna and flora via adsorption through cellular membranes and soft tissue, ingestion, irritation/ burning on contact and inhalation.	Impacts to flora (mangroves) and fauna further described below.
Sandy beaches	Shoreline loading and water movement may allow hydrocarbon residue to filter down into sediments, continue to biodegrade on the surface or remobilise into surf zone. Degree of loading is dependent upon the energy and tidal reach of the shoreline, the type of the sandy shore and continual weathering of the oil.	Indirect impacts to nesting and foraging habitats for birds and turtles. Direct impacts to infauna.	Chemical pathway to fauna and flora via adsorption through cellular membranes and soft tissue, ingestion, irritation/burning on contact and inhalation.	Indirect impacts to nesting and foraging habitats for birds and turtles. Direct impacts (mortality) to infauna through toxic effects and smothering.
Intertidal platforms	Shoreline loading and water movement may allow hydrocarbon residue to filter down into sediments (e.g., within wetlands) or continue to biodegrade on the surface or remobilise into surf zone. Degree of loading is dependent upon the energy and tidal reach of the shoreline, the type of the substrate and continual weathering of the oil.	Indirect impacts to foraging habitats for birds and turtles. Direct impacts to infauna.	Chemical pathway to fauna and flora via adsorption through cellular membranes and soft tissue, ingestion, irritation/burning on contact and inhalation.	Indirect impacts to foraging habitats for birds. Direct impacts (mortality) to infauna through toxic effects and smothering.
Shallow sub-tidal soft sediments	Hydrocarbon residue in the shallow waters adjacent to shorelines may settle to filter down into sediments. Degree of loading is dependent upon the energy and tidal reach of the shoreline, the type of the substrate and continual weathering of the oil.	Indirect impacts to foraging habitats for turtles and fish. Direct impacts to infauna.	Adsorption via cellular membranes and soft tissue, ingestion, irritation/burning on contact and inhalation.	Indirect impacts to foraging habitats for turtles and fish. Direct impacts (mortality) to infauna through toxic effects and smothering.
Mangroves	Coating of root system reducing air and salt exchange. Degree of coating is dependent upon the energy and tidal reach of the shoreline, the type of the substrate and continual weathering of the oil.	Yellowing of leaves. Defoliation. Increased sensitivity to stressors. Tree death. Reduced growth. Reduced reproductive output. Reduced seed viability.	External contact by oil and adsorption across cellular membranes.	Yellowing of leaves. Defoliation. Increased sensitivity to stressors. Tree death. Reduced growth. Reduced reproductive output. Reduced seed viability. Growth abnormalities.
Seagrasses and macroalgae	Coating of leaves/thalli reducing light availability and gas exchange. Degree of coating depends upon the energy and tidal reach of the shoreline, the type of the receptor and continual weathering of the oil.	Bleaching or blackening of leaves. Defoliation. Reduced growth.	External contact by oil and adsorption across cellular membranes.	Mortality. Bleaching or blackening of leaves. Defoliation. Disease.

Receptor	Physical Pathway	Potential Impacts	Chemical Pathway	Potential Impacts
				Reduced growth. Reduced reproductive output. Reduced seed/propagule viability.
Hard corals (coral reefs)	Coating of polyps, shading resulting in reduction on light availability. Degree of coating is dependent upon the metocean conditions, dilution, if corals are emergent at all and continual weathering of the oil.	Bleaching. Increased mucous production. Reduced growth.	External contact by oil and adsorption across cellular membranes.	Mortality. Cell damage. Reduced metabolic capacity. Reduced immune response. Disease. Reduced growth. Reduced reproductive output. Reduced egg/larval success. Growth abnormalities.
Non-coral benthic invertebrates	Coating of adults, eggs, and larvae. Degree of coating is dependent upon the energy and tidal reach of the shoreline, the type of the receptor and continual weathering of the oil.	Mortality. Behavioural disruption. Impaired growth.	Ingestion and inhalation. External contact and adsorption across exposed skin and cellular membranes. Uptake of DAH across cellular membranes. Reduced mobility and capacity for oxygen exchange.	Mortality. Cell damage. Reduced metabolic capacity. Reduced immune response. Disease. Reduced growth. Reduced reproductive output. Reduced egg/larval success. Growth abnormalities. Behavioural disruption.
Sharks, rays, and fish	Coating of adults but primarily eggs and larvae – reduced mobility and capacity for oxygen exchange.	Mortality. Oxygen debt. Starvation. Dehydration. Increased predation. Behavioural disruption.	Ingestion. External contact and adsorption across exposed skin and cellular membranes. Uptake of DAH across cellular membranes (for example, gills).	Mortality. Cell damage. Flesh taint. Reduced metabolic capacity. Reduced immune response. Disease. Reduced growth. Reduced reproductive output. Reduced egg/larval success.
Birds (seabirds and shorebirds)	Degree of coating is dependent upon the energy and tidal reach of the shoreline, the type of the receptor and continual weathering of the oil.	Feather and skin irritation and damage, with the potential to cause secondary impacts such as:	Ingestion (during feeding or preening). External contact and adsorption across exposed skin and membranes.	Mortality. Cell damage, lesions. Secondary infections.

Receptor	Physical Pathway	Potential Impacts	Chemical Pathway	Potential Impacts
		• Physical restriction of flight and swimming movement. • Mortality. • Hypothermia / impairing the waterproofing of feathers. • Disruption to feeding / starvation. • Disruption to breeding. • Disruption to migration.		Reduced metabolic capacity. Reduced immune response. Disease. Reduced growth. Reduced reproductive output. Growth abnormalities. Behavioural disruption.
Marine reptiles	Degree of coating is dependent upon the energy and tidal reach of the shoreline, the type of the receptor and continual weathering of the oil.	Irritation of eyes/mouth and potential illness, which may cause secondary impacts such as: • Mortality. • Disruption to feeding / starvation. • Physical restriction. • Behavioural disruption.	Inhalation. Ingestion. External contact and adsorption across exposed skin and membranes.	Mortality. Cell damage, lesions. Secondary infections. Reduced metabolic capacity. Reduced immune response. Disease. Reduced growth. Reduced hatchling success. Reduced reproductive output.
Marine mammals	Fur damage and matting, reduced mobility, and buoyancy (for applicable species).	Irritation of eyes/mouth, damage to fur and potential illness, which may cause secondary impacts such as: • Mortality. • Disruption to feeding / starvation. • Physical restriction. • Behavioural disruption.	Inhalation. Ingestion. External contact and adsorption across exposed skin and membranes.	Mortality. Cell damage, lesions. Secondary infections. Reduced metabolic capacity. Reduced immune response. Disease. Reduced growth. Reduced reproductive output. Growth abnormalities. Behavioural disruption.
Plankton	Coating of feeding apparatus. Reduced mobility and capacity for oxygen exchange.	Mortality. Behavioural disruption (for example, reduced mobility).	Inhalation. Ingestion. External contact.	Mortality. Impairment of biological activities (for example, feeding, respiration). Reduced mobility.

Receptor	Physical Pathway	Potential Impacts	Chemical Pathway	Potential Impacts
Water quality and sediment quality	Presence of hydrocarbon residue in the water, which may filter down to sediments or continue to biodegrade on the surface. Degree of loading in the water column is dependent upon the influence of wave energy and tidal range.	Impacts to flora and fauna, as discussed in rows above.	Adsorption via cellular membranes and soft tissue, ingestion, irritation/burning on contact and inhalation. Impacts to flora and fauna, as discussed in rows above.	Impacts to flora and fauna, as discussed in rows above.
Protected areas	Coating of benthic habitats, shoreline habitats and marine fauna/flora within protected areas as discussed in rows above.	Mortality, injury, or behavioural disruption to marine fauna. Death or impairment of habitats within protected areas. Reduction in the quality of the marine environment within protected areas. Environmental value of protected areas is degraded.	Impacts to flora and fauna, as discussed in rows above.	Mortality, injury, or behavioural disruption to marine fauna. Death or impairment of habitats within protected areas. Reduced growth of benthic habitats. Reduction in the quality of the marine environment within protected areas. Environmental value of protected areas is degraded.
Socio-economic environment (fisheries, tourism, shipping, defence, shipwrecks, Indigenous users, oil, and gas)	Presence of hydrocarbon residue in the water, which may filter down to sediments or continue to biodegrade on the surface. Coating of benthic habitats, shoreline habitats and marine fauna/flora within protected areas as discussed in rows above.	Degradation of cultural or maritime heritage sites. Disruption to tourism, recreation, or shipping activities. Reduction in resource available for commercial and recreational fisheries. EP stakeholder consultation did not raise any concerns regarding potential impacts to cultural features including sea country. However, Indigenous users and cultural features may be impacted in the event of an unplanned hydrocarbon release.	Impacts to flora, fauna and the physical environment as discussed in rows above. Commercial/recreational fish species – refer to 'fish' as discussed above.	Degradation of cultural or maritime heritage sites. Disruption to tourism, recreation, or shipping activities. Reduction in resource available for commercial and recreational fisheries.

Table 7-15: Nature and scale of hydrocarbon spills on environment and socio-economic receptors within the EMBA and MEVA

Receptor	Impacts of hydrocarbon spill	
	Entrained and dissolved aromatic hydrocarbons	Surface hydrocarbons
Fauna (including Threatened/Migratory Fauna)		
Plankton (including zooplankton, fish, and coral larvae)	There is potential for localised mortality of plankton due to reduced water quality and toxicity. Also, through physical contact of small oil droplets, plankton mobility, feeding and/or respiration may be impaired. Plankton could include the eggs and larvae of marine invertebrates and fish and therefore entrained oil could impact on recruitment of invertebrate/fish species. Effects will be greatest in the upper 10 m of the water column and areas close to the spill source where hydrocarbon concentrations are likely to be highest.	Plankton utilising the sea surface layer could be impacted by floating oil.
	Plankton could include the eggs and larvae of marine invertebrates and fish and therefore impact on recruitment of invertebrate/fish species. The operational area has the potential to overlap with spawning of some fish species given the year-round spawning of some species. In the unlikely event of a spill occurring, fish larvae may be impacted by hydrocarbons entrained in the water column. Following a hydrocarbon release a portion of the slick will rapidly evaporate and disperse in the offshore environment, reducing the concentration and toxicity of the spill. Maximum entrained oil concentrations were predicted at Ningaloo Outer NW. Plankton utilising the sea surface layer, as well as pelagic invertebrates, could be impacted from floating oil. Exposure to entrained oils and DAHs may result in lethal or sub-lethal impacts to plankton or pelagic invertebrates through a direct contact pathway. Such contact could impair the mobility, feeding and respiration of these fauna and exchange of chemicals could occur.	
Marine Mammals	Lethal or sub-lethal physical and toxic effects such as irritation of eyes/mouth and potential illness.	At risk of direct contact with surface hydrocarbons due to chance of surfacing within slick. Effects include irritation of eyes/mouth and potential illness. Surface respiration could lead to accidental ingestion of hydrocarbons or result in the coating of sensitive epidermal surfaces. Potential impact to feeding apparatus of some species (baleen whales).
	Thirteen migratory marine mammal species were identified by the PMST as occurring within the EMBA. Of these, two are listed as endangered (blue whale, southern right whale) and two as vulnerable (sei whale, fin whale). The operational area and EMBA overlaps with the pygmy blue whale migration BIAs, and the humpback whale migration BIAs (**Section 3.2.6.1**). **Table 7-14**provides further information on environmental impacts to marine mammals from hydrocarbon exposure and increased toxicity. Other migratory marine mammals may encounter either surface or water column hydrocarbons in the EMBA. Dugongs may be particularly susceptible to surface slicks, a reduction of seagrass habitat for foraging and/or ingestion of seagrass coated with oil. Dugongs occur throughout the shallow waters between the Pilbara offshore islands and the mainland and have been observed in the shallow waters along the east coast of Barrow Island and over the Lowendal Shelf. The EMBA overlaps a BIA for dugongs (**Figure 3-9**). Aerial surveys of dugong distribution have found that the animals occur around Barrow Island, Airlie Island, Lowendal Islands, and the Montebello Islands further offshore (Prince, 2001).	
Marine reptiles	Lethal or sub-lethal physical and toxic effects such as irritation of eyes/mouth and potential illness. The Recovery Plan for Marine Turtles in Australia: 2017–2027 (Commonwealth of Australia, 2017) highlights acute chemical discharge as one of several threats to marine turtles.	At risk of direct contact with surface hydrocarbons due to chance of surfacing within slick. Effects include irritation of eyes/mouth and potential illness. Surface respiration could lead to accidental ingestion of hydrocarbons or result in the coating of sensitive epidermal surfaces. Contact with hydrocarbons that have accumulated on shorelines particularly at nesting beaches. Oiling of eggs/hatchlings may occur. Shoreline hydrocarbons are expected to be less toxic than fresh oils due to weathering processes such as photo oxidation and biodegradation reducing the levels of lighter chain hydrocarbons which are generally more toxic.

Receptor	Impacts of hydrocarbon spill	
	Entrained and dissolved aromatic hydrocarbons	**Surface hydrocarbons**
	Seven species of threatened marine reptile were identified as possibly being impacted by a spill. Loggerhead, green, leatherback, hawksbill and flatback turtles are widely dispersed across the NWS and in the unlikely event of a hydrocarbon spill occurring, individuals traversing open water may come into contact with water column or surface hydrocarbons. The EMBA overlaps with BIAs and critical habitat for four turtle species (flatback, green, hawksbill and loggerhead) as shown in Figure 3-10, Figure 3-11, Figure 3-12, and Figure 3-13. Sea snakes are associated with the offshore reefs and banks within the EMBA. Critical habitat including internesting habitat offshore form important nesting beaches for turtle species are present within the EMBA. No shoreline accumulation above the moderate threshold value of 100 g/m^2 was predicted for Ningaloo Coast North (18,554.5 g/m^2) and Muiron Islands (2047.1 g/m^2). In the event of a spill, the presence of hydrocarbons on beaches would disrupt behaviour and potentially threaten turtle populations. For further detailed environmental impacts to marine reptiles from hydrocarbon exposure and increased toxicity, refer to **Table 7-14**Table 7-14.	
Birds (seabirds and shorebirds)	Lethal or sub-lethal physical and toxic effects such as irritation of eyes/mouth and potential illness. May encounter entrained hydrocarbons while diving and foraging.	Particularly vulnerable to surface slicks. As most fish survive beneath floating slicks, they will continue to attract foraging seabirds, which typically do not exhibit avoidance behaviour. Smothering can lead to reduced water proofing of feathers and ingestion while preening. In addition, direct contact with hydrocarbons can erode feathers causing chemical damage to the feather structure that subsequently affects ability to thermoregulate and maintain buoyancy on water. Shorebirds may be impacted by the presence of hydrocarbons accumulated on shorelines which may result in exposure to eggs and ingestion by foraging individuals. Shoreline hydrocarbons are expected to be less toxic than fresh oils due to weathering processes such as photo oxidation and biodegradation reducing the levels of lighter chain hydrocarbons which are generally more toxic.
	41 threatened or migratory species of seabirds and shorebirds were identified within the EMBA by the PMST (**Table 3-7**). Of these, sixteen were identified within the operational area (including the 20 km buffer). A BIA for wedge-tailed shearwater reproduction overlaps the operational area. Migratory seabird BIAs for reproduction and resting overlap with the EMBA (**Table 3-8**) therefore, species may be impacted by surface and entrained hydrocarbons while foraging (dive and skim feeding) with higher numbers expected during the breeding periods. Birds (seabirds and shorebirds) are highly susceptible to hydrocarbon spills, with impacts primarily attributed to oiling of birds at the sea surface from slicks and oil on shorelines. EMBA overlaps BIA of multiple seabirds including Ningaloo Coast North Barrow Island, Muiron Islands and Montebello Islands. Impacts to birds may include coating by oil when floating in open water, diving into open and coastal waters to feed on fish, wading and foraging on shallow intertidal mud/sand flats and wetlands or roosting on oil affected sandy beaches. Other impacts could include behavioural impacts whereby birds avoid important nesting and migratory stop-over areas including RAMSAR wetlands or reduced food availability if important foraging areas are impacted. For further information about environmental impacts to seabirds/shorebirds through hydrocarbon exposure and toxicity effects, refer to **Table 7-14**.	
Sharks, rays, and fish	Hydrocarbon droplets can physically affect fish, sharks and rays exposed for an extended duration (weeks to months). Smothering through coating of gills can lead to the lethal and sub-lethal effects of 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. There is potential for localised mortality of fish eggs and larva due to reduced water quality and toxicity. Effects will be greatest in the upper 10 m of the water column and areas close to the spill source where hydrocarbon concentrations are likely to be highest and therefore	While fish, sharks and rays do not generally break the sea surface, individuals may feed at the surface. For condensate/MDO spills where a slick is expected to quickly disperse and evaporate, prolonged exposure to surface hydrocarbons by fish, shark and ray species is unlikely. Due to the filter-feeding nature of whale sharks they may be susceptible to ingesting surface hydrocarbons, both fresh and weathered (tar balls) if feeding at the sea surface particularly from MDO spills.

Receptor	Impacts of hydrocarbon spill	
	Entrained and dissolved aromatic hydrocarbons	**Surface hydrocarbons**
	demersal fish communities (including those associated with the Ancient Coastline at 125 m depth contour KEF and Continental Slope Demersal Fish Communities KEF) may be exposed. For further information about environmental impacts to fish/sharks/rays from hydrocarbon exposure and toxicity effects, refer to **Table 7-14**	
	The whale shark foraging BIA is presented in **Figure 3-7** and overlaps the EMBA and is located approximately 8 km from the operational area. A whale shark foraging BIA off the Ningaloo coast is approximately 40 km from the operational area and within the moderate exposure value area. Whale sharks are oceanic, but also come into shallower, coastal waters to feeds in surface waters which often coincide with specific productivity events that are a focus of feeding for the animals. It is therefore possible that surface and/or entrained hydrocarbon and/or dissolved aromatic hydrocarbon could come in contact with, or be ingested by, whale sharks migrating or aggregating in the area at the time of release.	
Socio-economic		
Commercial, Recreational and Traditional Fisheries	Hydrocarbons in the water column can have toxic effects on fish (as outlined above) potentially reducing catch rates and rendering fish unsafe for human consumption.	In addition to the effects of entrained and DAHs, exclusion zones surrounding a spill can directly impact fisheries by restricting access for fishermen. Weathered MDO (WMDO) slicks may form tar balls which may result in oiling of nets and fishing infrastructure.
	Several commonwealth and state fisheries are found within the EMBA (**Section 3.2.7**). Impacts to these fisheries from a spill may range from disruption of fishing activities caused by the physical presence of the slick, loss of (or loss of function of) coastal intertidal habitat (for example, seagrass meadows, mangrove communities, intertidal mudflats) which may provide nursery habitat for fishery species (for example, fish and crustaceans) and contact of surface and entrained hydrocarbons with the eggs and larvae of commercially important species. Exposure to entrained and DAHs could result in the accumulation of oil in fish tissues to the extent that could result in hydrocarbon taint of fish flesh. Connell and Miller (1981) compiled a summary of studies listing the exposure value concentrations at which tainting occurred for hydrocarbons. The results contained in their review indicate that tainting of fish occurs when fish are exposed to ambient concentrations of 4 to 300 ppm (4,000 to 300,000 ppb) of hydrocarbons in the water, for durations of 24 hours or more, with response to phenols and naphthenic acids being the strongest. Given that entrained hydrocarbons are predicted to exceed the moderate threshold at some locations in the MEVA, hydrocarbon taint is possible in fish flesh although it is difficult to assess how long fish might be exposed for, small, less mobile fishes would be more susceptible. It is possible that impacts could be detected to fisheries on a stock level although it is more likely that natural variation in fish abundance would be on a greater scale than any impacts attributable to a hydrocarbon spill. The same negative impacts could also occur to important recreational fish species and the recreational fisheries they support although impacts to commercial fisheries could result in the additional impact of loss of income for commercial fishers.	
Recreation and tourism	There is the potential for surface, entrained and/or dissolved aromatic hydrocarbon to temporarily disrupt tourism activities which rely on the presence of marine fauna and/or the use of vessels (e.g., snorkelling/scuba diving, whale/whale shark watching/swimming and recreational fishing) via displacement from an exclusion zone or a reduction in fauna abundance due to avoidance of the area. Impacts to recreational fishing may also occur due to impacts to fish as described for Fisheries above. Given the water depths and distance from the nearest mainland, impacts to recreational and tourism related activities are unlikely.	
Shipping	Multiple shipping fairways intersect the EMBA (**Figure 3-19).** Hydrocarbons in the water column will have no effect on shipping.	In the event of a hydrocarbon spill shipping activities may be impacted by exclusion zones surrounding a spill. Exclusion zones could reduce access for shipping vessels 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.
Defence	Military exercise areas are located at Exmouth associated with the RAAF Base Learmonth. This training zone overlaps the EMBA and moderate exposure value area. However, they have been for aerial training are unlikely to be impacted by a hydrocarbon spill.	

Receptor	Impacts of hydrocarbon spill	
	Entrained and dissolved aromatic hydrocarbons	**Surface hydrocarbons**
Shipwrecks	There are shipwrecks within the EMBA and moderate exposure value area. Surface hydrocarbons will have no impact on shipwrecks. Notable shipwrecks include three historic shipwrecks Gem and one historic shipwreck at Northwest Cape (Fairy Queen). It is unlikely that contact would have any lasting impact on these sites apart from a possible temporary reduction in aesthetic value for a period.	
Indigenous users	Marine resource use by indigenous people is generally restricted to coastal waters. Fishing, hunting and the maintenance of maritime culture and heritage through ritual, stories and traditional knowledge continue as important uses of the nearshore region and adjacent areas. Indigenous users may be impacted by surface hydrocarbons, exclusion zones around spill sites during spill response and fishing and hunting stocks may be impacted by entrained and dissolved hydrocarbons.	
Existing oil and gas activity.	A number of oil and gas operators operate within the EMBA with existing projects and infrastructure in place as well as continuing drilling and exploration programs. A surface or subsea hydrocarbon spill has the potential to disrupt activity with associated economic impact. Exclusion zones surrounding spills will reduce access, potentially resulting in delays to work schedules with possible subsequent financial implications. In particular, Chevron's Gorgon and WA Oil operations on Barrow Island may be impacted in the event of an unplanned spill event through exclusion or access restrictions in the event of spill response and clean-up activities (if applicable).	
Protected areas		
Marine parks and commonwealth heritage areas	Protected areas are described in **Section 3.2.5**. These protected areas support all the habitats and faunal groups described above and support unique/protected habitats/marine fauna or ecological features. Impacts to the habitat/fauna receptors described above therefore have an impact on the values of these reserves which could have flow-on effects to tourism revenue for coastal communities that provide access to these marine reserves. The protected areas may also support nursery/feeding/aggregation areas for fisheries species and therefore may assist in maintaining healthy fish stocks and commercial/recreational fisheries.	
RAMSAR wetlands	No RAMSAR wetlands are located within the EMBA.	
KEFs	KEFs overlapping the EMBA are described in **Section 3.2.5.2**. While some features associated with the KEFs are subtidal or submerged and would not be directly contacted by a surface slick, they all may support increased productivity or abundance of marine fauna that use surface waters above the features (including plankton, pelagic invertebrates and fish, marine mammals, marine reptiles, and seabirds) which may be impacted by floating oil. Impacts to these marine faunae are described above.	
Threatened ecological communities	No threatened ecological communities are located within the EMBA.	

7.5.6 Spill Response Strategies

Numerous spill response strategies are available to be implemented in the event of a spill. These are generally strategies that have been implemented in the past or are considered good industry practice. Section 6 of the OPEP provides a detailed description of the applicable response strategies for this activity, which include, depending on the type and size of the spill:

- source control
- monitor and evaluate
- mechanical dispersion
- chemical dispersion (surface)
- offshore containment and recovery
- protection and deflection
- shoreline clean up
- oiled wildlife response
- scientific monitoring.

7.6 Hydrocarbon Spill- Marine Diesel Oil

7.6.1 Description of Event

Event	Worst credible marine diesel oil spill It is considered credible that a vessel collision could occur between the FPSO and a support vessel or errant third party tanker or between the primary vessel and a support vessel, or between a passing third party vessel and a primary or support vessel. The worst-case environmental incident resulting from a vessel collision is the rupturing of an FPSO MDO bunker tank resulting in the release of MDO to the environment. Vessel collisions could occur due to factors such as human error, poor navigation, vessel equipment failure or poor weather. This scenario would result in a spill of diesel at the sea surface. A maximum credible spill volume has been determined based on technical guidance provided by AMSA (2015). This guidance states that for a vessel other than an oil tanker, the maximum credible spill from a collision can be determined from the volume of the largest single fuel tank. In reviewing the fuel tank capacities of the, the largest single MDO bunker tank capacity identified as 1,519 m^3. Refuelling incident The second most significant MDO spill scenario identified is a primary vessel refuelling incident (fuel hose failure or rupture, coupling failure or tank overfilling) where fuel bunkering would need to be stopped manually. Fuel released prior to the cessation of pumping as well as fuel remaining in the transfer line may escape to the environment. The AMSA (2015) Technical Guidelines for Preparing Contingency Plans for Marine and Coastal Facilities provides guidance for calculating a maximum credible spill volume for a refuelling spill. The guidance provided by AMSA (2015) for a refuelling spill under continuous supervision is considered appropriate, given refuelling will be constantly supervised. The maximum credible spill volume during refuelling is calculated as: transfer rate (150 m^3/hr) × 15 minutes of flow giving a volume of 37.5 m^3. The detection time of 15 minutes is seen as conservative but applicable following failure of multiple barriers followed by manual detection and isolation of the fuel supply.
Extent	MDO spill trajectory modelling (GHD, 2020) indicated that there was some possibility of an MDO spill of 1,519 m^3 extending as follows (using the moderate exposure thresholds) based on the summary of the modelling locations: • surface oil above 10 g/m^2 was predicted to occur within approximately 220 km • dissolved hydrocarbons at or above 50 ppb were predicted to occur within approximately 220 km • shoreline oil accumulation above 10 g/m^2 was predicted to occur within approximately 200 km • Entrained oil at or above the low threshold was predicted to occur within approximately 110 km.
Duration	1,519 m^3 release of MDO was modelled for release over 1 hour from vessel collision replicating the potential duration of spill arising from a significant collision.

7.6.1.1 Stochastic Spill Modelling- Summary of Results for Moderate Exposure Thresholds

The modelling results (GHD, 2020) for the fate of hydrocarbon from vessel collision at the exposure values defined in **Section 7.5.4** are summarised below:

Floating oil

Surface oil above the low threshold (1 g/m^2) was predicted to extend up to approximately 280 km from the release location.

At the moderate threshold (10 g/m^2), the distance reduces to 220 km and 200 km as the threshold increases to 50 g/m^2.

The receptors predicted to be contacted by the floating oil above the moderate threshold of 10 g/m^2 are Ningaloo Offshore (100%), submerged receptor), Ningaloo Outer NW (28.7% probability, submerged receptor), Outer Ningaloo Coast North (4% probability, submerged receptor), Ningaloo Coast North (2% probability, emergent receptor) and Muiron Islands (0.7% probability, emergent receptor).

Shoreline accumulation

Shoreline accumulation >10 g/m^2 was predicted to occur at Ningaloo Coast North (15.3% probability), the Muiron Islands (3.3% probability) and Ningaloo Coast South (0.7% probability).

Shoreline accumulation >100 g/m^2 was predicted to occur at the Muiron Islands (1.3% probability) and Ningaloo Coast North (2.7% probability).

Entrained oil

The GHD 2020 modelling did not model entrained hydrocarbons at the low threshold of 1000 ppb. Instead, a threshold of 500 ppb was used for the total water accommodated fraction. At 500 ppb entrained oil was predicted to extend up to approximately 110 km from the release location, potentially contacting Ningaloo Offshore (43.3% probability, submerged receptor), Ningaloo Outer NW (10% probability, submerged receptor) and Outer Ningaloo Coast North (2% probability, submerged receptor).

Dissolved oil

Dissolved hydrocarbons at the low threshold (10 ppb) were predicted to extend a maximum distance of around 250 km from the release location.

At a moderate threshold of 50 ppb, the spatial extent decreased to approximately 250 km and to approximately 100 km at or above the high threshold value of 400 ppb.

The greatest probability of exposure for concentrations exceeding 10 ppb was predicted at Ningaloo Offshore (100 % probability) and Ningaloo Outer NW (51.3%) due to the proximity of these receptors to the release location.

Spill modelling results for the MDO scenario are presented in Appendix H.

7.6.2 Nature and Scale of Environmental Impacts

Potential receptors: Physical environment (water quality and benthic habitats), marine fauna (cetaceans, turtles, sharks, fish (pelagic), rays, seabirds, benthic fauna, plankton), marine flora, socio economic receptors (commercial and recreational fishing, tourism, shipping, defence, heritage, indigenous heritage such as totemic sp., cultural heritage sites, sea country and spiritual values), other petroleum activities, state marine reserves and AMPs.

Hydrocarbon spills will cause a decline in water quality and may cause chemical (e.g., toxic) and physical (e.g., coating of emergent habitats, oiling of wildlife at sea surface) impacts to marine species. The severity of the impact of a hydrocarbon spill depends on the magnitude of the spill (i.e., extent, duration) and sensitivity of the receptor. The nature and scale of a hydrocarbon spill is described throughout this chapter for a vessel collision scenario, given smaller hydrocarbon spills (from refuelling) will impact a smaller area than a vessel collision.

As a light hydrocarbon, MDO undergoes rapid spreading and evaporative loss in warm waters, indicating that a surface slick will be temporary, with around 40% of the released volume evaporating within 40 hours. The high rate of evaporation means that little MDO will become entrained, and few aromatic hydrocarbons are predicted to become dissolved. A surface release of MDO to the marine environment would result in a localised reduction in water quality in the upper surface waters of the water column near the location of the spill. Potential impact pathways (physical and chemical) of hydrocarbon exposure for receptors are summarised in **Table 7-14** and potential impacts to receptors found within the EMBA are further described in **Table 7-15**.

7.6.3 Net Environmental Benefit Analysis

Net environmental benefit analysis (NEBA) is a structured approach used by the response community and stakeholders to select spill response strategies that will effectively remove oil, are feasible to use safely in particular conditions, and will reduce the impact of an oil spill on the environment.

The NEBA process is used during pre-spill planning (strategic NEBA) and during a response (operational NEBA). A strategic NEBA is an integral part of the contingency planning process and is used to ensure response strategies for scenarios are well informed. An operational NEBA is used to ensure evolving conditions are understood, so response strategies can be adjusted as necessary to manage individual response actions and end points.

Balancing trade-offs may involve differing and conflicting priorities, values, and perceptions of the importance of sensitive receptors. There is no universally accepted way to assign perceived value or importance, and it is not a quantitative process. Overall, the NEBA process provides an estimate of potential environmental effects that are sufficient to allow the parties to compare and select preferred combinations of response strategies to reduce environmental impacts to ALARP.

A strategic NEBA has been developed for all response strategies identified as applicable to credible spills identified in the OPEP related to an unplanned release of condensate, with the potential environmental benefit or potential impact to each protection priority area. This will provide information that will help to select response strategies tailored to the key environmental values within the areas of highest priority. A summary of spill response strategies is available for each of the priorities for protection and the potential impact that a response strategy has on the area's environmental values.

This information is to be considered in the NEBA process that takes place during a spill response (i.e., an operational NEBA). An operational NEBA will also consider real-time monitoring of the effectiveness and potential impacts of a response and will also consider accessibility, feasibility, and safety of responders (refer to Section 6 of the OPEP).

7.6.4 Environmental Performance Outcomes and Control Measures

The EPOs relating to this event include:

- No loss of containment of hydrocarbon to the marine environment [NV-EPO-09]

The control measures applied to prevent hydrocarbon spill from refuelling and vessel collision are shown in **Table 7-16** and the EPSs and measurement criteria for this EPO are described in **Section 8.4**.

Selection of oil spill response strategies and associated performance outcomes, control measures and performance standards, including those required to maintain preparedness and for response, are detailed within the OPEP. The OPEP contains an evaluation of oil spill preparedness arrangements to demonstrate that oil spills will be mitigated to ALARP.

Table 7-16: Control measure evaluation for hydrocarbon spill- MDO

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
Standard Controls					
NV-CM-01	Maritime Notices	Administrative	Ensures other marine users are aware of the presence of vessels.	Costs associated with the personnel time in issuing notifications and closing out queries and responses.	**Adopted** – Benefits considered to outweigh negligible costs. Maritime requirement to issue marine notices.
NV-CM-02	Santos' stakeholder consultation strategy	Administrative	Santos will notify all relevant stakeholders listed, or as revised, in **Section 4** of CoPFAR activity details prior to commencement, including activity timing, vessel movements, proposed cessation date and vessel details. Ensures other marine users, such as commercial fishers, are aware of upcoming operations so they can plan their business accordingly.	Limited additional costs to Santos. Stakeholders' time required to review consultation material and communicate with Santos.	**Adopted** – Benefits considered to outweigh negligible costs. Important control to ensure other marine users are aware of upcoming operations and potential business disruptions.
NV-CM-06	Lighting will be used as required for safe work conditions and navigational purposes	Engineering	Ensures vessels meet minimum safety standards, therefore reducing potential for vessel collision events with associated diesel spill to the environment. Marine Order Part 30: Prevention of Collisions, and with Marine Order Part 21: Safety of Navigation and Emergency Procedures requires vessels to have navigational equipment to avoid collisions. Requirement of the Navigation Act 2012.	Costs associated with personnel time in checking vessel certifications are in place. Negligible costs of operating navigational equipment.	**Adopted** – Benefits considered to outweigh costs.
NV-CM-04	Existing PSZ around the DTM.	Administrative	Gazetted 500 m PSZ around the DTM and reduces the potential for third-party vessel collision with the primary vessels when	No additional costs. PSZs already gazetted.	**Adopted** – Benefits considered to outweigh no costs to Santos.

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
			they are working in these PSZs.		
NV-CM-05	Safety Exclusion Zone established around primary vessels during floating asset and damaged flowline removal activities, to reduce potential for collision or interference with other marine user activities	Administrative	Requested Safety Exclusion Zone around the primary vessels prevents reduces the potential for vessel collision with third party vessels.	No additional costs to Santos. Other marine users may be temporarily excluded from small areas.	**Adopted** – Befits outweigh the costs.
NV-CM-07	Seafarer Certification	Administrative	Requires appropriately trained and competent personnel, in accordance with Marine Order 70, to navigate vessels to reduce interaction with other marine users. Requires appropriately trained and competent personnel to navigate vessels.	Costs associated with personnel time in obtaining qualifications.	**Adopted** – Benefits considered to outweigh costs.
NV-CM-49	Dynamic positioning system	Engineering	Ensure vessel is running efficiently and routine maintenance endeavours to ensure risk of collision from vessel system failure is reduced.	No additional cost.	**Adopted** – Benefits considered to outweigh costs.
NV-CM-50	Accepted OPEP	Administrative	Implements response plans to deal with an unplanned hydrocarbon release quickly and efficiently in order to reduce impacts to the marine environment.	Administrative costs of preparing documents and large costs of preparing for and implementing response strategies.	**Adopted** – Regulatory requirement must be adopted.
NV-CM-47	Vessel spill response plans (SOPEP/ SMPEP)	Administrative	Implements response plans on board vessels to deal with unplanned hydrocarbon releases and spills quickly and efficiently in order to reduce impacts to the marine environment.	Administrative costs of preparing documents. Generally undertaken by vessel contractor so time for Santos personal to confirm and check SOPEP/ SMPEP in place.	**Adopted** – Benefits of considered to outweigh costs.
NV-CM-22	Marine assurance standard	Administrative	Ensures vessels meet Marine assurance standards to reduce the likelihood of unplanned discharge.	Costs associated with personnel time in checking vessel.	**Adopted** – Benefits of ensuring procedures are followed and measures implemented and that the vessels are compliant outweigh the costs. Regulatory requirement must be adopted.

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
NV-CM-21	Vessel PMS to maintain vessel DP, engines, and machinery	Administrative	Ensure vessel is running efficiently and routine maintenance endeavours to ensure risk of collision form vessel system failure is reduced.	No additional costs, is industry best practice.	**Adopted** – No additional costs.
NV-CM-51	Santos Refuelling and Chemical Transfer Standard (SO-91-IQ-00098	Administrative	Minimises risk of pollution to ALARP during hydrocarbon transfers/ vessel refuelling.	Personnel costs associated with ensuring procedures are in place and implemented during refuelling and chemical transfers.	**Adopted** – Benefits of ensuring procedures are followed and measures implemented outweigh the costs.
Additional Controls					
NV-CM-16	Support vessel on standby during FPSO disconnection and sail away	Eliminate	Eliminates the potential for interaction between other marine users and the FPSO during FPSO disconnection and sail away activities.	Cost associated with support vessel operations	**Adopted –** benefits of eliminating the risk outweigh the costs.
N/A	Zero fuel bunkering via hose	Eliminate	Removes spill risk from hose operations.	Cost associated with transfer of MDO via drums or containers. Not possible to modify vessels to allow additional fuel storage. Cost associated with vessel transits and risk transfer to Health and Safety issues with additional trips to port instead. Would significantly increase the schedule to include multiple trips	**Rejected** – Storage of fuel on vessels would result in unacceptable transfer of environmental risks to occupational health and safety/ operational risks and would not eliminate risk of MDO spills to sea. Costs associated with implementing control is deemed grossly disproportionate to environmental benefit and low risk activity with standard controls in place.
N/A	Require primary vessels to be double hulled	Administrative	Reduces the likelihood of a loss of hydrocarbon inventory in the highly unlikely event of a vessel collision, minimising potential environmental impact.	Vessels are subject to availability and are required to meet Santos' standards during activities, requirement of a double hull on vessels would limit the number available to Santos Also, requiring vessels to be refitted to ensure double hulls would be of high cost.	**Rejected –** Large costs associated with vessel selection and by having an activity schedule determined by vessel availability considered to be grossly disproportionate compared to low risk of a vessel collision and low risk of a large diesel spill.

CM Reference No.	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
N/A	Dedicated standby vessel in field 24 hours	Protective	Reduces potential for collision or interference with other marine users.	Large costs associated with a dedicated standby vessel.	**Rejected** – Large cost associated with dedicated standby vessel which outweigh any benefits.
N/A	Dedicated resources (e.g., dedicated spill response facilities on location) in the event of loss of hydrocarbons to allow rapid response	Administrative	May allow for quicker response to a spill as resources will be within proximity.	Large costs associated with a dedicated resource on location. Modelling shows limited shoreline contact.	**Rejected** – Large cost associated with dedicated resources on location deemed grossly disproportionate to very low likelihood of occurrence and high natural dispersion of MDO.

7.6.5 Environmental Impact Assessment

The impact assessment follows the risk assessment approach as detailed in **Section 7.5.5.**

7.6.5.1 Identification of hotspots for consequence assessment

As described in **Section 7.5.5**, all HEVs within the MEVA and EMBA for vessel collision scenario is as listed in **Table 7-13**. The values and sensitivities associated with these HEVs have been described in Appendix C. Further to this, **Table 7-17**filters the HEV to identify hotspots where they meet the criteria as described in Section 7.5.5.

Table 7-17: Hotspot Analysis for surface release scenario – MDO

Receptor	HEV Ranking	Exposure Threshold		Hotspot	Hotspot Selection Rationale
		Low (EMBA)	Moderate (MEVA)		
Muiron Islands	3	Y	Y	Y	HEV Ranking of 3, within MEVA for surface hydrocarbons and dissolved hydrocarbons. Low probability (1.3%) of shoreline accumulation > 100 g/m^2
Ningaloo Outer NW	3	Y	Y	Y	HEV ranking of 3, within MEVA for surface hydrocarbons and dissolved hydrocarbons
Ningaloo Coast – Outer Coast North	1	Y	Y	Y	HEV ranking of 1, within MEVA for surface and dissolved hydrocarbons
Ningaloo Coast North	1	Y	N	Y	HEV ranking of 1, greatest potential for shoreline accumulation >100 g/m^2
Ningaloo Offshore	2	Y	Y	Y	HEV ranking of 2, within MEVA for surface and dissolved hydrocarbons

Ningaloo Coast North and the Muiron Islands have been identified as the Protection Priority Areas for the MDO scenario (refer to Section 6 of the OPEP).

Description	
Receptors	Physical environment (water quality and benthic habitats) Marine fauna (cetaceans, turtles, sharks, fish (pelagic), rays, seabirds, benthic fauna, plankton) Protected areas – KEFs and Marine Parks Socio economic receptors (commercial and recreational fishing, tourism, shipping, defence, heritage, indigenous heritage such as totemic sp., cultural heritage sites, sea country and spiritual values, other petroleum activities).
Consequence	II-Minor

A summary of the consequence assessment for each receptor category is presented below. Potential impact pathway (physical and chemical) of hydrocarbon exposure for receptors are summarised in **Table 7-14** and potential impacts to receptors within the EMBA are described in **Table 7-15**.

Threatened/migratory fauna

A surface release of MDO to the marine environment would result in a localised reduction in water quality in the upper surface waters of the water column. 36.1% of MDO is predicted to evaporate within 24 hours under constant wind conditions and under stronger wind and breaking wave conditions, around 80.5 % of the MDO will have entrained and additional 15% is expected to have evaporated within 24 hours of the spill. Therefore, only <1% of floating oil will remain on the water surface indicating that surface slick will be temporary. Surface oil, and entrained hydrocarbon in the sea surface layer, could have the physical effect of coating fauna interacting within and under the surface, including plankton, pelagic invertebrates and fishes, marine reptiles, marine mammals, and seabirds, and may also affect some species through ingestion of oiled fish (as described in **Table 7-15**).

The MDO EMBA overlaps reproductionBIAs for number of seabirds, including reproduction BIAs for the fairy tern, lesser crested tern, roseate tern, and wedge-tailed shearwater. An unplanned release of MDO is not expected to interfere with their reproductionactivity, but could cause slight secondary effects through ingestion after preening or ingestion of oiled fish (as described in **Table 7-14** and **Table 7-15**)

The dugong, whale shark (foraging), pygmy blue whale (foraging/migration) and humpback whale (migration) BIAs overlap the EMBA. There is the potential for behavioural disruption to the local population as individuals traverse the area affected with potential for coating of cetaceans and dugong and ingestion of oiled prey (plankton/fish) as described in **Table 7-14** and **Table 7-15**.

The EMBA overlaps BIAs for a number of turtle species. Nesting and/or mating occurs at turtle nesting beaches and rookeries approximately 35 km from the operational area (Muiron Islands, Ningaloo Coast). Therefore, turtle behaviour could be disrupted with the potential to threaten turtle populations (as described in **Table 7-15**), particularly those at significant rookeries on Muiron Islands and Ningaloo Coast.

Deteriorating water quality/chemical and terrestrial discharge is identified as a potential threat to turtles in the marine turtle recovery plan, and some bird and shark species. Habitat modification, degradation and disruption, pollution and/or loss of habitat are also identified as threats to sharks, birds, cetaceans and turtles in conservation management and recovery plans. Given the offshore location of the release, and volume of potential hydrocarbon release there is little potential for modification to or a decrease in the availability of quality habitat (shorelines/subsurface). Shoreline accumulation may present a major disruption to shoreline individuals. The volumes of accumulated MDO are unlikely to result in a major reduction in area available for seabirds and/or turtles species. The quality of some habitat at Ningaloo Coast North and the Muiron Islands (shorelines/subsurface) may be reduced for a period, with recovery within two years.

Physical environment and habitats

In the event of MDO release, hydrocarbons that reach nearshore environments have the potential to impact benthic coral reefs and mangrove areas which may result in a decrease in ecological values, given toxicity impacts associated with hydrocarbon exposure. The quality of habitat may be reduced for a period with recovery over the short term (up to two years). As described above, accumulated hydrocarbons on shorelines could impact marine fauna that utilise beaches such as shorebirds and turtles, dependent upon the timing of a spill. Beaches on the Ningaloo Coast are important for green turtles, and to a lesser extent hawksbills turtles, while Muiron Islands has a regionally important nesting site for loggerhead turtles. Impacts to turtles could occur from surface hydrocarbons if MDO accumulates on nesting beaches. Entrained hydrocarbon could contact sandy beaches at high tide. Such impacts would be most likely to nesting female turtles as they move up and down beaches or to turtle hatchlings as they emerge from nests six to eight weeks following nesting. The quality of habitat available to the turtles may be reduced, however, recovery is expected over the short term (up to two years).

Protected areas

The EMBA intersects several State Marine Parks, AMPs, Commonwealth Heritage Areas, and marine management areas (**Section 3.2**). Combined, these areas support all the habitats and faunal groups described above. Impacts to the habitat/fauna receptors described above therefore have an impact on the values of these reserves which could have flow-on effects to tourism revenue of coastal communities that provide access to these marine reserves.

Socio-economic receptors

There is the potential for hydrocarbons to temporarily disrupt fishing activities if the surface or entrained hydrocarbon moves through fishing areas. However, the high rate of evaporation means little MDO will become entrained, and few aromatic hydrocarbons are predicted to become dissolved.

It is possible there could be accumulation of oil in fish tissues to the extent that could result in hydrocarbon tainting of fish flesh. Connell and Miller (1981) compiled a summary of studies listing the exposure value concentrations at which tainting occurred for hydrocarbons. The results contained in their review indicate tainting of fish occurs when fish are exposed to ambient concentrations of 4 to 300 ppm (4000 to 300,000 ppb) of hydrocarbons in the water, for durations of 24 hours or more, with response to phenols and naphthenic acids being the strongest.

Description	
Given the volume of oil that could be potentially released and minimal fishing efforts, the impacts to fisheries on a stock level will not lead to significant reduction of population supporting the local activity. Tourism could also be affected by a spill, either from reduced water quality/shoreline oiling preventing recreational activities or reducing aesthetic appeal or from impacts to habitats and marine fauna. However, considering the characteristics of MDO, the impact will be short term and temporary. A number of oil and gas operators operate within the EMBA with existing projects and infrastructure in place as well as continuing drilling and exploration programs. An unplanned hydrocarbon release has the potential to disrupt these activities, with associated economic impact, albeit on a temporary basis. Cultural Heritage and Features Shoreline accumulation or contact by floating oil to an emergent receptor is not expected. However, potential impacts to cultural features from a hydrocarbon spill may include decline in traditional food sources and /or mortality of fauna with cultural significance. EP stakeholder consultation did not raise any concerns regarding potential impacts to cultural features including sea country.	
Likelihood	B-Unlikely
A worst-case hydrocarbon release resulting from a vessel collision could result in disruption and short-term effects on the receiving environment. Impacts could result in detectable but insignificant decrease in local population size and habitats. However, recovery would be expected within two years. With the proposed control measures in place to prevent releases, any decline in local populations or degradation of habitats is considered unlikely and therefore the activity will be conducted in a manner that is considered acceptable. The likelihood of a hydrocarbon release occurring due to a vessel collision/bunkering is limited, given the set of mitigation and management controls in place. Subsequently the likelihood of a vessel collision releasing hydrocarbons to the environment resulting in a minor consequence is considered to be Unlikely (b).	
Residual Risk	The residual risk associated with this event is Very Low.

7.6.6 Demonstration of as Low as Reasonably Practicable

The use of vessels is integral to activity and therefore vessels and associated risks of unplanned hydrocarbon releases, cannot be completely eliminated.

Offshore refuelling is standard industry practice and oil pollution legislation (Protection of the Sea (Prevention of Pollution from Ships) Act 1983 and MARPOL Annex I) has been developed to safeguard against the risk of a hydrocarbon spill occurring during refuelling. Other hydrocarbon types such as heavy fuel oil or intermediate fuel oil have specifically not been selected for this activity (only diesel will be used in the operational area) to ensure potential environmental impacts are reduced to ALARP.

Disconnection and sail away of the FPSO cannot be eliminated. The FPSO is marked on Australian Hydrographic Service Nautical Charts which identifies the location of the FPSO. Collision prevention equipment (i.e. navigation and radio equipment) and seagoing qualifications used on vessels/FPSO/will comply with applicable AMSA Marine Orders / MARPOL requirements. The FPSO has double sides protecting MDO tanks which reduce the potential for a vessel collision to rupture these tanks.

Recovery of floating assets and the damaged section of production flowline B will only occur in accordance with the recovery procedures and this control is effective in managing the risks of a vessel collision during recovery. No additional controls were identified for this activity.

The combination of the standard prevention CMs (which reduce the likelihood of the event happening), recovery procedures and the spill response strategies (which may reduce the consequence) together reduce the overall hydrocarbon spill risk.

No additional controls have been identified and given the controls in place detailed above, the assessed residual risk for this impact is Very Low and cannot be reduced further. It is considered therefore that the impact of the activities conducted is reduced to ALARP.

In terms of spill response activities, Santos will implement oil spill response as specified within the OPEP. A detailed ALARP assessment on the adequacy of arrangements available to support spill response strategies and CMs is presented in the OPEP.

7.6.7 Acceptability Evaluation

Is the risk ranked between Very Low to Medium?	Yes – residual risk is ranked as Very Low
Is further information required in the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – activity evaluated in accordance with Santos' Environmental Hazard Identification and Assessment Procedure (EA-91-IG-00004_5), which considers principles of ESD. The residual risk for this aspect is Very Low and therefore does not affect the outcomes of the principles of ecologically sustainable development as per **Table 5-5**.
Are risks and impacts consistent with relevant legislation, international agreements and conventions, guidelines, and codes of practice (including species recovery plans, threat abatement plans, conservation advice and Australian Marine Park zoning objectives)?	Yes – management consistent with OPGGS(E)R 2023 including safety case and WOMP. Santos has considered the values and sensitivities of the receiving environment, including, but not limited to conservation values of the identified protection priorities (**Section 3.2**), relevant species recovery plans, conservation management plans and management actions (**Table 3-9**).
Are risks and impacts consistent with Santos' Environment, Health, and Safety Policy?	Yes – aligns with Santos' Environmental Health and Safety Policy.
Are risks and impacts consistent with stakeholder expectations?	Yes – DBCA provided feedback based on its previous feedback to Santos (related to baseline monitoring) and the value of protected areas, which Santos has addressed within**Table 4-9** .
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – see ALARP above.

Given the control measures in place to prevent a vessel collision and refuelling incidents and the low frequency of significant volume diesel spills that occur in the industry, the likelihood of a loss of containment event during the activity is unlikely. The risks from diesel spills are well understood and the activities will be managed in accordance with relevant legislation and standards. The control measures proposed are consistent with applicable actions described in the relevant recovery plans and approved conservation advice and no stakeholder concerns have been raised regarding this aspect.

With the implementation of industry standard and activity-specific control measures to reduce the chance of a diesel spill event (and minimise impacts), the residual risk is assessed to be Very Low and ALARP. Control measures will reduce the risk of impact from MDO spill to a level that is acceptable.

7.7 Hydrocarbon spill- Loss of Well Control

7.7.1 Description of Event

Event	Worst case credible LOWC As described in 7.5.1 the Worst Case credible LOWC of liquid hydrocarbons is a subsea lease caused by external impact • That during extreme cyclonic conditions it is possible that a mobile offshore drilling unit (MODU) working for an operator of an adjacent field breaks loose from its mooring and drifts over the location of the Van Gogh, Coniston and Novara subsea wells • As a result, the well conductor could suffer a catastrophic failure resulting in loss of subsea tree and wellhead from the well, Undetected leak scenario There is also a smaller liquid hydrocarbon leak scenario. In this scenario, the small leak (internal integrity failure) occurs for up to 167 days (maximum time between proposed satellite imagery being taken 1/4ly, and 77 days to fix the leak, refer to **Section 7.5.1.1**). Total discharge volume is estimated to be 40.91 m^3 over 167 days. Oil Spill Modelling Quantitative hydrocarbon spill modelling was undertaken for the original worst-case scenario as outlined within **Section 7.5.1**. The LOWC worst-case discharge volumes that were used for the hydrocarbon spill modelling were based on Santos' Ningaloo Vision Cessation of Production Worst Case Hydrocarbons Discharge Scenarios: Van Gogh, Coniston and Novara Wells Technical File Note. Rev 2, October 2023. Outputs from the modelling were used to inform the environmental impact assessment and to assist with emergency planning. The environmental consequences of a LOWC are highly variable, dependent on the characteristics of the hydrocarbon released, the dynamics of the receiving environment and the proximity of the release point to sensitive environmental receptors.
Extent	The EMBA for the worst-case hydrocarbon spill from a LOWC was defined in **Section 3.1** For information about the extent of potential impact associated with a LOWC, refer to **Section 7.7.4.**
Duration	The worst-case duration of a LOWC is predicted as 77 days (refer to the OPEP). This is the estimated time required to drill a relief well. Hydrocarbons would persist within the environment for a longer period of time.

7.7.1.1 Stochastic Spill Modelling-Summary of Results for Moderate Exposure Thresholds

The spill modelling results (conservatively modelled over a 100 day period as outlined in **Section 7.5.1**) for the subsea loss of well integrity is as summarised below:

Floating oil

Floating oil concentrations at the low exposure threshold of ≥1 could extend up to 170 km from the release location. No exposure at, or above the moderate (10 g/m^2) or high (50 g/m^2) thresholds was predicted.

The greatest probability of exposure for concentrations exceeding 1g/m^2 is predicted at Ningaloo-Outer NW (3%) and the minimum time before exposure was 90 hours following the spill commencement.

Shoreline oil accumulation

No shoreline accumulation was predicted exceeding the moderate exposure threshold of 100 g/m^2.

The greatest probability of shoreline oil accumulation at, or above, the low exposure threshold 10 g/m^2 was Barrow Island (5%) followed by Ningaloo Coast North (4.33%).

Entrained hydrocarbons

No entrained hydrocarbon exposure was predicted to occur at, or above the low exposure threshold of 1,000 ppb.

Dissolved hydrocarbons

No dissolved hydrocarbon exposure was predicted to occur at, or above the low exposure threshold of 10 ppb.

Spill modelling results for the worst case LOWC scenario are presented in Appendix H.

7.7.2 Nature and Scale of Environmental Impacts

Hydrocarbon spills will cause a decline in water quality and may cause chemical (e.g., toxic) and physical (e.g., coating of emergent habitats, oiling of wildlife at sea surface) impacts to marine species. The severity of the impact of a hydrocarbon spill depends on the magnitude of the spill (i.e., extent, duration) and sensitivity of the receptor.

The magnitude of potential environmental impact from a crude oil release depends on multiple factors including hydrocarbon type, release volume and rate, and ocean and weather conditions.

An assessment of the sensitive environmental receptors at risk from a crude oil release has been determined based on a literature review and trajectory and fate modelling described above. Section 3.2 includes a description of biological environment present in the operational and/or EMBA.

Potential receptors: Physical environment (water and sediment quality, shoals and banks, benthic habitats), threatened or migratory fauna (marine mammals, marine reptiles, sharks, fish, rays, and birds), protected and significant areas (KEFs, Marine Parks), socio-economic receptors (fisheries, tourism, recreation, and other third-party operators), cultural receptors and sea country.

A LOWC release to the marine environment would result in reductions in water quality for at least one model time step (around an hour) at a probability greater than 10% across the 300 individual realisations per scenario over the worst-case spatial extents of:

- no entrained oil (>1000 ppb).
- no dissolved oil (>50 ppb)
- no shoreline accumulation (>100 g/m²); shoreline accumulation >10 g/m² was predicted for some emergent receptors
- surface oil (>10 g/m²): no contact.

The potential impact pathways (physical and chemical) of hydrocarbon exposure to relevant habitat and marine fauna receptors are summarised in **Table 7-14** and an impact assessment completed for receptors within the EMBA in **Table 7-15**.

7.7.3 Net Environmental Benefit Analysis

Refer to **Section 7.6.3** and Section 6 of the OPEP for information on the NEBA.

7.7.4 Environmental Performance Outcomes and Control Measures

The EPOs relating to this hazard include:

- No loss of containment of hydrocarbon to the marine environment [NV-EPO-09]

The extensive planning, risk assessment of the activity and the engineering and operational control measures in place are considered to result in a very low risk of a hydrocarbon release due to LOWC occurring. The control measures considered for this activity are shown in **Table 7-18**. The EPSs and measurement criteria for the EPOs are described in **Section 8.4**.

Operational controls that would be implemented to guide and effective response after a spill has occurred are provided within relevant sections of the OPEP, together with corresponding EPSs and measurement criteria.

Table 7-18: Control measure evaluation for hydrocarbon spill-LOWC

CM Reference	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
Standard Controls					
NV-CM-52	NOPSEMA accepted WOMP for wells on title	Administrative	Includes control measures for well integrity and well control in an accepted WOMP, that reduce the risk of unplanned discharges to the marine environment. The WOMP also includes information on: • barriers in place to isolate hydrocarbons from the	Costs associated with personnel time in writing, reviewing, and implementing the WOMP and Safety Case.	**Adopted** –Regulatory requirement.

CM Reference	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
			marine environment • inspection, monitoring and testing of barriers over the life of the well • response to increases in well integrity risk • notification and reporting requirements. Effective barriers manage isolation of the reservoir from the environment, acting to eliminate hydrocarbon releases.		
NV-CM-53	NOPSEMA WOMP for long term suspension of the NV wells covered by this EP, will be in place before FPSO disconnection and permanent sail away.	Administrative	A NOPSEMA WOMP that covers the long term suspension of the wells covered by this EP, will be in place before FPSO disconnection and permanent sail away	Documentation to be provided to the PM before FPSO disconnection and sail away under this EP.	**Adopted** – Benefits considered to outweigh costs.
NV-CM-54	Evidence of barrier testing of wells has been completed as detailed in the NOPSEMA WOMP which must be accepted prior to FPSO sail away.	Administrative	Provides evidence to demonstrate that barriers have been tested as detailed in the NOPSEMA WOMP, prior to FPSO disconnection for permanent sailaway from the field. Demonstrates that the business will have the reservoirs isolated from the subsea production system at the XTs with barrier testing of the XTs completed and verified as per the WOMP (DR-91-ZG-10048). Minimises the LOWC release volume and therefore impacts to the environment.	Documentation to be provided to the PM before FPSO disconnection and sail away under this EP.	**Adopted** – Benefits considered to outweigh costs.

CM Reference	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
NV-CM-55	Navigational charts	Administrative	Wells gazetted and marked on navigational charts to minimise the risk of collision from third parties.	Negligible costs, standard industry practice.	**Adopted-** benefits outweigh negligible costs to Santos
NV-CM-02	Stakeholder Consultation Strategy	Administrative	Santos will notify all relevant stakeholders listed, or as revised, in Section 4 of FAR activity details prior to commencement, including activity timing, vessel movements, proposed cessation date and vessel details. Minimises risk of collision from third parties.	Personnel cost and administrative costs associated with preparing material and liaising with stakeholders.	**Adopted** – Benefits considered to outweigh costs.
NV-CM-46	Accepted OPEP	Administrative	Implements response plans to deal with an unplanned hydrocarbon release quickly and efficiently to reduce impacts to the marine environment.	Administrative costs of preparing documents and large costs of preparing for and implementing response strategies.	**Adopted** – Regulatory requirement.
NV-CM-56	Third party agreements and contracts	Administrative	Memorandums of Understanding (MoUs) for relief well drilling and contracts for source control personnel assist in controlling the flow of hydrocarbons as quickly as possible to reduce environmental impacts.	Cost of contracts and MoUs.	**Adopted** – Benefits considered to outweigh costs.
NV-CM-57	Subsea integrity management plan	Administrative	Provides risk based IMMR approach to integrity which may result in some minor reduction of already very low shoreline accumulation (maximum ashore one tonne) and exposure to submerged hydrocarbons.	Minimal cost, plan already exists.	**Adopted** – Minimal cost, may provide small environmental benefit.
Additional Controls					
N/A	Additional (fortnightly) ROV monitoring of	Engineering	May reduce spill detection to two weeks (14 days) which	Vessel (workclass RoV) day rate of around $150,000 approximately $300,000 per 2	**Rejected** – The significant cost of additional surveillance of the subsea trees

CM Reference	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
	subsea trees, in addition to risk-based inspection program required by the accepted WOMP		consequently may result in some minor reduction of already very low shoreline accumulation (maximum ashore one tonne) and exposure to submerged hydrocarbons.	days campaign and hence over $7,800,000 a year. (Assuming 2 day campaigns, every fortnight as per considered for the current inforce EP control considered and also rejected)	with ROV is deemed grossly disproportionate to the low risk of an unplanned release of hydrocarbons. Also potentially difficult to implement to have a vessel for such a short time every fortnight, meaning that an annual hire might be needed, estimated to be tens of millions of dollars for the duration of the EP. Additionally, there is little to no environmental benefit, given the predicted very low shoreline accumulation and exposure to submerged hydrocarbons.
N/A	Additional (fortnightly) surveillance over the field using aircraft in addition to inspection program required by the accepted WOMP (relevant to 167-day leak scenario only)	Engineering	May reduce spill detection time to two weeks (14 days), which consequently may result in some minor reduction of already very low shoreline accumulation (minor accumulation at low threshold only).	Aircraft – over $1M per year (assumed $26,000 per hour and 1.5 hr flight time = ~$40,000 per flight.	**Rejected** - The cost of additional surveillance using aircraft and/or satellite imagery is deemed grossly disproportionate to the low risk of an unplanned leak occurring.
NV-CM-61	Quarterly satellite imagery to be taken of the title area	Engineering	Provides a method to aid in the earlier identification of a potential leak, and may result in some minor reduction of already very low shoreline accumulation (minor accumulation at low threshold only).	Satellite imagery – approximately $10k per image and 4 images per year.	**Adopted** Satellite imagery may detect a surface sheen from a leak
N/A	Protection and burying of subsea infrastructure	Engineering	Reduces the risk of external impact to subsea tree or wellhead and hence the risk of impact to sensitive receptors from a loss of hydrocarbons.	Large cost and seabed disturbance associated with protection and burying. Burying of infrastructure will impact inspection and maintenance campaigns and future decommissioning activities.	**Rejected** – Large cost associated with protection and burying is grossly disproportionate compared to the risk. May also cause issues for future inspection, maintenance, and decommissioning campaigns.
N/A	Rock dump of subsea infrastructure	Engineering	Reduces the risk of external impact to subsea tree or wellhead and	Large cost and seabed disturbance associated with rock dumping. Burying of infrastructure will impact	**Rejected** – Large cost associated with rock dumping is grossly disproportionate

CM Reference	Control Measure	Hierarchy of Control	Environmental Benefit	Potential Cost/Issues	Evaluation
			hence the risk of impact to sensitive receptors from a loss of hydrocarbons.	inspection and maintenance campaigns and future decommissioning activities.	compared to the risk. May also cause issues for future inspection, maintenance, and decommissioning campaigns.
N/A	Dedicated standby or guard vessel in field 24 hours	Protective	Reduces potential for third party external damage to subsea tree or wellhead.	Large costs associated with a dedicated standby/guard vessel. May not be successful in preventing adrift MODU from impacting subsea tree/wellhead because the worst case discharge scenario can only occur in an extreme cyclone event during which the dedicated standby vessel would have had to take evasive action and leave the area.	**Rejected** – Large cost associated with dedicated standby/guard vessel which is an ineffective control, would create more emissions and all of which outweigh any benefits.
N/A	Well specific source control plan in place for all wells	Administrative	May allow for quicker response to a loss-of well-control scenario, thereby limiting potential spill extent and volume.	Costs associated with organisational costs and reviewing relief well plans.	**Rejected –** Santos only has relief well plans in place for activities , where full bore discharge is credible (such as drilling new wells, workovers and plug and abandonment), and it is part of the intervention planning process. Given the low risk presented by wells and the standards used to manage well integrity, it is not considered an effective control.
N/A	MODU on standby for drilling a relief well	Engineering	Will allow for relief well to be drilled immediately as MODU is on standby.	Large cost associated with the MODU is estimated at $555,000 per day.	**Rejected –** MODU is at least approximately $555,000 per day, the cost of having a MODU on standby is disproportionate to the environmental benefit.

7.7.5 Environmental Impact Assessment

The impact assessment follows the risk assessment approach as detailed in **Section 7.5.5.**

7.7.5.1 Identification of Hotspots for Consequence Assessment

As described in **Section 7.5.5**, all HEVs within MEVA and EMBA for LOWC are listed in Table 7-19.The values and sensitivities associated with these HEVs have been described in Appendix C. Additionally, Table filters the HEV to identify the hotspots where they meet the criteria.

Table 7-19: Hotspot Analysis for LOWC 1,225 m3 of Van Gogh Crude Oil

Receptor	HEV Ranking	Exposure Threshold		Hotspot	Hotspot Selection Rationale
		Low (EMBA)	Moderate (MEVA)		
Ningaloo Outer NW	3	Y	N	N	Submerged receptor with low probability (3%) of floating oil at the low threshold

Receptor	HEV Ranking	Exposure Threshold		Hotspot	Hotspot Selection Rationale
		Low (EMBA)	Moderate (MEVA)		
Gascoyne AMP	3	Y	N	N	Submerged receptor with low probability (1%) of floating oil at the low threshold
Ningaloo Coast – Outer Coast North	1	Y	N	N	High HEV ranking, however this is a submerged receptor with very low probability (0.67%) of floating oil at the low threshold.
Ningaloo Coast North	1	Y	N	Y	High HEV ranking, 4.33% probability of shoreline accumulation at low threshold. Worst case accumulation volume of 38 m^3 and worst-case length of shoreline oiled 25 km.
Barrow Island	3	Y	N	Y	High HEV ranking, 5% probability of shoreline accumulation at low threshold. Worst case accumulation volume of 15 m^3 and worst-case length of shoreline oiled 10 km.
Dampier Archipelago	3	Y	N	N	High HEV ranking, however, very low probability (0.33%) of shoreline accumulation at low threshold. Worst case accumulation volume of 2 m^3 and worst-case length of shoreline oiled 1 km.
Lowendal Islands	3	Y	N	N	High HEV ranking, however, very low probability (0.67%) of shoreline accumulation at low threshold. Worst case accumulation volume of 2 m^3 and worst-case length of shoreline oiled 1 km.
Middle Islands Group	4	Y	N	N	Low HEV ranking, very low probability (0.33%) of accumulation at the low threshold.
Montebello Islands	3	Y	N	Y	High HEV ranking, 1.33% probability of shoreline accumulation at low threshold. Worst case accumulation volume of 10 m^3 and worst-case length of shoreline oiled 7 km.
Muiron Islands	2	Y	N	Y	High HEV. 2.33% probability of shoreline accumulation at the low threshold. Worst case accumulation volume of 6 m^3 and worst-case length of shoreline oiled 4 km.
Northern Islands Group	3	Y	N	N	High HEV ranking, however, very low probability (0.33%) of accumulation at the low threshold. Worst case accumulation volume of 2 m^3 and worst-case length of shoreline oiled 1 km.
Southern Islands Group	4	Y	N	N	Low HEV ranking, low probability (1.33%) of accumulation at the low threshold.
Thevenard Island	4	Y	N	N	Low HEV ranking, very low probability (0.67%) of accumulation at the low threshold.

Ningaloo Coast North, Barrow Island, Montebello Island and Muiron Islands were identified as hotpots since they had the highest probability of shoreline accumulation at low threshold. Ningaloo Coast North, Barrow Island and Muiron Islands were identified as priority protection areas (refer to Section 6.5 of the OPEP).

Description	
Receptors	Physical environment (water quality and benthic habitats) Marine fauna (cetaceans, turtles, sharks, fish (pelagic), rays, seabirds a, benthic fauna, plankton), marine flora Protected and significant areas (KEFs, marine parks) Socio economic receptors (commercial and recreational fishing, tourism, shipping, defence, heritage, indigenous heritage such as totemic sp., cultural heritage sites and sea country)
Consequence	III-Moderate

Physical environment

Entrained and dissolved hydrocarbons may have the potential to affect water quality, threatened and migratory marine fauna and submerged features such as KEFs and shoals in the vicinity of the operational area.

In the unlikely event of a LOWC, hydrocarbons are unlikely to reach shoreline habitats. No entrained and dissolved hydrocarbons are expected to occur at, or above the low threshold values of 1,000 ppb and 10 ppb respectively.

Threatened or migratory fauna

In the highly unlikely event of a LOWC, the volume of Van Gogh crude oil released would result in a reduction in water quality with the potential to impact marine fauna. Marine fauna present in the area may be potentially impacted by a spill through exposure to floating oil. A description of impacts to marine fauna from exposure to crude oil is provided in **Table 7-14** and **Table 7-15**.

Marine mammals (cetaceans and dugong), marine turtles and birds (seabirds and shore birds) are most at risk if exposed to floating oil. The EMBA overlaps BIAs for the Southern Right whale, (migration and reproduction), humpback whale (migration), Pygmy blue whale (foraging/migration) and dugong (reproduction), reproduction BIAs for the fairy tern, lesser crested tern, roseate tern, and wedge-tailed shearwater and a number of marine turtle BIAs. There is potential for behavioural disruption to the local population as individuals traverse the area affected. Impacts from a LOWC release would be greatest within several kilometres from the spill when the toxic aromatic components of the hydrocarbon will be at their highest concentration and when the hydrocarbon is at its thickest on the surface of the receiving waters.

Habitat modification, degradation, disruption, or loss, deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant recovery plans and conservation advice (**Table 3-9**). With controls in place that align with relevant actions described in various recovery plans, the activity will be conducted in a manner that reduces potential impacts to ALARP and an acceptable level.

Protected areas

The EMBA intersects several Marine Parks, AMPs, Commonwealth Heritage Areas, and marine management areas (**Section 3.2**). Combined, these areas support all the habitats and faunal groups described above. Impacts to the habitat/fauna receptors described above therefore have an impact on the values of these reserves which could have flow-on effects to tourism revenue of coastal communities that provide access to these marine reserves.

Socio-economic receptors

There is the potential for surface oil to temporarily disrupt fishing activities if the surface oil moves through fishing areas. Surface hydrocarbons at or above the moderate exposure threshold of 10 g/m^2 are not expected. Dissolved and entrained hydrocarbons at or above the low threshold values are also not expected. Fisheries contacted by floating oil a t or above the low threshold (1 g/m^2) may be temporarily closed, which would have an impact on fishermen through loss of income. Market value/ demand for fish may also be impacted due to actual or perceived tainting of catches. The significance of any decrease in market value/demand for fish may be substantial to those few individual fisheries operating in the affected areas, but it is unlikely to cause any significant long-term impact.

Heritage values are not predicted to be impacted by surface oil although in the short-term there would be an impact on the aesthetic value of the area.

There are oil and gas operators operate within the EMBA with existing projects and infrastructure in place as well as continuing drilling and exploration programs. A Van Gogh crude subsea release has the potential to disrupt these activities if contacted by floating oil, with associated economic impact, albeit on a temporary basis.

Tourism could be affected by spilled Van Gogh crude, either from reduced water quality/shoreline oiling preventing recreational activities or reducing aesthetic appeal or from impacts to habitats and marine fauna. marine nature-based tourist activities, resulting in a loss of revenue for operators.

Indigenous users may be impacted if a land-based response is required. However, consultation will help manage activities such that potential impacts are reduced to acceptable levels. Indigenous communities' fish in the shallow coastal and nearshore waters of Ningaloo Reef, and therefore, may be potentially impacted if a hydrocarbon release were to occur as fish may be 'tainted' as described above.

On the basis of the above assessment a LOWC and given the lack of floating, entrained, dissolved or accumulated shoreline hydrocarbons at or above the moderate threshold values, the impact consequence as a result of the LOWC scenario is considered Moderate (III).

Likelihood	Remote

In accordance with the Santos Risk Matrix, a worst-case surface release of crude as a result of LOWC has been defined as an 'Remote' event as it 'requires exceptional circumstances and is unlikely even in the long-term'.

The likelihood of a LOWC event occurring is based on industry statistics, Santos' statistics, and the standard preventive control measures in place. Wells are designed with essential engineering and safety control measures to prevent a loss of containment

Description	
occurring. A full-bore blowout scenario is not possible during the cessation of production phase as Santos has no plans to actively re-enter any of the NV wells. The worst-case credible scenario of an external force from another operator's MODU breaking mooring and dragging anchors over subsea wells and causing a LOWC through stress cracking of a subsea tree or wellhead has not happened in the Australian industry. For Offshore Operations of North Sea Standard, the frequency of well blowout for a production well (includes shut in production wells) from external causes was found to be 2.7×10^{-5} per well year. There were no records of well releases caused by external factors in the database. Frequency is based on 8 blowouts in UK, Norway, and US Gulf of Mexico between 1980 and 2014 (IOGP 2019). Management controls in place to control the flow of hydrocarbons include construction design and regular inspection and maintenance. Additional industry-standard and activity-specific control measures to reduce the chance of a loss of containment event have also been implemented including (but not limited to) procedures such as a NOPSEMA accepted WOMP, safety case, and a spill response plan (OPEP). These control measures are considered to reduce the risk of a loss of containment (and minimise impacts) occurring to a level that is acceptable. In accordance with the Santos Risk Matrix, given the control measures in place, the likelihood of worst-case seabed release of crude as a result of LOWC resulting in a Moderate (III) consequence is considered to be Remote.	
Residual Risk	Very low

7.7.6 Demonstration of As Low As Reasonably Practicable

The combination of the standard and additional prevention control measures (**Section 7.7.4**) (which reduce the likelihood of the event happening), and the spill response strategies (which may reduce the consequence) together reduce the hydrocarbon spill risk.

The NOPSEMA accepted WOMP includes control measures to prevent a release occurring (such as barrier testing requirements), and measures if any integrity issues were to be identified through inspection requirements of the WOMP. Santos has also proposed quarterly satellite imagery to be obtained and analysed to help early identification of an unplanned leak.

Based on the stochastic spill modelling, Santos has determined applicable source control response measures to limit the spill volume from a LOWC event to ALARP. Further detail is provided below.

Source control and detection controls

A number of source control options have been evaluated for the activity (refer to OPEP). Of these source control options; the drilling of a relief well is considered the primary means of controlling the source in the event of an unplanned well release. Spill response and impact assessment for this activity has been based on the relief well taking 77 days to execute. A breakdown of the key tasks and their timeframe to drill a relief well in 77 days have been included in Section 9 of the OPEP.

Supporting controls to allow the relief well schedule to be met include:

- rig capability register is maintained
- status of relief well tangible equipment
- APPEA MoU provides for access to other operators' rigs
- contracts and MoUs for third party independent well control specialist personnel are in place.

The implementation timeframe of this control is key to its effectiveness. Additional controls were considered to reduce the timeframe for detection; however, all were rejected based on no environmental benefit realised for significant additional cost. A full-bore well blowout is not considered a credible scenario for the cessation of operations phase, and no shoreline accumulation above threshold levels is predicted.

Spill mitigation controls

Santos considers that through the selection of appropriate spill response strategies, development of spill response controls and maintenance of preparedness arrangements and resources to implement these controls, spill risk is mitigated to ALARP. Preparedness spill response controls are outlined in **Table 7-18** while those that would be implemented in the event of a spill are outlined within the OPEP.

7.7.7 Acceptability Evaluation

Is the risk ranked between Very Low and Medium?	Yes – maximum credible hydrocarbon spill volume (crude oil from a LOWC) residual risk is ranked as Very Low.
Is further information required in the consequence assessment?	Yes – hydrocarbon spill modelling results were used to determine consequence and risk.
Are risks and impacts consistent with the principles of ESD?	Yes – activity evaluated in accordance with Santos' Environmental Hazard Identification and Assessment Procedure (EA-91-IG-00004_5), which considers principles of ESD. The residual risk for this aspect is Very Low and therefore does not affect the outcomes of the principles of ecologically sustainable development as per **Table 5-5**
Are risks and impacts consistent with relevant legislation, international agreements and conventions, guidelines, and codes of practice (including species recovery plans, threat abatement plans, conservation advice and Australian Marine Park zoning objectives)?	Yes – management consistent with OPGGS(E)R 2023 Regulations, including safety case and WOMP. Santos has considered the values and sensitivities of the receiving environment, including but not limited to conservation values of the identified protection priorities (**Section 3**) relevant species recovery plans, conservation management plans and management actions(**Table 3-9**). Management is also consistent with the zoning of the Australian marine parks, and their management plans in that risks have been reduced to ALARP, e.g., implementation of spill response activities will limit impacts, thereby conserving the marine park values which includes RAMSAR wetlands and other habitats critical to the diversity and value of the protected areas.
Are risks and impacts consistent with Santos' Environment, Health and Safety Policy?	Yes – aligns with Santos' Environment, Health, and Safety Policy.
Are risks and impacts consistent with stakeholder expectations?	Yes – DBCA provided feedback based on its previous feedback to Santos (related to baseline monitoring) and the value of protected areas, which Santos has addressed within **Table 4-9**.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes – see ALARP above.

The likelihood of a LOWC event during the activity is remote when considering industry statistics, Santos' statistics, and the preventative controls in place. Wells are designed with essential engineering and safety control measures to prevent a LOWC incident occurring. Additional industry-standard and activity-specific control measures to reduce the chance of the event occurring (and minimise impacts) have also been implemented, including (but not limited to) procedures such as the WOMP, NV Integrity Management Plan and a spill response plan (OPEP). In accordance with Santos' risk assessment process, the residual risk is Very Low and considered to be ALARP. The proposed control measures will reduce the risk of impacts from a LOWC to a level that is considered acceptable.

7.8 Minor Hydrocarbon Release (Surface and Subsea)

7.8.1 Description of Event

Event	Causes for accidental hydrocarbon releases (other than diesel release from a vessel collision or bunkering, and LOWC) include: • Spills of hydraulic fluids, lubricant oils and (stored) waste oils • ROV failure (including oil seal, hydraulic system hose and quick disconnect system failures) or loss of contents of ROV mounted bladder (MEG, methanol, or hydraulic fluid) • loss of primary containment (drums, tanks, intermediate bulk containers [IBCs], etc) due to handling, storage and dropped objects (e.g., swinging load during lifting activities) • vessel pipework failure or rupture, hydraulic hose failure, inadequate bunding • lifting – dropped objects damaging diesel infrastructure (hoses, pipes, tanks, etc) • subsea cutting equipment failure (hydraulic system seals, hoses etc.) • rupture or leak from a flowline, service line or umbilical. The vessels main engines and equipment such as pumps, cranes, winches, power packs and generators require MDO for fuel and a variety of hydraulic fluids and lubricating oils for efficient operation and maintenance of moving parts. These products are present within the equipment and also held in storage containers and tanks on the vessels. Small hydrocarbon leaks could occur from loss of primary containment due to handling, storage and dropped objects (during lifting activities). Volumes are likely to be small and limited to the volume of individual containers (e.g., IBC, 44-gallon drums) stored on the deck of vessels. The credible spill for this scenario is considered to be the loss of an IBC (1 m^3) during transfer from a support vessel to a primary vessel. Equipment deployed overboard during activities (e.g., ROV operations and subsea cutting and infrastructure recovery) can result in unplanned discharges (of hydraulic fluids) directly to the marine environment due to equipment failure, equipment interactions with the vessel thrusters and/or accidental contact with subsea equipment. Minor accidental loss of other hydrocarbon-based liquids (e.g., used lubricating oils, cooking oil, and hydraulic oil) to the marine environment could also occur via tank pipework failure or rupture, hydraulic hose failure, inadequate bunding and/or storage, insufficient fastening or inadequate handling which could result in impacts to water quality and hence sensitive environmental receptors. Potential discharge fluids from a rupture or leak from a flowline, service line, or umbilical include treated seawater (including corrosion inhibitor) and residual reservoir hydrocarbons (in the flowlines). Prior to the removal of the damaged section of production flowline B and additional flushing under this EP, the production flowline B between DC2 and DC3 will not have been flushed. A detailed analysis of on the contents on this line has determined that 14m^3 of residual hydrocarbon between DC2 and DC3 still remains in this line, of which 4m^3 is estimated to be present within the 910m damaged section of Production Line B (**Table 2-6**). Methanol, hydraulic fluid, treated seawater, umbilical demulsifier and scale inhibitor unplanned discharges associated with the wet parked flowlines and umbilicals are discussed in **Section 7.4**
Extent	The relative low volumes are expected to rapidly disperse into the marine environment. Below toxic/harmful threshold concentrations are expected to occur at short distances from the hydrocarbon release point. In the event of a worst-case spill, potential impacts beyond the operational area are not expected.
Duration	Potentially toxic/harmful threshold concentrations limited to a very short period immediately following release, i.e., in the order of hours.

7.8.2 Nature and Scale of Environmental Impacts

Potential receptors: Physical environment (water quality and benthic habitats), threatened migratory or local fauna (cetaceans, turtles, sharks, fish (pelagic), rays, seabirds), socio economic receptors (commercial and recreational fishing, shipping) and cultural receptors.

Physical environment

When hydraulic fluids and lubricating fluids are spilled in the marine environment, they behave similarly to marine diesel oil (MDO), which is explained in Section 7.5.3. Hydraulic fluids are medium oils of light to moderate viscosity and spread quickly, similar to diesel oil. They dissipate quickly, especially in rough sea conditions. Lubricating oils are more viscous and therefore have a slightly slower spreading rate in the event of a spill.

If a small volume of hydrocarbons is released into the marine environment, it could contaminate the water surrounding the vessels or the release. However, the impacts would be localized and restricted to the immediate area of the spill. In the open ocean, the concentrations would likely disperse rapidly and fall below the threshold of impact. These small volumes of hydrocarbons are not expected to have flow-on effects on sediment quality or benthic habitats.

Spills are unlikely to reach sensitive receptors such as the Ningaloo WHA, marine parks or shorelines, and no emergent or intertidal habitats are expected be affected.

Threatened migratory or local fauna

The minor and temporary changes in water quality resulting from the spill are not predicted to harm marine fauna, including cetaceans, turtles, pelagic fish, sharks, marine mammals, seabirds. The operational area overlaps with BIA for pygmy blue whales (migration) and humpback whales (migration) (refer to **Section 3.2.6.1**), and therefore may be present in the operational area. Several Recovery Plans and Conservation Advice for threatened and migratory species that may be present in the operational area identify marine pollution and deteriorating water quality from chemical discharge as threats to these species (**Table 3-9**).

Small hydrocarbon releases are unlikely to have an ecological effect on threatened or migratory fauna, given the small volumes that could be released, and the open ocean environment. Physical coating of marine fauna or lethal/sub-lethal toxicity effects from any accidentally released hydrocarbons, is considered unlikely, given the expected low concentrations and short exposure times.

Socio-economic receptors

The localised and temporary impacts of an unplanned minor spill of hydrocarbons make it unlikely to have a significant impact on commercial fishing, tourism, and recreational activities. Additionally, there are no cultural receptors within the operational area.

7.8.3 Environmental Performance Outcomes and Control Measures

The EPOs relating to this event include:

- No loss of containment of hydrocarbon to the marine environment [NV-EPO-09]

The control measures considered for this event are shown in **Table 7-20** and EPSs and measurement criteria for the EPOs are described in Section 8.4.

Table 7-20: Control measure evaluation for minor release of hydrocarbon

CM Reference	Control Measure	Environmental Benefit	Potential Cost/Issues	Evaluation
Standard Controls				
NV-CM-30	General chemical management procedures	Potential impacts to the environment are reduced through following correct procedures for the safe handling and storage of chemicals.	Personnel costs associated with ensuring procedures are in place and implemented during inspections.	**Adopted** – Benefits of ensuring procedures are followed and measures implemented outweigh the costs of personnel time.
NV-CM-46	Hazardous chemical management procedures	Reduces the risk of spills and leaks (discharges) to sea by controlling the storage, handling, and clean-up.	Personnel cost associated with implementation of procedures and permanent or temporary storage areas.	**Adopted** – Benefits of ensuring procedures are followed and measures implemented outweigh costs.
NV-CM-31	Chemical selection procedure	Reduced toxicity to marine environment through ensuring only environmentally acceptable chemicals discharged to sea.	Potential additional cost and delays of chemical substitution.	**Adopted** – Benefits of ensuring procedures are followed outweighs costs.
NV-CM-58	Maritime Dangerous Goods Code	Dangerous goods managed in accordance with International Maritime Dangerous Goods Code to reduce the risk of an environmental incident, such as an accidental release to	Cost associated with implementation of code/procedure.	**Adopted** – Benefits of ensuring procedures are followed and measures implemented outweigh costs.

CM Reference	Control Measure	Environmental Benefit	Potential Cost/Issues	Evaluation
		sea or unintended chemical reaction.		
NV-CM-50	Accepted OPEP	Implements response plan to deal with an unplanned hydrocarbon spill quickly and efficiently in order to reduce impacts to the marine environment.	Personnel and administrative costs associated with preparing documents, ongoing management (spill response exercises) and implementation of OPEP.	**Adopted** – Regulatory requirement must be adopted.
NV-CM-47	Vessel spill response plans (SOPEP/ SMPEP)	Effective management of an accidental spill (discharge to sea) to reduce impact to the environment.	Personnel cost associated with ongoing management (spill response exercises) and implementation of plans.	**Adopte**d – Benefits of ensuring response plans in place, are followed and measures implemented and that the vessels are compliant outweighs costs.
NV-CM-59	Infrastructure left in situ (wet parked until future decommissioning) will be marked on nautical charts	Ensures other marine users are aware of the presence of equipment abandoned in situ.	Negligible, given is standard industry practice.	**Adopted -** Benefits considered to outweigh negligible costs.
NV-CM-60	ROV inspection and maintenance procedures	Maintenance and pre-deployment inspection on ROV completed as scheduled to reduce the risk of hydraulic fluid releases to the marine environment.	Additional personnel costs of ensuring procedures in place and followed.	**Adopted** – Benefits of ensuring procedures are followed outweigh costs.
NV-CM-21	Vessel planned maintenance system (PMS) to maintain vessel DP, engines, and machinery	Ensure vessel is running efficiently and routine maintenance endeavours to ensure emissions are minimal.	No additional costs, is industry best practice.	**Adopted – No additional costs**
NV-CM-57	Subsea Integrity management plan	Reduces the potential for unplanned release of minor hydrocarbons by ensuring that subsea systems integrity is maintained.	Cost associated with implementation of the plan.	**Adopted-** benefits outweigh costs associated.
Additional controls				
N/A	Scupper plugs continuously in place to prevent deck drainage	Would eliminate potential impacts of contaminants being discharged to sea in rainwater.	Increased health and safety risks from wet deck not draining. Large amounts of water on a vessel's deck can also cause stability issues (free-surface effect).	**Rejected-** Safety considerations outweigh the benefit, given small volumes of contaminants.

7.8.4 Environmental Impact Assessment

Description	
Receptors	Physical environment (water quality and benthic habitats) Threatened migratory or local fauna (cetaceans, turtles, sharks, fish (pelagic), rays, seabirds, and shorebirds) Socio economic receptors (commercial and recreational fishing, shipping) Indigenous heritage.
Consequence	I-Negligible
In the event of a minor hydrocarbon loss, the volumes are likely to be small and rapidly disperse into the marine environment. The small volumes, dilution, and dispersion from natural weathering processes such as ocean currents are such that spills will be localised and for a short duration. The number of receptors present at the activity location are expected to be limited to a small number of transient individuals. The susceptibility of marine fauna to hydrocarbons is determined by the type of hydrocarbon and the length of exposure. However, since the extent and duration of exposures would be limited, the risk of exposure to marine fauna from this hazard is considered to be very low. The small amounts of hydrocarbons released in worst-case scenarios will diminish quickly in both time and distance at the sea surface, thus reducing the impact on organisms. Additionally, rapid dilution at deeper depths would also lead to a rapid decrease in the impact on organisms over time and distance. Deteriorating water quality and marine pollution are identified as potential threats to a number of marine fauna species in relevant recovery plans and conservation advice and to MNES (**Table 3-9**). With control measures in place, the activity will be conducted in a manner that reduces potential impacts to ALARP and an acceptable level. Toxic impacts to the benthic communities would be limited to a highly localised area around the release location for a subsea release. Impacts from surface spills to benthic communities are not expected due to the water depths (>340 m). Near the sea surface, fish are able to detect and avoid contact with surface slicks and as a result, fish mortalities rarely occur in open waters from surface spills (Kennish, 1997; Scholz et al., 1992). Pelagic fish species are therefore generally not highly susceptible to impacts from hydrocarbon spills. In offshore waters near to the release point, pelagic fish are at risk of exposure to the more toxic aromatic components of the hydrocarbons. Pelagic fish in offshore waters are highly mobile and comprise species such as tunas, sharks, and mackerel. Due to their mobility, it is unlikely pelagic fish would be exposed to toxic components for long periods in this spill scenario. The more toxic components would also rapidly evaporate, and concentrations would significantly diminish with distance from the spill site, limiting the potential area of impact. The potential minor hydrocarbon releases are not expected to significantly impact the receiving environment with control measures proposed to prevent releases; therefore, the activity will be conducted in a manner that is considered acceptable. EP stakeholder consultation did not raise any concerns regarding potential impacts to cultural features including sea country. Given a small hydrocarbon spill would not result in a decreased population size at a local or regional scale or long-term reduction to water and sediment quality, it is expected a spill of this nature would result in a Negligible (I) consequence.	
Likelihood	D – Occasional
A small hydrocarbon liquid release has reduced likelihood due to a number of controls being in place, which include: • The control measures in place to prevent spills • The procedures in place to clean up a spill. Consequently, the likelihood of releasing minor volumes of hydrocarbons to the environment is considered Unlikely.	
Residual Risk	The residual risk associated with this event is Low.

7.8.5 Demonstration of As Low As Reasonably Practicable

The activities require the storage and use of hydraulic and lubricating oils/fluids for equipment and machinery, including for ROV and cutting operations. Removing these oils/fluids from the activity is not possible. To minimize the risks of minor spills and leaks, a comprehensive set of control measures has been proposed. Any potential impact on marine fauna resulting from a spill of this magnitude would be minimal and limited to a small number of individuals in a specific area. The assessed residual risk for this impact is already low and cannot be further reduced. Therefore, it is concluded that impact of these activities conducted is ALARP.

7.8.6 Acceptability Evaluation

Is the risk ranked between Very Low and Medium?	Yes – maximum minor hydrocarbon spill residual risk is ranked as Very Low.
Is further information required in the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – activity evaluated in accordance with Santos' Environmental Hazard Identification and Assessment

	Procedure (EA-91-IG-00004_5) which considers principles of ecologically sustainable development. The residual risk for this aspect is Very Low and therefore does not affect the outcomes of the principles of ecologically sustainable development as per **Table 5-5.**
Are risks and impacts consistent with relevant legislation, international agreements and conventions, guidelines, and codes of practice (including species recovery plans, threat abatement plans, conservation advice and Australian Marine Park zoning objectives)?	Yes – management consistent with SOLAS 1974 and Navigation Act 2012, Marine Order 91 (Marine pollution prevention – oil) and with relevant recovery plans and conservation advice for species that may occur in the operational area (**Table 3-9**).
Are risks and impacts consistent with Santos' Environment, Health, and Safety Policy?	Yes – aligns with Santos' Environment, Health, and Safety Policy.
Are risks and impacts consistent with stakeholder expectations?	Yes – DBCA provided feedback based on its previous feedback to Santos (related to baseline monitoring) and the value of protected areas, which Santos has addressed within **Table 4-9**.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes-see ALARP above

With the control measures in place to prevent the accidental release of minor volumes of hydrocarbons, and potential social and environmental impacts and risk well understood and considered low, the environmental risk associated with a minor hydrocarbon release is considered acceptable.

7.9 Subsea Release of Dry Gas to the Marine Environment

7.9.1 Description of Event

<table>
<tr><td>Event</td><td>
An unplanned release of hydrocarbon in the form of dry gas from the subsea wells is a credible scenario during the NV operations phase. The scenario is still considered credible during the life of this EP until wells are plugged and abandoned. The scenario applies to all wells operated in gas injection or gas production mode (G1 and all oil producers operated as gas injectors).

An unplanned release of dry gas from the subsea system is no longer credible for this EP, as the subsea system will have already been flushed (displacing gas out of the subsea system) before the NV CoPFAR EP commences. It is not discussed further in this EP.

Gas Well

The following scenarios could result in subsea dry gas releases from the gas wells:
<table>
<tr><th>No.</th><th>Scenario</th><th>Maximum credible volume</th></tr>
<tr><td>1</td><td>External Impact - Anchor / Chain drag over wellhead and subsea tree. (Gas wells)</td><td>Oil: 0 stb/d
Gas: 0.0216 MM scf/d</td></tr>
<tr><td>2</td><td>Internal impact – corrosion / failure of primary and secondary barriers, flow behind casing.</td><td>Oil: 0 stb/d
Gas: 1.1 MM scf/d
This scenario is the worst-case credible release.</td></tr>
</table>
The worst-case release dry gas release could result in a maximum release (leak) of approximately 486.2 MM scf of dry gas over a 442 day period (365 days between IMMR RoV inspections in accordance with the WOMP and a period of 77 days to fix the leak. This section focuses on the worst case release volume only.
</td></tr>
<tr><td>Extent</td><td>In the event of an unplanned release of dry gas impacts would be highly localised.</td></tr>
<tr><td>Duration</td><td>In the event of a dry gas leak as a result of internal influence, it is credible that the leak is undetected for a period of time until IMMR inspection by ROV (e.g. A worst case scenario would be that a failure in integrity occurs immediately after one ROV survey and is not detected until the next IMMR inspection in accordance with the WOMP). The maximum period a release goes undetected for is 365 days plus the timeframe required to fix the dry gas release. Santos has continued to apply the 77 duration to fix the leak. Therefore, in total, the duration may conservatively reach 442 days.</td></tr>
</table>

7.9.2 Nature and Scale of Environmental Impacts

Potential receptors: Plankton; invertebrates; fish; marine mammals; marine reptiles.

In the event of an accidental loss of gas containment from a subsea source, the released gas would rise towards the sea surface, passing through three distinct zones of interest (ARC, 2018) (refer also **Figure 7-6**): The Jet Zone, the Zone of established flow and the Zone of Surface Flow.

Jet Zone: The high velocity at the release point generates the jet zone which is dominated by the initial momentum of the gas. Water is also entrained into this zone, resulting in a rapid loss of momentum a few metres from the leak source.

Zone of Established Flow (ZOEF): In the buoyant plume zone, momentum is no longer significant relative to buoyancy, which then becomes the predominant force for the remainder of the plume. In this region the gas continues to expand due to reduced hydrostatic pressures. Although the terminal velocity of a gas bubble in stationary water is only about 0.25 m/s, velocities in the centre of release plumes can reach 5 to 10 m/s due to the build-up of momentum

in the entrained bulk liquid. That is, the water surrounding the upward moving gas is entrained and given an upward velocity, which is then increased as more gas moves through at a relative velocity of 0.25 m/s.

Zone of Surface Flow (ZOSF): At the surface interaction zone the upward flow of water turns and moves in a horizontal layer away from the centre of the plume. The influence of the surface water currents cause this radial flow to turn downward forming a parabolic surface influence as seen in **Figure 7-6**. The gas exits from the centre of the plume and causes a surface disturbance or 'boil zone' identified by the arrows in the top view of **Figure 7-6.**

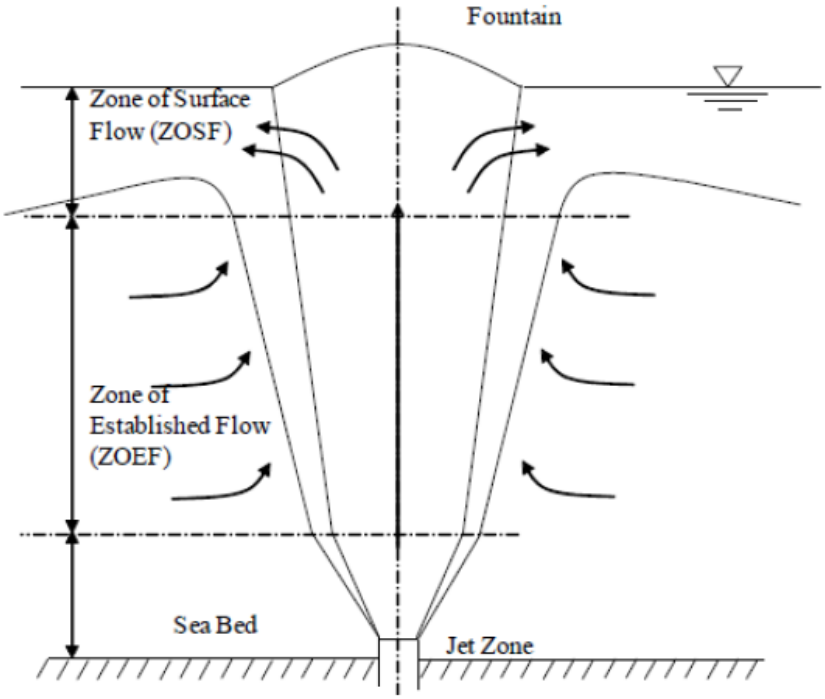

Figure 7-6 Typical underwater release with gas plume formation

The most predominate subsea plume zone is the ZOEF. The extents of the Jet Zone and the ZOSF are considered insignificant by comparison. The plume is assumed to form a simple conical shape, whereby its diameter at sea surface is related to the depth of its release.

A Subsea Release and Dispersion Assessment (Add Energy, 2016), was prepared for the Van Gogh Infill and Novara drilling campaign in 2018, which showed that the loss of containment from the gas lift flowline would results in the gas rising to the sea surface in a plume of gas bubbles that break the surface in a 'boil zone'. The boil zone would have a diameter of 72–74 m and the gas above the boil zone would disperse in the atmosphere in a buoyant plume as the gas (predominantly methane) is less dense than air. Whilst the cumulative gas released from a full loss of containment from the gas lift flowline is less than the production well dry gas release scenarios, the principles are consistent in that subsea gas release assumes the boil zone at the sea surface is a function of water depth. The diameter of the boil zone is taken to be 20% of the water depth (Add Energy, 2016), hence a diameter of 72m – 74m at 370m depth, is still applicable for a larger loss of containment.

Sea surface gas fires in the boil zone could occur (if there was an ignition source), but are unsustainable and would rapidly self-extinguish, because the significant subsea dispersion as the gas rises to the sea surface, means that the velocity of the gas-air mixture rising from the boil zone is less than the fundamental burning velocity for the gas, leading to the fire self-extinguishing.

Given the nature of the gas releases that could occur, continuous exposure to marine fauna at high concentrations is not expected as the bubbles rise towards the surface in a plume in water depths of 340 – 400m, as well as dissolving in the water column before being released to atmosphere. The fraction of dissolved methane will be oxidised to carbon dioxide and water, resulting in low to non-existent toxicity on the water column.

7.9.3 Environmental Performance and Control Measures

The Environmental Performance Outcome (EPO) relating to this event is:

- No loss of containment of hydrocarbon to the marine environment [EPO-NV-10]

The control measures considered for this event are shown below (**Table 7-21**). EPS and measurement criteria for the adopted controls are presented in **Table 8-2.**

Table 7-21 Control Measures Evaluation for a Dry Gas Release

Reference No	Control measure (CM)	Hierarchy of Controls	Environmental benefit	Potential cost/issues	Evaluation
Standard Controls					
NV-CM-52	NOPSEMA accepted WOMP for wells on title	Administrative	Includes control measures for well integrity and well control in an accepted WOMP, that reduce the risk of unplanned discharges to the marine environment. The WOMP also includes information on: barriers in place to isolate hydrocarbons from the marine environment inspection, monitoring and testing of barriers over the life of the well response to increases in well integrity risk notification and reporting requirements. Effective barriers manage isolation of the reservoir from the environment, acting to eliminate hydrocarbon releases.	Costs associated with personnel time in writing, reviewing, and implementing the WOMP and Safety Case.	**Adopted** – Regulatory requirement.
NV-CM-53	NOPSEMA WOMP for long term suspension of the NV wells covered by this EP, will be in place before FPSO disconnection and permanent sail away.	Administrative	A NOPSEMA WOMP that covers the long term suspension of the wells covered by this EP, will be in place before FPSO disconnection and permanent sail away	Documentation to be provided to the PM before FPSO disconnection and sail away under this EP.	**Adopted** – Benefits considered to outweigh costs.
NV-CM-54	Evidence of barrier testing of wells has been completed as detailed in the NOPSEMA WOMP which must be accepted prior to FPSO sail away.	Administrative	Provides evidence to demonstrate that barriers have been tested as detailed in the NOPSEMA WOMP, prior to FPSO disconnection for permanent sailaway from the field. Demonstrates that the business will have the reservoirs isolated from the subsea production system at the XTs with barrier testing of the XTs completed and verified as	Documentation to be provided to the PM before FPSO disconnection and sail away under this EP.	**Adopted** – Benefits considered to outweigh costs.

Reference No	Control measure (CM)	Hierarchy of Controls	Environmental benefit	Potential cost/issues	Evaluation
			per the WOMP (DR-91-ZG-10048). Minimises the LOWC release volume and therefore impacts to the environment.		
NV-CM-55	Navigational charting of infrastructure	Administrative	Subsea infrastructure is charted on Australian AHS Nautical Charts so other users are aware.	No additional costs. Other marine users may be temporarily excluded from areas, disrupting their activities.	**Adopted** – the positive benefits of identifying subsea infrastructure to other marine users outweighs the process of arranging their charting with AHS.
NV-CM-55	Navigational charts	Administrative	Wells gazetted and marked on navigational charts to minimise the risk of collision from third parties.	Negligible costs, standard industry practice.	**Adopted-** benefits outweigh negligible costs to Santos
NV-CM-56	Third party agreements and contracts	Administrative	Memorandums of Understanding (MoUs) for relief well drilling and contracts for source control personnel assist in controlling the flow of hydrocarbons as quickly as possible to reduce environmental impacts.	Cost of contracts and MoUs.	**Adopted** – Benefits considered to outweigh costs.
NV-CM-57	Subsea integrity management plan	Administrative	Provides risk based IMMR approach to integrity which may result in some minor reduction of already very low shoreline accumulation (maximum ashore one tonne) and exposure to submerged hydrocarbons.	Minimal cost, plan already exists.	**Adopted** – Minimal cost, may provide small environmental benefit.
Additional control measures					
N/A	Well specific source control plan in place for all wells	Administrative	May allow for quicker response to a loss-of well-control scenario, thereby limiting potential spill extent and volume.	Costs associated with organisational costs and reviewing relief well plans.	**Rejected** – Santos only has relief well plans in place for activities, where full bore discharge is credible (such as drilling new wells, workovers and plug and abandonment), and it is part of the intervention planning process. Given the low risk presented by wells and the standards used to manage well integrity, it is not

Reference No	Control measure (CM)	Hierarchy of Controls	Environmental benefit	Potential cost/issues	Evaluation
					considered an effective control.
N/A	MODU on standby for drilling a relief well	Engineering	Will allow for relief well to be drilled immediately as MODU is on standby.	Large cost associated with the MODU is estimated at least $555,000 per day.	**Rejected** – MODU is at least approximately $555,000 per day, the cost of having a MODU on standby is disproportionate to the environmental benefit.

7.9.4 Environmental Impact Assessment

The following individual scenarios (as described in **Section 7.9.1)** leading to a subsea release of dry gas have been risk assessed in the below sections:

- Subsea dry gas release from a gas production well or gas injector/producer as a result of loss of integrity from *external impact or internal impact*

However, the internal impact scenario results in the worst case credible dry gas release, so that is what is assessed within Section 7.9.4.1.

7.9.4.1 Subsea dry gas release from a gas well as a result of Internal Impact

Receptors	Physical environment (water quality and benthic habitats) Threatened migratory or local fauna (cetaceans, turtles, sharks, fish (pelagic), rays, seabirds, and shorebirds) Socio economic receptors (commercial and recreational fishing, shipping)
Consequence	II - Minor

Physical Environment and Habitats

Given the nature of the gas releases that could occur, even though the leak could potentially occur for up to 442 days, continuous exposure to marine fauna at high concentrations is not expected as the bubbles rise towards the surface in a plume as well as dissolving in the water column before being released to atmosphere.

The gas is approximately 90% Methane (classified as non-toxic and non-hazardous), 9% nitrogen and 1% carbon dioxide. Methane is not readily water soluble, and so will not saturate the water column, instead rising rapidly to release to the atmosphere at the sea surface rather than being trapped at depth in the water column. Dry gas is also not persistent on the surface.

In sea water in the presence of oxygen, methane oxidises to carbon dioxide and water (H^2O). However, in a pipeline rupture scenario, approximately 85 percent of the CH_4 released will reach the atmosphere, as the fraction oxidised in the water column amounts to 5 to 15 percent (Ward et al., 1987).

Threatened, Migratory, and Local Fauna

Receptors occurring within the subsea plume from the gas release could be impacted – within a radius of 10's of metres from the release site. These receptors may include pelagic fish, marine invertebrates and marine mammals. Benthic receptors would not be affected as the gas bubbles rise to the surface.

Studies on the impacts of methane on fish have shown that a behavioural response can be elicited through continuous exposure such as increased activity and scattering within the water (avoidance behaviour). Continuous exposure at high concentrations can lead to toxic impacts but is dependent on the exposure time, environmental conditions and the nature of the toxicant (Patin, 1999).

Patin (1999) also notes that "Further exposure leads to chronic poisoning. At this stage, cumulative effects at the biochemical and physiological levels occur. These effects depend on the nature of the toxicant, exposure time, and environmental conditions. A general effect typical for all fish is gas emboli. These emerge when different gases

(including the inert ones) oversaturate water". However, in this credible worst case scenario the methane component is not readily water soluble and therefore will not saturate the water, given the deep, and open ocean environment. Low-oxygen conditions caused by methane-consuming microbes, could potentially threaten small marine organisms such as plankton, fish larvae, and other creatures that can't roam large distances. A small component of gas may remain in the waters occupied by and surrounding the gas plume. However, 'trapping/saturation' of the gas and significant oxygen depletion (and subsequent impacts to marine life) is not expected to occur given the surrounding waters are generally well mixed and experience open ocean currents. Given the nature of the gas releases that could occur in field, continuous exposure at high concentrations is not expected as the bubbles rise towards the surface in a plume as well as dissolving in the water column before being released to atmosphere. The fraction of dissolved methane will be oxidised to carbon dioxide and water, resulting in low to non-existent toxicity on the water column. Therefore, the gas would not saturate the water in the immediate vicinity of the release where the majority of potential receptors are concentrated (assuming fauna are present in the immediate area due to a possible attraction to the infrastructure). Rapid dissipation of the bubbles as they rise to the sea surface will also occur. Therefore, toxicological impacts are not expected, but if toxic impacts did result, this would be to individuals in the immediate vicinity of the plume and would be no more than a minor impact. There are BIAs (for migratory blue whale, humpback whale and seabird species that overlaps with the operational area. However, the areas are not feeding or aggregation grounds and the expectation is that these species would be transiting the area. The BIA area is far larger than the operational area and so the species are able to avoid the localised impact area if needed. Given the transient nature of marine mammals through the deep water open ocean area, no significant impacts on marine mammals would be expected. Whilst behavioural impacts (avoidance of the area) may result from the release of bubbles, physiological impacts are not expected and the impact on behaviour is considered minor. The gas release will dissipate quickly within the water column. Regardless of the volume of gas released it is expected that this will result in a minor consequence as the environmental effects would last for weeks to less than 12 months, with short term behavioural impacts to a small proportion of the local population, with no impact on the physical environment, habitat or its function. A discharge of this nature would result in a *Minor (II)* consequence.
Likelihood — Remote
In accordance with the Santos Risk Matrix, a worst-case subsea release of dry gas from a production well has been defined as a 'Remote' event as it 'requires exceptional circumstances and is unlikely even in the long term'. In accordance with the Santos Risk Matrix, given the control measures in place, the likelihood of a worst-case subsea release of dry gas from a production well resulting in a *Minor (II)* consequence is considered to be Remote.
Residual Risk — The residual risk associated with this event is **Very Low**

7.9.5 Demonstration of ALARP

The combination of the standard and additional prevention control measures (**Section7.9.3**) which reduce the likelihood of the event happening), and the strategies to fix any leak, (which may reduce the consequence) together reduce the release risk.

A release of dry gas is demonstrated to have a minor potential environmental impact in what is a deep water, open ocean environment. The WOMP includes control measures to prevent a release occurring (such as barrier testing requirements), and measures if any integrity issues were to be identified through inspection requirements of the WOMP.

Wells are marked on nautical charts for mariners, and a cautionary zone applies around the facility to keep other users away from the field. Operational vessels undertaking subsea inspection activities are required to have dynamic positioning allowing subsea inspection activities to be performed without anchoring and eliminating the risk of anchor dragging impacting the subsea system. The use redundancy in the positioning system provides assurance that inspection activities will not damage subsea infrastructure through dragging objects (e.g. ROVs).

7.9.6 Acceptability Evaluation

Is the risk ranked between Very Low and Medium?	Yes – maximum dry gas release is ranked very low
Is further information required in the consequence assessment?	No – potential impacts and risks are well understood through the information available.
Are risks and impacts consistent with the principles of ESD?	Yes – activity evaluated in accordance with Santos' Environmental Hazard Identification and Assessment Procedure (EA-91-IG-00004) which considers principles of ecologically sustainable development.

	The residual risk for this aspect is Very Low and therefore does not affect the outcomes of the principles of ecologically sustainable development as per **Table 5-5**
Are risks and impacts consistent with relevant legislation, international agreements and conventions, guidelines, and codes of practice (including species recovery plans, threat abatement plans, conservation advice and Australian Marine Park zoning objectives)?	Yes – management consistent with SOLAS 1974 and Navigation Act 2012, Marine Order 91 (Marine pollution prevention – oil) and with relevant recovery plans and conservation advice for species that may occur in the operational area **(Table 3-7)**
Are risks and impacts consistent with Santos' Environment, Health, and Safety Policy?	Yes – aligns with Santos' Environment, Health, and Safety Policy.
Are risks and impacts consistent with stakeholder expectations?	Yes – TWS commented on integrity of wells with potential for release, but as outlined in **Section 7.9** Santos has control measures in place to avoid this occurring.
Are performance standards such that the impact or risk is considered to be ALARP?	Yes-see ALARP above

With the control measures in place to prevent the unplanned release of dry gas from a gas well, and potential social and environmental impacts and risk well understood and considered low, the environmental risk associated with a minor hydrocarbon (dry gas) release is considered acceptable.

8. Implementation Strategy

OPGGS(E)R 2023 Requirements
Section 22(1)
The environment plan must contain an implementation strategy for the activity in accordance with this section.

The specific measures and arrangements that will be implemented in the event of an oil pollution emergency are detailed within the OPEP.

Stakeholder engagement is assessed separately for the requirements of the activities. Ongoing stakeholder management strategies are discussed in Section 4 and Section 8.13.

8.1 Environmental Management System

OPGGS(E)R 2023 Requirements
Section22(2). Environmental management system
The implementation strategy must contain a description of the environmental management system for the activity, including specific measures to be used to ensure that, for the duration of the activity: (a) the environmental impacts and risks of the activity continue to be identified and reduced to a level that is as low as reasonably practicable; and (b) control measures detailed in the environment plan are effective in reducing the environmental impacts and risks of the activity to as low as reasonably practicable and an acceptable level; and (c) environmental performance outcomes and standards set out in the environment plan are being met.

The Santos management system exists to support its moral, professional, and legal obligations to undertake work in a manner that does not cause harm to people or the environment. The management system is a framework of policies, standards, processes, procedures, tools, and control measures that, when used together by a properly resourced and competent organisation, ensure:

- a common HSE approach is followed across the organisation
- HSE is proactively managed and maintained
- the mandatory requirements of HSE management are implemented and are auditable
- HSE management performance is measured, and corrective actions are taken
- opportunities for improvement are recognised and implemented
- workforce commitments are understood and demonstrated.
- This implementation strategy is designed to meet the requirements of the EP to require that:
- environmental impacts and risks continue to be identified for the duration of the activity and reduced to ALARP
- control measures are effective in reducing environmental impacts and risks to ALARP and acceptable levels
- environmental performance outcomes and standards set out in this EP are met
- stakeholder consultation is maintained throughout the activity as appropriate.

8.2 Environment, Health, and Safety Policy

Santos' Environment, Health and Safety Policy (Appendix A) clearly sets out Santos' strategic environmental objectives and the commitment of the management team to continuous environmental performance improvement. This EP has been prepared in accordance with the fundamentals of this policy. By accepting employment with Santos, each employee and contractor is made aware during the recruitment process that he or she is responsible for the application of this policy.

8.3 Hazard Identification, Risk and Impact Assessment and Controls

Hazards and associated environmental risks and impacts for the proposed activities have been systematically identified and assessed in this EP (refer to **Sections 6** and **7**). The control measures and EPS that will be

implemented to manage the identified risks and impacts, and the environmental performance outcomes that will be achieved, are detailed below in **Table 8-2**.

To ensure that environmental risks and impacts remain acceptable and ALARP during the activity and for the duration of this EP, hazards will continue to be identified, assessed and controlled as described in **Section 8.11** and **Section 8.12.**

Any new, or proposed amendment to a control measure, EPS or EPO will be managed in accordance with the Environment Management of Change Procedure (EA-91-IQ-10001) (**Section 8.11.2**).

Oil spill response control measures and environmental performance standards and outcomes are listed in the Ningaloo Vision Cessation of Production and Floating Asset Removal OPEP (7750-650-EIS-0008).

8.4 Environmental Performance Outcomes

OPGGS(E)R 2023 Requirements
Section21(2). Environmental performance outcomes and standards
The environment plan must: a) set environmental performance standards for the control measures identified under paragraph (5)(c); and b) set out the environmental performance outcomes against which the performance of the titleholder in protecting the environment is to be measured; and c) include measurement criteria that the titleholder will use to determine whether each environmental performance outcome and environmental performance standard is being met.

To ensure environmental risks and impacts will be of an acceptable level, environmental performance outcomes for this EP have been defined and are listed in **Table 8-1** for planned activities and unplanned events, those relating to oil spill response are listed in the Ningaloo Vision Cessation of Production and Floating Asset Removal OPEP (7750-650-EIS-0008) These outcomes will be achieved by implementing the identified control measures to the defined environmental performance standards.

Table 8-1: Environmental Performance Outcomes

Reference	Environmental Performance Outcomes
NV-EPO-01	Reduce impacts on other marine users through the provision of information to relevant stakeholders such that they are able to plan for their activities and avoid unexpected interference
NV-EPO-02	Seabed disturbance is limited to planned activities and defined locations within the operational area
NV-EPO-03	Reduce impacts to marine fauna from lighting on vessels through limiting lighting to that required by safety and navigational lighting requirements
NV-EPO-04	No injury or mortality to *Environment Protection and Biodiversity Conservation Act 1999* and the WA *Biodiversity Conservation Act 2016* listed fauna during activities
NV-EPO-05	No unplanned objects, emissions or discharges to sea or air
NV-EPO-06	No unplanned discharges to sea, air or land as a result of the transport and disposal of recovered seabed and floating assets
NV-EPO-07	Disposal of floating assets is undertaken by suitably experienced contractors at appropriately licenced waste facilities, with the final disposal of the waste streams undertaken in accordance with SMS-EXA-OS01-PD02-PD01 Waste Monitoring and Reporting
NV-EPO-08	No introduction of marine pest species
NV-EPO-09	No loss of containment of hydrocarbon to the marine environment

8.4.1 Control Measures and Performance Standards

The control measures (CM) that will be used to manage identified environmental impacts and risks and the associated statements of performance required of the control measures (i.e., EPSs) are listed in **Table 8-2**. Measurement criteria (MC) outlining how compliance with the control measure and environmental performance standard could be evidenced are also listed.

Table 8-2: Control Measures and Environmental Performance Standards for the Proposed Activity (Environment Plan)

Control Measure	CM Reference	Environmental Performance Standard	EPS Reference No.	Measurement Criteria	EPO Reference No.
Maritime Notices	NV-CM-01	Information provided to either AMSA, Department of Defence, AHO and/or nearest port authority on primary vessel(s) and IMMR vessel arrival and departure so the maritime industry is aware of petroleum activities.	NV-CM-01-EPS-01	Transmittal records demonstrate notification of activity prior to the activity commencing	NV-EPO-01 NV-EPO-09
Santos' stakeholder consultation strategy	NV-CM-02	Santos will notify all relevant stakeholders of relevant activity details prior to commencement, including activity timing, vessel movements, proposed cessation date and vessel details.	NV-CM-02-EPS-01	Santos' correspondence to relevant stakeholders	NV-EPO-01 NV-EPO-09
		If any primary vessel departs and returns from the operational area, relevant maritime notices will be updated.	NV-CM-02-EPS-02	Santos' correspondence to relevant stakeholders	
		All correspondence with external stakeholders is recorded.	NV-CM-02-EPS-03	Consultation records	
		Santos' consultation coordinator is contactable before, during and after completion of the planned activity to ensure stakeholder feedback is evaluated and considered during the operational activity phases.	NV-CM-02-EPS-04	Consultation coordination contact details made available to all relevant people in all correspondence.	
		Santos will not restrict commercial fishing access to the operational area and is committed to concurrent operations where safety of either vessel is not compromised.	NV-CM-02-EPS-05	Incident records show nil incidents of complaints of restrictions to commercial fishing access to the operational area, and show nil incidents of vessel safety being compromised by concurrent operations	
No fishing from project vessels	NV-CM-03	Personnel are prohibited from recreational fishing activities on vessels.	NV-CM-03-EPS-01	Induction records (e.g. induction presentation/pack) confirming no fishing prohibition is communicated to all personnel	NV-EPO-01
Existing (gazetted) PSZ established around the DTM location	NV-CM-04	A 500 m PSZ is defined around the NV DTM locations.	NV-CM-04-EPS-01	Notice to Mariners placed with AHO outlining PSZ and timeframes of the activity	NV-EPO-01 NV-EPO-09
Safety Exclusion Zone established around primary vessels during floating asset and damaged flowline removal activities to reduce potential for collision or interference with other marine user activities	NV-CM-05	A 500 m safety exclusion zone is established around the primary vessels during the activity	NV-CM-05-EPS-01	Notice to Mariners placed with AHO outlining PSZ and timeframes of the activity	NV-EPO-01 NV-EPO-09
Lighting will be used as required for safe work conditions and navigational purposes	NV-CM-06	Vessel navigation lighting and equipment is compliant with COLREGS/Marine Orders 30: Prevention of Collisions, and with Marine Orders 21: Safety of Navigation and Emergency Procedures.	NV-CM-06-EPS-01	Offshore Vessel Inspection Database (OVID) or equivalent confirms vessel certification compliance with applicable regulations	NV-EPO-01 NV-EPO-03 NV-EPO-09
Seafarer certification	NV-CM-07	Vessel crews are trained and competent, in accordance with Flag State regulations, to navigate vessels and reduce interaction with other marine users.	NV-CM-07-EPS-01	Training matrix	NV-EPO-01 NV-EPO-09
Identification system	NV-CM-08	Primary vessels have an Automatic Identification System to aid in their detection at sea.	NV-CM-08-EPS-01	Completed inspection report or statement of conformance supplied by primary vessel contractors	NV-EPO-01
Constant bridge watch	NV-CM-09	Competent crew shall maintain constant bridge-watch.	NV-CM-09-EPS-01	Bridge log or equivalent	NV-EPO-01 NV-EPO-04
Primary vessel personnel inductions	NV-CM-10	Induction materials reinforce to the Vessel Master the importance of marine communications in the event of any potential interactions with active commercial fishers.	NV-CM-10-EPS-01	Induction records (e.g. induction presentation/pack) talks to the importance of communication requirements.	NV-EPO-01
DTM tow and offloading procedure	NV-CM-11	A DTM Tow & Offloading Procedure will be developed in conjunction with the contractors preforming the recovery and tow operations. The DTM Tow & Offloading Procedure will be prepared and developed with consideration for - navigational hazards, - navigational controls, - required notifications, - way points, - applicable nautical charts, - metocean condition limits for lifting due to dynamic loads and for controlling swing of DTM above water, if lifted onto vessel. Proposed heavy lift operations require certain metocean conditions to limit dynamic loading and be able	NV-CM-11-EPS-01	Records confirm version of document and evidence of implementation in the project. Records confirming floating assets towed in accordance with floating assets tow plan	NV-EPO-01 NV-EPO-05

Control Measure	CM Reference	Environmental Performance Standard	EPS Reference No.	Measurement Criteria	EPO Reference No.
		to control movement/swing of the DTM once clear of the water. Where infield metocean conditions do not allow for lifting on title, a sheltered water location will be sought. - places of refuge, Environmental Sensitive Sea Area's (ESSA) and designated Area to be Avoided (ATBA), including a figure showing the planned tow route.			
		The DTM Tow & Offloading Procedure will be reviewed by Santos and a 3rd Party Verifier to confirm it has considered and addressed the items identified in NV-CM-11-EPS-01.	NV-CM-11-EPS-02	Records confirm the verification of report was undertaken prior to tow, and report/certificate/document or equivalent.is available	
		The DTM Tow and Offloading Procedure will: - be prepared prior to towing; - include recovery procedures specific to managing an unplanned loss of buoyancy of the DTM on tow; - detail the contingency procedures for preventative actions if the buoy starts to sink, and - steps (e.g. emergency bridle) to be taken to recover the DTM in the event of an unplanned loss of buoyancy or DTM sinking to the seabed during tow. If the DTM experiences an unplanned loss of buoyancy during tow, recovery of the DTM is conducted as soon as practicable to do so.	NV-CM-11-EPS-03	Records confirm development of procedure, and implementation of procedure if required, including the issue of notifications (as required) by maritime law (Refer Table 8-4) Records demonstrate that the DTM loss of buoyancy is resolved to allow continued transport to port if it suffers an unplanned loss of buoyancy during tow from the operational area to port.	NV-EPO-01 NV-EPO-05
Recovery procedures	NV-CM-12	A recovery procedure/s will be developed, reviewed, and issued for use prior to mobilisation to the field. A Constructability Review as well as a Hazard Identification and Risk Assessment Review of the procedures will be performed to ensure that risks have been managed in accordance with ALARP principles prior to issuing procedures for use. Procedures developed, are to include: • Riser Disconnection and Recovery Procedure which details the procedural activities associated with the removal and recovery of the risers and wet storage of the Umbilical • Damaged Flowline Disconnection and Recovery Procedure which details the procedural activities associated with the removal and recovery of the damaged section of the production flowline B • DTM Disconnection Procedure (TV-22-IG-00061) which details the procedural activities associated with the disconnection of the DTM	NV-CM-12-EPS-01	Records of the constructability review and HAZID are available. Records confirm floating assets recovered in accordance with procedure.	NV-EPO-01 NV-EPO-05
Engagement of independent Marine Warranty Surveyor for verification of the tow connection points or primary structural members for towing or lifting of the buoy.	NC-CM-13	Engagement of an independent Marine Warranty Surveyor for verification of the DTM lifting and/or tow operations will be undertaken, and will include aspects such as: - lift/tow connection points, or - primary structural members on the DTM - lift/tow equipment - lifting/tow vessel; and - document how they are suitable for lifting or towing, or suitable, with implemented adjustments.	NV-CM-13-EPS-01	Records confirm the Marine Warranty Surveyor has undertaken verification activity	NV-EPO-01 NV-EPO-05
DTM pick up line removed once the FPSO has departed the operational area.	NV-CM-14	When the FPSO has disconnected from the DTM and departed the operational area, the DTM pick up line will be removed by the support/standby vessel	NV-CM-14-EPS-01	Records show that the pickup line has been removed once the FPSO has departed the operational area.	NV-EPO-01 NV-EPO-04
Add a float/buoy to the DTM arrangement once the FPSO has departed the operational area.	NV-CM-15	A surface float/buoy is tethered to the DTM when the FPSO has departed the operational area in order to act as a visual marker to infrastructure below the water surface.	NV-CM-15-EPS-01	Records show that the float/buoy was added to the DTM	NV-EPO-01 NV-EPO-04
Support vessel on standby during FPSO disconnection and sail away	NV-CM-16	During FPSO disconnection and sail away from the operational area. A support vessel will be on standby to warn off any third party vessels that approach the PSZ.	NV-CM-16-EPS-01	Bridge log or equivalent	NV-EPO-01 NV-EPO-09

Control Measure	CM Reference	Environmental Performance Standard	EPS Reference No.	Measurement Criteria	EPO Reference No.
Pre- and post asset removal seabed ROV surveys of seabed asst removal activities and wet storage locations	NV-CM-17	Survey of assets (DTM, risers and associated componentry, damaged production flowline B), including seabed adjacent to infrastructure completed prior to and after the floating asset and damaged flowline removal activities.	NV-CM-17-EPS-01	Completed survey reports with associated videos and/or photos	NV-EPO-02
Wet storage positioning	NV-CM-18	Any equipment that has been temporarily wet stored during floating asset and damaged flowline removal is surveyed to record its position (and limited to within 50m of existing infrastructure where practicable), and the site is surveyed to confirm removal at end of decommissioning.	NV-CM-18-EPS-01	Record of wet-stored equipment position	NV-EPO-02
Premobilisation review and planning of lighting on vessels is undertaken prior to vessel based activities	NV-CM-19	Where a vessel based activity may require 24-hour lighting, a project execution plan, planning and inductions, will include a requirement to minimise external lighting where practicable during the activity.	NV-CM-19-EPS-01	Where a vessel based activity may require 24-hour lighting, a project execution plan, planning and inductions, will include a requirement to minimise external lighting where practicable during the activity.	NV-EPO-03
Procedures for interacting with marine fauna	NV-CM-20	Vessels comply with Santos protected marine fauna interaction and sighting Procedure (EA-91-11-00003) which ensures compliance with Part 8 of the EPBC Regulations 2000 and includes controls for minimising the risk of collision with marine fauna.	NV-CM-20-EPS-01	Conformance to be checked on receipt of marine fauna sighting datasheets Completed vessel statement of conformance	NV-EPO-04
		Any vessels strike with cetaceans will be reported in the National Ship Strike Database.	NV-CM-20-EPS-02	Conformance checked on Santo's receipt of incident report	
		Helicopter contractor procedures comply with Santo's Protected Marine Fauna Interaction and Sighting Procedure (EA-91-11-00003) which ensures compliance with Part 8 of the Environment Protection and Biodiversity Conservation Regulations 2000, which includes controls for minimising interaction with marine fauna.	NV-CM-20-EPS-03	Helicopter contractor procedures align with Santo's Protected Marine Fauna Interaction and Sighting Procedure (EA-91-11-00003)	
Vessel planned maintenance system (PMS) to maintain vessel DP, engines, and machinery	NV-CM-21	Documented maintenance program is in place for equipment on vessels that provides a status on the maintenance of equipment.	NV-CM-21-EPS-01	CMMS records	NV-EPO-04 NV-EPO-05 NV-EPO-09
Marine assurance standard	NV-CM-22	Vessels selected and on-boarded in accordance with the Offshore Marine Assurance Procedure (SO-91-ZH-10001) to ensure contracted vessels are operated, maintained, and manned in accordance with industry standards (for example, Marine Orders) and regulatory requirements (this EP) and the relevant Santos procedures mentioned in this EP.	NV-CM-22-EPS-01	Completed documentation in accordance with procedure	NV-EPO-04 NV-EPO-05 NV-EPO-09
Vessel bridge crew receive induction in marine fauna observations, marine fauna interaction procedure requirements	NV-CM-23	All vessel bridge crew complete project specific HSE induction that includes information and requirements relating to marine fauna observations and reporting requirements, such that vessel crew will be competent to: • observe marine fauna that are potentially approaching the vessel • complete marine fauna observation reporting requirements as required by the Santos procedure for interacting with marine fauna, Part 8 of the EPBC Regulations 2000 and the National Ship Strike Database.	NV-CM-23-EPS-01	Induction records demonstrate that bridge crew were inducted on the requirements of the Santos protected marine fauna interaction and sighting Procedure (EA-91-11-00003)	NV-EPO-04
Waste incineration	NV-CM-24	Waste incineration managed in accordance with MARPOL Annex VI	NV-CM-24-EPS-01	Completed documentation in accordance with procedure	NV-EPO-05
Fuel oil quality	NV-CM-25	MARPOL compliant fuel oil will be used during the activity	NV-CM-25-EPS-01	Fuel bunkering records and/or relevant purchase records	NV-EPO-05 NV-EPO-09
International oil pollution prevention certificate	NV-CM-26	Pursuant to MARPOL Annex VI primary vessels and support vessels(s) will maintain a current International Air Pollution Prevention Certificate as relevant to vessel class which certifies that measures to prevent ODS emissions, and reduce nitrogen oxides, sulphur oxides and incineration emissions during the activity are in place.	NV-CM-26-EPS-01	OVID or equivalent confirms current international air pollution prevention certificate	NV-EPO-05
Ozone depleting substance handling procedures	NV-CM-27	ODS managed in accordance with MARPOL Annex VI to reduce the risk of an accidental release of ODS to air.	NV-CM-27-EPS-01	OVID or equivalent confirms current international air pollution prevention certificate	NV-EPO-05
Waste (garbage) management procedure	NV-CM-28	Waste management procedure implemented to reduce the risk of unplanned release of waste to sea. The procedure includes standards for:	NV-CM-28-EPS-01	Completed Santos Offshore Representative inspection checklist	NV-EPO-05 NV-EPO-07

Control Measure	CM Reference	Environmental Performance Standard	EPS Reference No.	Measurement Criteria	EPO Reference No.
		• bin types • lids and covers • waste segregation • bin storage			
		No waste (garbage) discharged to sea, unless the waste is food waste disposed in accordance with MARPOL Annex V.	NV-CM-28-EPS-02	Completed garbage disposal record book or recording system verified by Santos Offshore Representative	
				Marine assurance inspections	
		Pursuant to MARPOL Annex V, placards displayed to notify personnel of waste disposal restrictions.	NV-CM-28-EPS-03	Completed Santos Offshore Representative inspection checklist	
				Completed marine assurance inspections	
Deck cleaning product selection	NV-CM-29	Deck cleaning products planned to be released to sea meet the criteria for not being harmful to the marine environment according to MARPOL Annex V.	NV-CM-29-EPS-03	SDS and product supplier supplementary data, and chemical risk assessments as required	NV-EPO-05
General chemical management procedures	NV-CM-30	Safety datasheet (SDS) available for all chemicals to aid in the process of hazard identification and chemical management.	NV-CM-30-EPS-01	Contractor's routine inspection of the chemical storage/ SDSs verified by onsite inspection – by either Santos Offshore Representative or Marine Assurance Inspection	NV-EPO-05
		Chemicals managed in accordance with SDS in relation to safe handling and storage, spill-response and emergency procedures, and disposal considerations.	NV-CM-30-EPS-02	Contractor's chemical management procedures verified by onsite inspection – by either Santos Offshore Representative or Marine Assurance Inspection	
Chemical selection procedure	NV-CM-31	Products with potential to be released to the sea meet the criteria for not being harmful to the marine environment according to MARPOL Annex V; or Gold/Silver/D or E rated through OCNS; or have a completed Santos ecotoxicological risk assessment so only environmentally acceptable products are used. The selection criteria for chemical preference through the risk assessment process as outlined Santos Operations Chemical Selection, Evaluation and Approval Procedure (EA-91-II-10001) is low aquatic toxicity (e.g., EC50/LC50 > 100 mg/L), low bioaccumulation potential (e.g., Log Pow <3) and readily biodegradable (e.g., >60 in 28 days OECD 306).	NV-CM-31-EPS-01	Completed Santos risk assessments show chemicals selected are acceptable as per Santos Operations Chemical Selection, Evaluation and Approval Procedure (EA-91-II-10001)	NV-EPO-05 NV-EPO-09
Sewage treatment system	NV-CM-32	Pursuant to MARPOL Annex VI, vessel(s) have a current International Sewage Pollution Prevention (ISPP) Certificate which certifies that required measures to reduce impacts from sewage disposal are in place (as applicable to vessel class).	NV-CM-32-EPS-01	OVID or equivalent confirms current International Sewage Pollution Prevention (ISPP) Certificate	NV-EPO-05
		Sewage discharged in accordance with MARPOL Annex IV.	NV-CM-32-EPS-02	Completed Santos Offshore Representative inspection checklist	
				Sewage discharge records	
		Preventive maintenance on sewage treatment equipment is completed as scheduled.	NV-CM-32-EPS-03	OVID or equivalent confirms current International Sewage Pollution Prevention Certificate	
Oily water treatment system	NV-CM-33	Oily mixtures (bilge water) only discharged to sea in accordance with MARPOL Annex I.	NV-CM-33-EPS-01	Completed Santos Offshore Representative inspection checklist	NV-EPO-05
				Oil record book or log where available	
		Preventative maintenance on oil filtering equipment completed as scheduled.	NV-CM-33-EPS-02	Maintenance records or evidence of maintenance in operational reports where available	
		Pursuant to MARPOL Annex I, vessel(s) will have an International Oil Pollution Prevention (IOPP) Certificate which certifies that required measures to reduce impacts of planned oil discharges are in place.	NV-CM-33-EPS-03	OVID or equivalent confirms current International Oil Pollution Prevention Certificate	
Recycling/onshore disposal of decommissioned assets in accordance with relevant legislative requirements.	NV-CM-34	Decommissioned assets are disposed of or recycled using suitably qualified contractors at appropriately licenced waste facilities, in accordance with relevant legislation of the receiving jurisdiction.	NV-CM-34-EPS-01	Transport and disposal / recycling contracts and waste receipts. Licence or equivalent certification/approval as appropriate to the waste management facility.	NV-EPO-07

Control Measure	CM Reference	Environmental Performance Standard	EPS Reference No.	Measurement Criteria	EPO Reference No.
		The performance of waste disposal contractors against the waste hierarchy (Section 2.12) will be considered in the evaluation of tenders and agreed performance indicators will be included in the final contract.	NV-CM-34-EPS-02	Tender evaluation records and final waste disposal contracts.	
		Waste monitoring and reporting will be recorded in accordance with Santos procedure SMS-EXA-OS01-PD02-PD01 Waste Monitoring and Reporting standard, to enable accurate and consistent reporting and waste performance management, specifically: • waste stream description • total waste weight and/or volume collected • unit of measurements (e.g. tonnes and/or cubic meters) • recovery or disposal method • hazardous/non-hazard waste classification.	NV-CM-34-EPS-03	Waste disposal records and/or waste contractor audit reports.	
		Undertake engagement with waste contractors to identify the potential waste disposal pathways for recovered assets.	NV-CM-34-EPS-04	Records confirm engagement with waste contractors	
Hazardous Materials Management Plan (or similar)	NV-CM-35	The plan will provide information on the management measures applicable to materials such as hydrocarbons and NORMS. The plan shall detail radiation testing/detection requirements, the quarantine/isolation and storage requirement on deck for any potentially hazard materials. If hazardous material (e.g., NORMS) are present then a management plan will be developed and implemented to guide safe handling and appropriate disposal. If radioactive materials or NORMs contamination on seabed assets are detected, the affected equipment will be managed in a manner consistent with ARPANSA Code for the Safe Transport of Radioactive Material (2019), including: • correct and clear placarding or labelling of contaminated equipment • contaminated equipment is segregated from non-contaminated equipment, personnel, and work areas • contaminated equipment remains segregated and is stored securely until disposed of at a licensed facility.	NV-CM-35-EPS-01	Records confirm testing was conducted and that infrastructure was quarantined/isolated if required. Records show that all radioactive/NORMs identified equipment is stored, transported, and disposed in accordance with the Radioactive Materials Management Plan.	NV-EPO-05 NV-EPO-06
On deck cutting of recovered risers	NV-CM-36	Recovered risers are cut on deck in a bunded area, to capture any discharge, such that it can be appropriately disposed of onshore.	NV-CM-36-EPS-01	Records demonstrate that recovered rises were cut on deck in a bunded area. Records demonstrate any captured discharge from riser cutting is appropriately allocated for onshore disposal.	NV-EPO-05
Capping of ends of the undamaged sections of production flowline B wet parked until future decommissioning	NV-CM-37	Undamaged ends of production flowline B that will remain wet parked until future decommissioning, are capped after the damaged section of the flowline has been cut and removed, to prevent ongoing discharge to the environment.	NV-CM-37-EPS-01	Records demonstrate that caps were fitted to the undamaged ends of production flowline B.	NV-EPO-05
Dropped object prevention procedure	NV-CM-38	Vessel Safety Case includes the following control measures for dropped objects that reduce the risk of objects entering the marine environment: • Lifting equipment certification and inspection. • Lifting crew competencies. • Heavy-lift procedures. • Preventative maintenance on cranes.	NV-CM-38-EPS-01	NOPSEMA-accepted Safety Case. Completed inspection checklist Details contained in incident documents.	NV-EPO-05
		Lifting operations managed in accordance with Vessel work instructions or procedures.	NV-CM-38-EPS-02	Vessel work instructions or procedures.	
		Objects dropped overboard are recovered (if possible) to mitigate the environmental consequences from objects remaining in the marine environment, unless the environmental consequences are negligible, or safety risks are disproportionate to the environmental consequences.	NV-CM-38-EPS-03	Fate of dropped objects detailed in incident documents.	

Control Measure	CM Reference	Environmental Performance Standard	EPS Reference No.	Measurement Criteria	EPO Reference No.
Install a cabled data linked depth sensor/monitor to the DTM which can send signals back to beach via a surface buoy to confirm the DTM's depth within the water column	NV-CM-39	A data linked surface buoy is connected to the DTM via a tether or on the end of DTM pick up line once shortened to confirm the presence of the DTM on location and at the correct depth (i.e. approximately 30m below mean surface level), until the FAR campaign.	NV-CM-39-EPS-01	Recording results from the location information sent from the depth sensor back to Santos show DTM location and depth in water column	NV-EPO-05
Third party DTM mooring analysis / buoyancy study	NV-CM-40	Undertake third party study with the objective of determining if the disconnection of some DTM moorings would reduce the risk of loss of buoyancy of the DTM, whilst in the operational area, until FAR.	NV-CM-40-EPS-01	Third party study findings and recommendations in relation to DTM mooring lines	NV-EPO-05
		If determined to be ALARP and acceptable, undertake mooring disconnection from the DTM if the findings and recommendations of the third party study makes this recommendation.	NV-CM-40-EPS-02	Daily reports from the vessel campaign if the study recommends that any DTM moorings are disconnected.	NV-EPO-05
DTM Disconnection Procedure	NV-CM-41	Implementation of the NV DTM Disconnection Procedure to ensure that actions are performed for safely disconnecting the FPSO from the DTM. The DTM Procedure has been developed to outline: • Individual work steps • Responsibilities • Manning requirements • Safety requirements • General requirements • Disconnection criteria	NV-CM-41-EPS-01	The daily report will demonstrate the commencement of disconnection of the FPSO through implementation of the DTM Disconnection Procedure. Completed reporting form (FPSO Ningaloo Vision Disconnect From Field – Report to AMSA).	NV-EPO-05
DTM Recovery Procedure will be developed to recover DTM from an actual unplanned loss of buoyancy (potentially to seabed)	NV-CM-42	The DTM Recovery Procedure will be developed and in place prior to FPSO disconnection and sailaway. This procedure will apply to the time period the DTM is on station in the operational area from FPSO sail away to DTM removal from the title area.	NV-CM-42-EPS-01	The DTM Recovery Procedure is demonstrated to be approved for use, prior to FPSO disconnection and sailaway	NV-EPO-05
		If the DTM experiences an unplanned loss of buoyancy while on station or during recovery operations, it will be recovered as soon as practicable.	NV-CM-42-EPS-02	Records demonstrate the DTM is recovered and removed from the operational area within 12 months of FPSO sail away.	NV-EPO-05
		A survey/inspection will be conducted as soon as practicable following an unplanned loss of buoyancy event to assess the condition of the DTM and inform feasible recovery methods.	NV-CM-42-EPS-03	Records confirm a survey/inspection has been conducted to assess the condition of the DTM and inform removal methods in the event the DTM suffers and unplanned loss of buoyancy.	NV-EPO-05
		Execution of recovery would take place as soon as practicable pending permissioning document requirements.	NV-CM-42-EPS-04	Records demonstrate agree regulatory pathway and approvals are in place for the recover.	NV-EPO-05
Implementation of the management controls in the Santos Invasive Marine Species Management Plan (IMSMP)	NV-CM-43	Vessels are managed to low risk in accordance with the Santos IMSMP (7715-650-PRO-0016) and consistent with the IMO 2023 Guidelines for the control and management of ships' biofouling to minimize the transfer of invasive aquatic species (Biofouling Guidelines 2023) prior to movement or transit into or within the invasive marine species management zone, which requires: • assessment of applicable vessels using the IMSMP risk assessment • the management of immersible equipment to low risk.	NV-CM-43-EPS-01	Completed risk assessment demonstrating equipment and vessels are 'low risk'.	NV-EPO-08
		Pursuant to the Biosecurity Act 2015 and Australian Ballast Water Management Requirements 2017, primary and support vessels carrying ballast water and engaged in international voyages shall manage ballast water so that marine pest species are not introduced.	NV-CM-43-EPS-02	Records show Ballast Water Management is implemented.	
				Completed ballast water record book or log is verified by Santos Offshore Representative	
		Vessels receive entry clearance from DAWE (Seaports) as necessary (or as applicable to their location and movements).	NV-CM-43-EPS-03	Records show a complete Questionnaire for Biosecurity Exemptions for Biosecurity Control Determination issued to Seaports at least one month in advance where practicable	

Control Measure	CM Reference	Environmental Performance Standard	EPS Reference No.	Measurement Criteria	EPO Reference No.
Anti-foulant system	NV-CM-44	Vessel anti-foulant system maintained in compliance with International Convention on the Control of Harmful Anti-fouling Systems on Ships, where applicable.	NV-CM-44-EPS-01	OVID or equivalent confirms current International Anti-Fouling System Certificate.	NV-EPO-08
NOPSEMA accepted NV Field Safety Case Addendum	NV-CM-45	Prior to towing, length of all trailing ropes and lines from the DTM will be shortened to as short as practicable.	NV-CM-45-EPS-01	Towing preparations in accordance with NOPSEMA accepted NV Field Safety Case Addendum	NV-EPO-04
Hazardous chemical management procedure	NV-CM-46	For hazardous chemicals including hydrocarbons, the following standards apply to reduce the risk of an accidental release to sea: • Storage containers closed when the product is not being used. • Storage containers managed in a manner that provides for secondary containment in the event of a spill or leak. • Storage containers labelled with the technical product name as per the safety data sheet (SDS). • Spills and leaks to deck, excluding storage bunds and drip trays, immediately cleaned up. • Storage bunds and drip trays do not contain free flowing volumes of liquid. • Spill response equipment readily available.	NV-CM-46-EPS-01	Completed Contractor's routine inspection(s) of the chemical storage/ SDSs verified by onsite inspection – by either Santos Offshore Representative or Marine Assurance Inspection.	NV-EPO-05 NV-EPO-09
				Contractor's chemical management procedures. Verified by onsite inspection – by either Santos Offshore Representative or Marine Assurance Inspection.	
Vessel spill response plans (OPEP/SMPEP)	NV-CM-47	Vessels have current and implemented a SOPEP, or SMPEP, pursuant to MARPOL Annex I.	NV-CM-47-EPS-01	Approved SOPEP or SMPEP.	NV-EPO-05 NV-EPO-09
		SOPEP or SMPEP spill response exercises conducted not less often than every three months to ensure personnel are prepared.	NV-CM-47-EPS-02	Spill exercise records or evidence of a spill exercise in an operational report.	
Contractor flushing procedure	NV-CM-48	Contractor flushing procedure will include: • Metering of chemical injection volumes during flushing activities • Dosing rates/optimised treatment rates for chemicals.	NV-CM-48-EPS-001	Santos approved contractor flushing procedure	NV-EPO-05
Dynamic positioning system	NV-CM-49	For vessels equipped with Dynamic Positioning (DP) equipment design, redundancy, equipment maintenance and operation in accordance with the IMCA Guideline for the Design and Operation of Dynamically Positioned Vessels	NV-CM-49-EPS-01	Records of annual DP trials	NV-EPO-09
		DP trials to ensure correct operation.	NV-CM-49-EPS-02	Record of field entry DP trails	
Accepted OPEP	NV-CM-50	In the event of a hydrocarbon spill to sea, the Santos OPEP requirements are implemented to mitigate environmental impacts.	NV-CM506-EPS-01	Incident report	NV-EPO-09
Santos Refuelling and Chemical Transfer Standard (SO 91 IQ 00098)	NV-CM-51	Bunkering activities follow the requirements of the Santos Refuelling and Chemical Transfer Standard (SO-91-IQ-00098) which includes key requirements to prevent spills to the environment such as: • when bunkering activities can occur • roles and responsibilities • dry-break couplings and breakaway couplings used • bunkering activity communication requirements • bunker hose undergoes hydrostatic leak testing.	NV-CM-51-EPS-02	Completed bunkering checklist	NV-EPO-09
				Spills details contained in incident documentation	
NOPSEMA accepted WOMP for NV wells	NV-CM-52	A NOPSEMA-accepted WOMP in place that includes control measures for well integrity to reduce the risk of an unplanned release of hydrocarbons. The WOMP includes control measures to manage well integrity risks to ALARP, including:	NV-CM-52-EPS-01	NOPSEMA accepted WOMP.	NV-EPO-09

Control Measure	CM Reference	Environmental Performance Standard	EPS Reference No.	Measurement Criteria	EPO Reference No.
		• Barriers in place to isolate hydrocarbons from the marine environment; • Inspection, monitoring and testing of barriers over the life of the well; • Response to increases in well integrity risk; • Notification and reporting requirements • Effective barriers manage isolation of the reservoir from the environment, acting to eliminate hydrocarbon releases.		Incident records confirm no breach of containment	
NOPSEMA WOMP for long term suspension of the NV wells covered by this EP, will be in place before FPSO disconnection and permanent sail away.	NV-CM-53	A NOPSEMA WOMP that covers the long term suspension of the wells covered by this EP, - will be in place before FPSO disconnection and permanent sail away; and - evidence will also be in place to demonstrate that reservoirs will have been isolated from the subsea production system at the XTs with barrier testing of the XTs completed and verified as per the WOMP (DR-91-ZG-10048) in preparation for the commencement of this EP.	NV-CM-53-EPS-01	• NOPSEMA accepted WOMP in place prior to FPSO disconnection • Records showing reservoirs will have been isolated from the subsea production system at the XTs with barrier testing of the XTs completed and verified	NV-EPO-09
Provide evidence of testing have been completed on the SCSSVs to demonstrate they operate correctly, in accordance with the NOSPEMA accepted WOMP.	NV-CM-54	Records of testing of all wells on title in accordance with the NOSPEMA accepted WOMP, to demonstrate that all SCSSVs are functioning as required to provide a barrier to the well, prior to FPSO disconnection and permanent sail away either through inflow testing records, or closing signature (risk profile records). Evidence is provided to the Project Manager of Floating Asset removal for NV CoPFAR, before FPSO disconnection and sailaway.	NV-CM-54-EPS-01	Evidence (records) of successful inflow testing and /or closing signature results to show SCSSV's are operating correctly.	NV-EPO-09
Navigational charts	NV-CM-55	DTM (until its removed) and wells are gazetted and marked on navigational charts to minimise the risk of collision from third parties.	NV-CM-55-EPS-01	Wells and DTM clearly marked on navigational charts	NV-EPO-09
Third party agreements and contracts	NV-CM-56	APPEA Mutual Aid Memorandum of Understanding (MoU) for relief well drilling. Contracts/MOUs for source control personnel	NV-CM-56-EPS-01	Documentation of MoUs, AMOSC/OSRL and Wild Well Control contracts and third-party agreements.	NV-EPO-09
Subsea integrity management plan	NV-CM-57	Subsea systems integrity is maintained and demonstrated in compliance with the NV Subsea Production System Integrity Procedure (1541-286-WPR-0027), including: • risk based inspection program • triggered inspections in response to natural events such as cyclones or reported third party interference or damage.	NV-CM-57-EPS-01	Integrity inspection reports	NV-EPO-09
Maritime Dangerous Goods Code	NV-CM-58	Dangerous goods managed in accordance with IMDG Code to reduce the risk of an environmental incident, such as an accidental release to sea or unintended chemical reaction.	NV-CM-58-EPS-01	Completed Multimodal Dangerous Goods Form for OSV transfers Completed inspection checklist	NV-EPO-09
Infrastructure left in situ (wet parked until future decomm) will be marked on nautical charts	NV-CM-59	Notify AHO of locations for equipment abandoned in situ so they can be marked on navigational charts.	NV-CM-59-EPS-01	Records demonstrate that AHO has been notified for equipment abandoned in situ.	NV-EPO-09
ROV inspection and maintenance procedures	NV-CM-60	Preventative maintenance on ROV completed as scheduled to reduce the risk of hydraulic fluid releases to sea.	NV-CM-60-EPS-01	Maintenance records or evidence of maintenance in operational reports.	NV-EPO-09
		ROV pre-deployment inspection completed to reduce the risk of hydraulic fluid releases to sea.	NV-CM-60-EPS-02	ROV procedure includes confirmation of ROV readiness	
Quarterly satellite imagery to be taken of the title area	NV-CM-61	Satellite imagery of the title area will be obtained quarterly (i.e. approximately every 90 days), and will be reviewed to see if it identifies any potential presence of hydrocarbon sheen on the surface that could be attributable to a hydrocarbon leak from a well on title. If there is a presence of sheen on the surface that could be potentially attributable to wells on title, Santos will take adaptive management steps to investigate as soon as practicable.	NV-CM-61-EPS-01	Records of satellite imagery and review.	NV-EPO-09

8.5 Roles and Responsibilities

OPGGS(E)R 2023 Requirements
Section22(3) Implementation Strategy for the Environment Plan
The implementation strategy must establish a clear chain of command, setting out the roles and responsibilities of personnel in relation to the implementation, management, and review of the environment plan, including during emergencies or potential emergencies.

While the Santos Chief Executive Officer (CEO) has the overall accountability for the implementation of the Santos Management System and Santos Environment Health and Safety Policy, the Coniston Novara and Van Gogh assets sits under the remit of the Executive Vice President of WA, Northern Australia, Timor Leste Business Unit. The Santos General Manager – Projects and Decommissioning is accountable for ensuring implementation, management, and review of this cessation of production EP.

Key roles and environmental responsibilities for the decommissioning activity are detailed in **Table 8-3**, and will be communicated to these positions before the activity commences and when any changes are made to these positions.

Table 8-3: Roles and responsibilities

Role	Responsibilities
During all activities	
Production Manager, Oil Assets	• Ensure compliance with Santos' Environment, Health, and Safety Policy. • Ensure relevant Santos Management System Standards and procedures are implemented as necessary. • Ensure adequate resources are in place to meet the requirements within the EP. • Ensure overall compliance with the EP with advice and guidance from the Santos Environmental Coordinator and Environment Manager. • Ensure incidents and non-conformances are managed as per Section 8.11 and 8.12, respectively. • Review information received from external sources regarding lessons learnt and non-conformances, relevant to the survey, with the project team to identify if there are actions relevant to the survey. If actions are relevant implement as per Section 8.12.
Senior Manager, Approvals (WA, NA TL)	• Ensure incident preparedness and response arrangements meet Santos and regulatory requirements. • Ensure adequate resources are in place to meet the compliance requirements within the OPEP. • Have overall responsibility for approving the OPEP.
Environment Manager (WA, NA, TL)	• Ensure adequate resources are in place to meet environment compliance requirements within the EP. • Provide support and advice to the Environment Coordinator (Compliance) as needed. • Notify NOPSEMA of a change in titleholder, a change in the titleholder's nominated liaison person or a change in the contact details for (as per Section 1.6).
Senior Stakeholder Adviser / Relevant Persons Coordinator	• Responsible for implementation of steps described in Section 8.13 • relating to post acceptance consultation throughout the duration of the Activity • Maintains a Relevant Persons contact and information database. • Maintains a Relevant Persons Notification Log specific to the EP. • Maintains records of all Relevant Persons correspondence specific to the EP • Ensures relevant stakeholders are identified throughout the life of the EP. • Prior to commencement of the activity and on advice of HSE Team Lead, provides a notification to all relevant stakeholders listed, or as revised, in Table 8-4. The notification will include information on activity timing, vessel movements and vessel details. • On advice of Santos Environmental Coordinator (Compliance), provide cessation notifications to relevant stakeholders identified in Table 8-4. • Is available before, during and after the activity to ensure opportunities for stakeholders to provide feedback are available. • Prepares and distributes quarterly consultation updates to relevant

Role	Responsibilities
Santos Environmental Coordinator (Compliance)	• Ensure environmental monitoring is conducted in accordance with the Santos Management System and this EP. • Ensure incident investigations are conducted as per Santos Management System. • Ensure EP compliance report that covers environmental performance of the activity in this EP is prepared and submitted to NOPSEMA.
Senior Oil Spill Response Advisor	• Have overall responsibility for: – providing upfront and ongoing guidance, framework, and direction on preparation of this OPEP – developing and maintaining arrangements and contracts for incident response support from third parties – developing and defining objectives, strategies and tactical plans for response preparedness defined in this OPEP and Incident Response Plan – undertaking assurance activities on arrangements outlined within the OPEP.
During IMMR campaigns	
Santos Offshore Representative or Company Site Representative	• Be responsible for day-to-day monitoring of operations. • Interface with the Santos Production Manager – Asset Retirement) and assist the contractor in performing field campaigns in a safe and environmentally acceptable manner in accordance with this EP. • Ensure all personnel are given a full briefing on environmental sensitivities of the permit area and environmental management procedures and commitments detailed in this EP. • Ensure Santos Environment, Health and Safety Policy is applied in areas of responsibility. • Maintain clear communication between Santos and contractors on environmental issues. • Notify Santos General Manager – Projects and Decommissioning immediately of any changes in operations which could impact negatively on environmental performance. • Ensure incident investigations are conducted as required. • Participate in the investigation of any environmental incidents. • Be responsible for the offshore management of contractor activities and ensuring compliance with the relevant commitments (including record keeping) made in this EP. • Be offshore focal point for communications between Santos and contractor personnel. • Immediately report any incidents to the Vessel Master and the Santos General Manager – Projects and Decommissioning.
Santos Environmental Coordinator (Compliance)	• Ensure site environmental audits are carried out as required to ensure compliance. • Ensure environmental monitoring is conducted in accordance with the Santos Management System and this EP. • Liaise with the Santos Production Manager and Offshore Site Representative to ensure compliance with all aspects of this EP. • Perform environmental education and inductions for operational personnel. • Ensure incident investigations are conducted as per Santos Management System. • Ensure EP compliance report that covers environmental performance of the activity in this EP is prepared and submitted to NOPSEMA.
All personnel	• Adhere to this EP. • Follow good housekeeping procedures and work practices. • Report HSE incidents, hazards, or non-conformance to the Vessel Master in a timely manner. • Report sightings of marine fauna and pollution.
During Floating Asset Removal and Damaged Flowline Removal Activities	
Project Manager	• Ensure compliance with Santos' Environment, Health, and Safety Policy. • Ensure relevant Santos Management System Standards and procedures are implemented as necessary. • Ensure adequate resources are in place to meet the requirements within the EP and OPEP. • Ensure adequate emergency response capability is in place.

Role	Responsibilities
	• Ensure overall compliance with the EP and OPEP with advice and guidance from the Santos Senior Environmental Coordinator/HSE Manager as necessary. • Interface with the Santos General Manager – Projects and Decommissioning and assist the contractor in performing field campaigns in a safe and environmentally acceptable manner in accordance with this EP. • Ensure incidents and non-conformances are managed as per Section 8.11 and 8.12, respectively. • Review information received from external sources regarding lessons learnt and non-conformances, relevant to the survey, with the project team to identify if there are actions relevant to the survey. If actions are relevant implement as per Section 8.12.
Santos Offshore Representative or Company Site Representative	• Be responsible for day-to-day monitoring of operations. • Ensure all personnel are given a full briefing on environmental sensitivities of the permit area and environmental management procedures and commitments detailed in this EP. • Ensure Santos Environment, Health and Safety Policy is applied in areas of responsibility. • Maintain clear communication between Santos and contractors on environmental issues. • Notify Santos Project Manager (Onshore) immediately of any changes in operations which could impact negatively on environmental performance. • Ensure incident investigations are conducted as required. • Participate in the investigation of any environmental incidents. • Be responsible for the offshore management of contractor activities and ensuring compliance with the relevant commitments (including record keeping) made in this EP. • Be offshore focal point for communications between Santos and contractor personnel. • Immediately report any incidents to the Vessel Master and the Santos Project Manager (Onshore).
Santos Environmental Coordinator (Compliance)	• Ensure site audits are performed as required to ensure compliance. • Ensure environmental monitoring is conducted in accordance with the Santos Management System and this EP. • Liaise with the Santos Project Manager (Onshore) and Offshore Company Site Representative to ensure compliance with all aspects of this EP. • Perform environmental education and inductions for operational personnel. • Ensure environment, health and safety incident investigations are conducted as per Santos Management System. • Ensure EP compliance report that covers environmental performance of the activity in this EP is prepared and submitted to NOPSEMA.

8.6 Workforce Training and Competency

OPGGS(E)R 2023 Requirements
Sections 22(4) Implementation Strategy for the Environment Plan
The implementation strategy must include measures to ensure that each employee or contractor working on, or in connection with, the activity is aware of his or her responsibilities in relation to the environment plan, including during emergencies or potential emergencies, and has the appropriate competencies and training.

This section describes the mechanisms that will be in place, so each employee and contractor is aware of his or her responsibilities in relation to the EP and has appropriate training and competencies.

8.6.1 Activity Inductions

All offshore personnel will complete an induction that will include a component addressing their EP responsibilities. Induction attendance records for all personnel will be maintained. Inductions will include information about:

- Santos' Environment, Health, and Safety Policy
- regulatory regime (NOPSEMA regulations)
- EPBC Act Policy Statement 2.1 and how it applies to the activity

- operating environment (e.g., nearby protected marine areas, sensitive environmental periods)
- interaction with other marine users (i.e., topic to reinforce the importance of marine communications regarding any potential interactions with active commercial fishing)
- activities with highest risk (e.g., invasive marine species and hydrocarbon releases)
- EP commitments (e.g., **Table 8-1** and **Table 8-2**)
- incident reporting and notifications
- regulatory compliance reporting
- management of change process for changes to EP activities
- oil pollution emergency response (e.g., OPEP requirements).

8.6.2 Training and Competency

All offshore personnel will complete relevant training and hold qualifications and certificates for their role. Santos and its contractors are individually responsible for ensuring their personnel are qualified and trained. The systems, procedures and responsible persons will vary and will be managed through the use of online databases, staff on boarding process and training departments, etc.

Personnel qualification and training records will be sampled before and/or during an activity. Such checks will be performed during the procurement process, facility acceptance testing, inductions, crew change, and operational inspections and audits.

8.6.3 Workforce Involvement and Stakeholder Communications

Daily operational meetings will be held offshore at which HSE will be a standing agenda item. It is a requirement that supervisors attend daily operational meetings, and all personnel attend daily toolbox or pre shift meetings.

Toolbox meetings will be regularly held offshore to plan jobs and discuss work tasks, including HSE risks and controls.

HSE performance will be monitored and reported during the activity, and performance metrics (such as the number of environmental incidents) will be regularly communicated to the workforce. Workforce involvement and environmental awareness will also be promoted by encouraging offshore personnel to report marine fauna sightings and marine pollution (e.g., oil on water, dropped objects).

8.7 Asset Management

Santos' management system defines business expectations and requirements for the management of assets to ensure the strategic and economic value is optimised through the asset life cycle, while preventing harm to people and the environment.

As part of the asset life cycle management requirements, Santos assets are required to have a decommissioning strategy and plan. The Ningaloo Vision Decommissioning Project will be managed in accordance with Santos's Decommissioning Management Procedure SMS-DEV-OS02-PD01 and Project Delivery Process SMS-PRM-OS01-PS01. The Project Delivery Process (PDP) ensures Santos delivers repeatable, predictable, and successful project outcomes. It is a structured, decision-driven process to identify and realise maximum value from business opportunities including robust and cost-effective decommissioning plans and decisions.

Any equipment recovered from the operational area during the decommissioning phase, will be taken to shore for recycling or reuse, or disposal in accordance with applicable legislation. Santos will record the final disposal of the various waste streams in accordance with SMS-EXA-OS01-PD02-PD01 Waste Monitoring and Reporting. The disconnection and sailaway of the FPSO presented in this EP includes the potential for an international end point for FPSO disposal and recycling (**Section 2.9.1).** Santos may be required to obtain a Hazardous Waste Export Permit in accordance with the requirements of the Hazardous Waste (Regulation of Exports and Imports) Act 1989, and will comply with requirements under the Act to the extent applicable.

Any future decommissioning option that may result in equipment being left in situ will require Santos to obtain a Sea Dumping Permit in accordance with the requirements of the Sea Dumping Act 1981 administered by DCCEEW.

8.8 Emergency Preparedness and Response

OPGGS(E)R 2023 Requirements
Sections 22(8) Implementation Strategy for the Environment Plan
The implementation strategy must contain an oil pollution emergency plan and provide for updating the plan.

Vessels are required to have and implement incident response plans, such as an emergency response plan and SMPEP or SOPEP. Regular incident response drills and exercises (e.g., as defined in emergency response plan, SMPEP or SOPEP) will be carried out on support vessels to refresh the crew in using equipment and implementing incident response procedures.

Santos will implement the NV CoPFAR OPEP (7750-650-EIS-0008) in the event of a hydrocarbon spill. The OPEP details how Santos will prepare and respond to a spill event and meets the requirement of Regulations.

8.9 Incident Reporting, Investigation and Follow up

OPGGSR 2023 Requirements
Section22(7) Implementation Strategy for the Environment Plan
The implementation strategy must state when the titleholder will report to the Regulator in relation to the titleholder's environmental performance for the activity. The interval between reports will not be more than 12 months.
Section 22(6)
The implementation strategy must provide for sufficient monitoring of, and maintaining a quantitative record of, emissions and discharges (whether occurring during normal operations or otherwise), such that the record can be used to assess whether the environmental performance outcomes and standards in the environment plan are being met.

All personnel will be informed through inductions and daily operational meetings of their duty to report HSE incidents and hazards. Reported HSE incidents and hazards will be shared during daily operational meetings and will be documented in the incident management systems as appropriate. HSE incidents are investigated and reported in accordance with the Santos Incident Reporting, Investigation and Learning Procedure SMS-HSS-OS07-PD01 which uses root cause analysis.

Environmental recordable and reportable incidents will be reported to NOPSEMA as required, in accordance with **Table 8-4**. The incident reporting requirements will be provided to all crew on board the facilities and support vessels with special attention to the reporting time frames to provide for accurate and timely reporting.

For the purposes of this activity, in accordance with OPGGS(E) Regulations:

- a recordable incident, for an activity, means a breach of an EPO or EPS, in the EP that applies to the activity, that is not a reportable incident
- a reportable incident, for an activity, means an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage.

For the purposes of this EP, a reportable incident is an incident that is assessed to have an environmental consequence of moderate or higher in accordance with the Santos environmental impact and risk assessment process outlined in **Section 5**. Of the planned and unplanned events assessed within this EP, the following were identified to have a potential consequence level of Moderate or higher if the event were to occur and would therefore be a reportable incident:

- introduction of invasive marine species (Major)
- hydrocarbon release from LOWC (Moderate).

8.10 Reporting and Notifications

OPGGSR 2023 Requirements
Section22(7) Implementation Strategy for the Environment Plan
The implementation strategy must state when the titleholder will report to the Regulator in relation to the titleholder's environmental performance for the activity. The interval between reports will not be more than 12 months.
Section22(6)
The implementation strategy must provide for sufficient monitoring of, and maintaining a quantitative record of, emissions and discharges (whether occurring during normal operations or otherwise), such that the record can be used to assess whether the environmental performance outcomes and standards in the environment plan are being met.

8.10.1 Notifications and Compliance Reporting

Regulatory, other notification and compliance reporting requirements are summarised in **Table 8-4.**

Table 8-4: Activity notification and reporting requirements

Initiation	Required Information	Timing	Type	Recipient
Before the Activity				
Department of Defence Standing arrangement with DoD	Activity timing, location, description, and vessel contact details. Confirm restricted air space status.	At least five weeks before the activity commences where practicable.	Written	DoD: offshore.petroleum@defence.gov.au
AFMA Standing arrangement with AFMA	Activity timing, location, description, and vessel contact details.	At least four weeks before the activity commences where practicable.	Written	AFMA: petroleum@afma.gov.au
AHO Notification Standing arrangement with AHO	Activity timing, location, description, and vessel contact details.	At least four weeks before the activity commences where practicable.	Written	AHO: datacentre@hydro.gov.au
DAFF Standing arrangement with DAFF	Activity timing, location, description, and vessel contact details.	At least four weeks before the activity commences where practicable.	Written	DAFF: Petroleum&Fisheries@agriculture.gov.au
DPIRD This is a standing arrangement with DPIRD	Activity timing, location, description, and vessel contact details.	At least four weeks before the activity commences where practicable.	Written	DPIRD:Environment@dpird.wa.gov.au
Recfishwest As requested during additional consultation	Activity timing, location, description, and vessel contact details.	At least four weeks before the activity commences where practicable.	Written	RedFishWest: info@recfishwest.org.au
WAFIC Standing arrangement with WAFIC	Activity timing, location, description, and vessel contact details.	At least four weeks before the activity commences where practicable.	Written	WAFIC: oilandgas@wafic.org.au
OPGGS(E) Section 54 & 55 – Notifications	Complete NOPSEMA's Section 54 Start or End of Activity Notification form prior to each campaign.	At least ten days before the campaign activity commences.	Written	NOPSEMA

Initiation	Required Information	Timing	Type	Recipient
NOPSEMA must be notified that the activity is to commence.				
DEMIRS Standing arrangement with DEMIRS.	Activity timing, location, description, and vessel contact details.	At least ten days before the activity commences where practicable.	Written	DEMIRS
AMSA JRCC Standing arrangement with AMSA JRCC.	Activity timing, location, description, and vessel contact details.	24 to 48 hours before the activity commences.	Written	AMSA's JRCC: rccaus@amsa.gov.au
Tuna Australia This is a standing arrangement with TA.	Activity timing, location, description, and vessel contact details.	24 to 48 hours before the activity commences.	Written	Contact details as provided by Tuna Australia
During the Activity				
AHO Notification Standing arrangement with AHO.	Any changes to the intended operations.	As soon as practicable.	Written	AHO: datacentre@hydro.gov.au
Australian Marine Mammal Centre Reporting Any ship strike incident with cetaceans will also be reported to the National Ship Strike database.	Ship strike report provided to the Australian Marine Mammal Centre: https://data.marinemammals.gov.au/report/shipstrike.	As soon as practicable.	Written	DCCEEW
	Any changes to the intended operations.	As soon as practicable.	Written	AMSA's JRCC: rccaus@amsa.gov.au

Initiation	Required Information	Timing	Type	Recipient
AMSA Reporting Under the MoU between Santos and AMSA.	Titleholder agrees to notify AMSA of any marine pollution incident [1].	Within two hours of incident.	Oral	AMSA
	POLREP and SITREP available online (refer to OPEP).	POLREP as requested by AMSA following verbal notification. SITREP as requested by AMSA within 24 hours of request.	Written	AMSA
Department of Biodiversity, Conservation and Attractions Reporting Any harm or mortality to fauna listed as threatened under the WA *Biodiversity Conservation Act 2016*.	Notification of any harm or mortality to fauna listed as a threatened species under the WA *Biodiversity Conservation Act 2016* as a result of Santos' activities.	A fauna report will be submitted to DBCA within seven days to fauna@dbca.wa.gov.au.	Written	DBCA
Department of Biodiversity, Conservation and Attractions Reporting Notification of the event of a hydrocarbon release.	Notification of actual or impending spillage.	As soon as practicable.	Oral or written	DBCA Pilbara regional office
DCCEEW Reporting Any harm or mortality to EPBC Act listed threatened marine fauna. Marine Fauna Sighting Data.	Notification of any harm or mortality to an EPBC listed species of marine fauna whether attributable to the activity or not.	Within seven days to EPBC.permits@environment.gov.au	Written	DCCEEW
	Marine fauna sighting data recorded in the marine fauna sighting database.	As soon as practicable, in any case no later than three months of the end of the activity.	Written	DCCEEW
DPIRD Reporting If marine pests or disease are	Notification of any suspected marine pests or diseases including any organism listed in the Western Australian Prevention List for Introduced Marine Pests and any other non-endemic	Within 24 hours.	Oral	DPIRD FishWatch

Initiation	Required Information	Timing	Type	Recipient
suspected this must be reported to DPIRD.	organism that demonstrates invasive characteristics.			
Department of Transport Reporting All actual or impending MOP incidents that are in, or may impact, State waters resulting from an offshore activity.	Notification of actual or impending spillage, release or escape of oil or an oily mixture that is capable of causing loss of life, injury to a person or damage to the health of a person, property or the environment.	Within two hours.	Oral	DoT
	WA DoT POLREP and SITREP available online (refer OPEP).	As requested by DoT after verbal notification.	Written	DoT
Department of Water and Environmental Regulation	Notification of a spill event. Santos will contact DWER on the 24-hour pollution watch hotline 1300 784 782 and email: pollutionwatch@dwer.wa.gov.au	As soon as practicable.	Oral or written	DWER Recipient 1300 784 782 and email: pollutionwatch@dwer.wa.gov.au
Director of National Parks Reporting Notification of the event of oil pollution within a marine park or where an oil spill response action must be taken within a marine park; or if any changes to intended operations. This is a standing arrangement with DNP.	The DNP should be made aware of oil / gas pollution incidences which occur within a marine park or are likely to impact on a marine park as soon as possible. Notification should be provided to the 24-hour Marine Compliance Duty Officer on 0419 293 465. The notification should include: titleholder details time and location of the incident (including name of marine park likely to be affected) proposed response arrangements as per the OPEP (such as dispersant, containment) confirmation of providing access to relevant monitoring and evaluation reports when available contact details for the response coordinator. Note that the DNP may request daily or weekly Situation Reports, depending on the scale and severity of the pollution incident.	So far as reasonably practicable prior to response action being written.	Oral and written	Director of National Parks
	Notify if details regarding the activity change and result in an overlap with or new impact to a marine park.	As soon as practicable.	Written	DNP: marineparks@awe.gov.au

Initiation	Required Information	Timing	Type	Recipient
OPGGS(E) Section24(c), 47 & 48 – Reportable Incident NOPSEMA must be notified of any reportable incidents. For the purposes of Section 24(c), a reportable incident is defined as: an incident relating to the activity that has caused, or has the potential to cause, moderate to significant environmental damage.	The oral notification must contain: • all material facts and circumstances concerning the reportable incident known or by reasonable search or enquiry could be found out. • any action taken to avoid or mitigate any adverse environmental 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.	As soon as practicable, and in any case not later than two hours after the first occurrence of a reportable incident, or if the incident was not detected at the time of the first occurrence, at the time of becoming aware of the reportable incident.	Oral	NOPSEMA
	A written record of the oral notification must be submitted. The written record is not required to include anything that was not included in the oral notification.	As soon as practicable after the oral notification.	Written	NOPSEMA National Offshore Petroleum Titles Administrator
	A written report must contain: • all material facts and circumstances concerning the reportable incident known or by reasonable search or enquiry could be found out • any action taken to avoid or mitigate any adverse environmental 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 • the action that has been taken, or is proposed to be taken, to prevent a similar incident occurring in the future. • Consider reporting using NOPSEMA's Report of an Accident, Dangerous Occurrence or Environmental Incident form.	Must be submitted as soon as practicable, and in any case not later than three days after the first occurrence of the reportable incident unless NOPSEMA specifies otherwise. Same report to be submitted to NOPTA within seven days after giving the written report to NOPSEMA.	Written	NOPSEMA National Offshore Petroleum Titles Administrator
OPGGS(E)Section 50 – Recordable Incidents NOPSEMA must be notified of a breach of	Complete NOPSEMA's Recordable Environmental Incident Monthly Report form.	As soon as practicable after the end of the calendar month, and in any case, not later than 15 days after the end of the calendar month.	Written	NOPSEMA

Initiation	Required Information	Timing	Type	Recipient
an EPO or EPS, in the environment plan that applies to the activity that is not a reportable incident.				
OPGGS(E) Section51 – Environmental Performance NOPSEMA must be notified of the environmental performance at the intervals provided for in the EP.	Report must contain sufficient information to determine whether or not environmental performance outcomes and standards in the EP have been met.	A detailed environmental performance report for a twelve month period commencing the date of EP acceptance, shall be submitted to NOPSEMA within 3 months post reporting timeframe, on annual basis.	Written	NOPSEMA
Santos' commitment to include activity in Quarterly Consultation Update until activity ends.	The Quarterly Consultation Update will include the activity. This consultation will cease once the activity has ended.	Quarterly.	Written	The Quarterly Consultation Update is circulated to a broad group of Santos' stakeholders, including many of the stakeholders identified in Section 6.2.
WA Museum This is a standing arrangement with DCCEEW.	Notify regulators of the discovery of any suspected UCH identified during the planning, development, operation, or decommissioning.	Within 21 days of the discovery.	Written	DCCEEW Australasian Underwater Cultural Heritage Database at: https://environment.gov.au/shipwreck/public/forms/notification.do;jsessionid=6D0EB76D31466B6B14B3DDA92EFA7B57?mode=add
End of Activity				
OPGGS(E) Section 54 – Notifications NOPSEMA must be notified that the activity is completed.	Complete NOPSEMA's Section54 Start or End of Activity Notification form for both notifications.	Within ten days after cessation of each activity campaign.	Written	NOPSEMA

Initiation	Required Information	Timing	Type	Recipient
AHO AFMAAMSA JRCC DAFF DCCEEW Department of Defence DPIRD DEMIRS Recfishwest Tuna Australia	Activity cessation notification.	Within ten days after cessation of each campaign.	Written	AHO: datacentre@hydro.gov.au AHS: webmaster@hydro.gov.au AFMA: petroleum@afma.gov.au AMSA's JRCC: rccaus@amsa.gov.au DAFF: Petroleum&Fisheries@agriculture.gov.au DCCEEW: Petroleum&Fisheries@agriculture.gov.au DoD: offshore.petroleum@defence.gov.au DPIRD: Environment@dpird.wa.gov.au DEMIRS: petroleum.environment@DEMIRS.wa.gov.au Recfishwest: info@recfishwest.org.au Tuna Australia
Commercial Fishers Notification As requested during consultation.	Activity Cessation Notification provided to relevant commercial fishing stakeholders, as agreed with WAFIC or relevant industry body.	Within ten days after cessation of each campaign.	Written	WAFIC oilandgas@wafic.org.au
OPGGS(E) Section22(7) & 51 – Environmental Performance NOPSEMA must be notified of the environmental performance of the activity.	Report must contain sufficient information to determine whether or not environmental performance outcomes and standards in the EP have been met.	A detailed environmental performance report for a twelve-month period commencing from the date of EP acceptance, shall be submitted to NOPSEMA within 3 months post reporting timeframe, on annual basis.	Written	NOPSEMA
OPGGS(E) Section46 EP ends when titleholder notifies completion, and the Regulator	Notification advising NOPSEMA of end of all activities to which the EP relates and that all obligations have been completed.	Within 12 months of the final Section54 (2) notification.	Written	NOPSEMA

Initiation	Required Information	Timing	Type	Recipient
accepts the notification. NOPSEMA must be notified that the activity has ended, and all EP obligations have been completed.				

8.10.2 Monitoring and Recording Emission and Discharges

OPGGS(E)R 2023 Requirements
Section22(6) Implementation Strategy for the Environment Plan
Includes an appropriate implementation strategy and monitoring, recording, and reporting arrangements.
Section34(e) Criteria for Acceptance of Environment Plan
The implementation strategy must provide for sufficient monitoring of, and maintaining a quantitative record of, emissions and discharges (whether occurring during normal operations or otherwise), such that the record can be used to assess whether the environmental performance outcomes and standards in the environment plan are being met.

Vessel-based discharges to the marine environment, associated with this activity will be recorded and controlled in accordance with requirements under relevant marine orders.

Santos and contractors will maintain records so that emissions and discharges can be determined or estimated. Such records will be maintained for a period of five years. Contractors are required to make these records available upon request. Santos records discharges or emissions (where practicable), to the environment as described in **Table 8-5**.

Table 8-5: Monitoring methods for emissions and discharges

Discharge/Emission	Parameter	Record	Recording Frequency
Chemicals (discharged to the marine environment as per **Sections 6.6** and **6.7**)	Volume	Chemical risk assessment Volumes used will be estimated based on known inventories	For every chemical use with a fate to the marine environment
Oily water	Volume and location	Oil record book* or equivalent	For every discharge
Garbage (including food scraps)	Volume and location	Garbage record book*	For every discharge
Sewage	Volume and location	Sewage record book*	For every discharge
Ballast water	Volume and location	Ballast water record book or log**	For every discharge
Unplanned discharge of solid objects	Volume	Incident report	For every discharge
Unplanned discharge of hazardous liquids	Volume	Incident report	For every discharge
Unplanned hydrocarbon release	Volume	Incident report	For every discharge
*Maintained as per vessel class in accordance with relevant Marine Orders ** Maintained as per Australian Ballast Water Management Requirements (Department of Agriculture, Water and the Environment, 2020)			

8.11 Document Management

8.11.1 Information Management and Document Control

This EP, as well as approved management of change documents, are controlled documents and current versions will be available on Santos' intranet. Santos' contractors are also required to maintain current versions of these documents.

Environmental performance outcomes and standards will be measured based on the measurement criteria listed in Table 8-2. Such records will be maintained for a period of five years. Contractors are required to make these records available upon request.

8.11.2 Management of Change

The Management of Change (MoC) process provides a systematic approach to initiate, assess, document, approve, communicate and implement changes to EPs and OPEPs.

The MoC process considers Sections 18, 19, 26(3) to (5), 38 and 39 of the OPGGS(E)R 2023 and determines if a proposed change can proceed and the manner in which it can proceed. The MoC procedure will determine whether a revision of the EP is required and whether that revision is to be submitted to NOPSEMA. For a change to proceed,

the associated environmental impacts and risks must be demonstrated to be acceptable and ALARP. Additional stakeholder consultation may be required, depending on the nature and scale of the change. Additional information about the MoC process is provided in Figure 8-1.

The MoC procedure also allows for the assessment of new information that may become available after EP acceptance, such as new management plans for Australian Marine Parks, new recovery plans or conservation advice for threatened or migratory species, and changes to the Protected Matters Search results. If a review identifies new information, this is treated as a “Change that has an impact on EP”, and the MoC process is followed accordingly.

The MoC procedure also includes an assurance check process which applies the MoC process to long- term (usually five-year multi-activity EPs) EPs that may have lengthy periods of time between use or acceptance and activity commencement. Where there is an identified change from the accepted EP content, a check is done to test the ‘significance’ of the change, to determine whether it can be accommodated which may then result in an MoC as described above.

Accepted MoCs become part of the in-force EP or OPEP, are tracked on a register and are made available on Santos’ intranet. Where appropriate, the EP compliance register will be updated so that control measure or EPS changes are communicated to the workforce and implemented. Any MoC will be distributed to the management people identified in **Table 8-3** (excluding the Chief Executive Officer and Directors), and the most relevant management position will ensure the MoC is communicated and implemented, which may include crew meetings, briefings or communications as appropriate for the change.

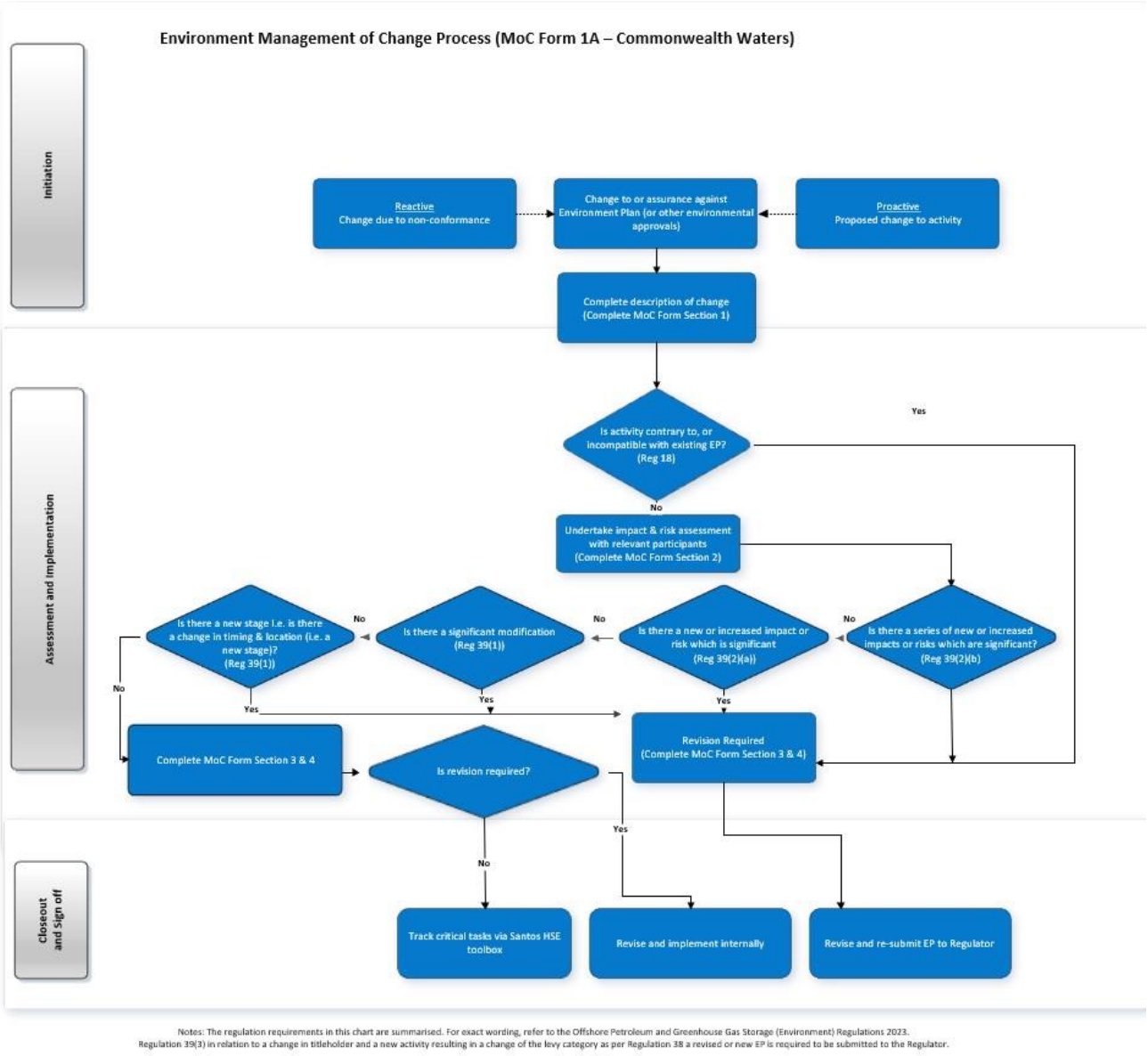

Figure 8-1: EP MoC process schematic

8.11.3 Reviews

This EP has assessed the environmental impacts and risk from the proposed activity during any time of the year. Information and requirements that have informed the assessment of environmental impacts and risks may change, such as:

- legislation
- businesses conditions, activities, systems, processes, and people
- industry practices
- science and technology
- societal and stakeholder expectations.

To ensure Santos maintains up-to-date knowledge of the industry, legislation and conservation advice, the following tasks are undertaken:

- maintain membership of the Australian Energy Producers (AEP), which provides a mechanism for communicating potential changes in legislation, industry practice and other issues that may affect EP implementation to relevant personnel in Santos
- undertake annual spill response exercises to check spill response arrangements and capability are adequate
- identify stakeholders prior to the activity commencing under this EP via the mechanisms outlined in Section 4
- review the values and sensitivities within the EMBA which includes completing a new Protected Matters Search, reviewing Appendix C against relevant legislation to capture and review any relevant updates and incorporate as required, and reviewing any recently known published relevant scientific papers
- monitoring the AIMS North West Shoals to Shore Research Program, specifically the fish and pearl oyster impact studies
- reviewing the DPIRD WA Prevention List for Introduced Marine Pests prior to each survey stage
- subscription to NOPSEMA's "The Regulator" issued quarterly
- subscribe to various regulator updates
- have regular liaison meetings with Regulators

Through maintenance of up-to-date knowledge, changes to information and requirements that inform the assessment of environmental impacts and risks are identified. If the changes are material to the assessment of environmental impacts and risks from the activity, the EP will be reviewed, and any changes required documented in accordance with Santos' MoC procedure (**Section 8.11.2**).

8.12 Audits and Reviews

OPGGS(E)R 2023 Requirements
Section 22(5) Implementation Strategy for the Environment Plan
The implementation strategy must provide for sufficient monitoring, recording, audit, management of nonconformance and review of the titleholder's environmental performance and the implementation strategy to ensure that the environmental performance outcomes and standards in the environment plan are being met.

8.12.1 Audits

Santos audit plans and schedules are reviewed and updated at the beginning of each calendar year and cover all Santos facilities and activities. Santos' audit schedule may be amended to accommodate operational priorities, activity risk, personnel availability, or high audit demand during certain periods (for example, regulatory audits, contractor audits). Santos will determine if a vessel audit is required following contract award and vessel confirmation.

Audits will be undertaken in a manner consistent with Santos' Assurance Operating Standard (SMS-LRG-OS03).

Audit scope typically includes a selection of control measures, EPS, and EPOs. However, audits may also include other parts of the EP.

Audits findings may include opportunities for improvement and non-conformances. Audit non-conformances are managed as described in **Section 8.12.3**.

8.12.2 Inspections

During an activity, HSE inspections (desktop or vessel based) will be conducted at least once during the activity to identify hazards, incidents, and EP non-conformances. These inspections will also check compliance against the EPOs and EPS of this EP (**Table 8-2**) and inform end of activity reporting (**Table 8-4**). Any in-field opportunities for improvement or corrective actions will be discussed during the inspection with the Vessel Master.

8.12.3 Non-conformance Management

EP non-conformances will be addressed and resolved by a systematic corrective action process as outlined in Santos' Assurance Operating Standard (SMS-LRG-OS03)). Non-conformances identified by audits and inspections will be entered into Santos' incident and action tracking management system (i.e., 'HSE Toolbox'). Once entered, corrective actions, time frames and responsible persons (including action owners and event validators) will be assigned. Corrective action 'close out' will be monitored using a management escalation process.

8.12.4 Continuous Improvement

For this EP, continuous improvement will be driven by the list below, and may result in a review of the EP with changes applied in accordance with **Section 8.11.2**:

- improvements identified from the review of business-level HSE key performance indicators
- actions arising from Santos and departmental HSE improvement plans
- corrective actions and feedback from HSE audits and inspections, incident investigations and after action reviews
- opportunities for improvement and changes identified during pre-activity reviews and MoC documents
- actions taken to address concerns and issues raised during the ongoing stakeholder management process (**Section 4**).

Identified continuous improvement opportunities will be assessed in accordance with the MoC process to ensure any potential changes to this EP, or OPEP, are managed in accordance with the Regulations and in a controlled manner.

8.13 Post acceptance consultation implementation strategy

8.13.1 Post-acceptance consultation implementation strategy – First Nations people and groups, and local governments, communities and industry

Santos is committed to appropriate post acceptance consultation implementation for this Activity with relevant government authorities and other relevant interested persons and organisations.

Post acceptance consultation activities for this EP will be principally supported by Santos' regional engagement program for its existing operational footprint in the Carnarvon Basin, with a focus on First Nations people and groups and local governments, communities and industry with interests in the lands and waters of the adjacent Pilbara region.

The regional engagement program includes provision of the Quarterly Consultation update which promotes a path way for self-identification of relevant persons over the EP validity period.

During this EP validity period, Santos will periodically review information sources which may give rise to additional or new relevant persons, primarily through the planned consultation to support future phases of decommissioning (**Section 1.5.1**).

8.13.1.1 First Nations people and groups

Santos will undertake consultation over the life of the activity with First Nations representative organisations, such as Prescribed Body Corporates (PBCs) and Native Title Representative Bodies.

These engagements will be undertaken principally through Santos' existing *regional engagement program*, which has a focus on engaging those organisations with closest proximity to Santos' existing, proposed and planned activities in the Carnarvon Basin.

Having regard to Santos' experience consulting with First Nations groups, and feedback from First Nations Relevant Persons, Santos considers that consultation through representative bodies provides an appropriate mechanism for ongoing consultation with First Nations relevant persons.

Representative bodies provide for regular, culturally appropriate engagement, including processes for dissemination of information to First Nations Elders, cultural leaders and communities in a manner that is readily accessible and culturally appropriate.

Santos is currently in discussion with Pilbara PBCs on the establishment of consultation frameworks that will provide for effective and regular engagement on proposed, planned, existing and completed activities. These PBCs are listed below, which have coastal interests from North West Cape to Dampier.

- Buurabalayji Thalanyji Aboriginal Corporation
- Nganhurra Thanardi Garrbu Aboriginal Corporation
- Wirrawandi Aboriginal Corporation

More broadly, Santos has also identified representative organisations Yamatji Marlpa Aboriginal Corporation and Murujuga Aboriginal Corporation as key organisations for engagement as part of Santos' WA regional engagement program.

Santos plans to grow this regional engagement network to include PBCs in the eastern Pilbara and western Kimberley to support Santos' future activities in the Bedout Basin (north of Port Hedland), given the proximity of other proposed activities to these regions.

Engagement of all First Nations organisations will include consideration of culturally appropriate management measures for inclusion within EPs, where First Nations people believe that there may be impacts or risks, or have concerns with regards to:

- Traditional lands and waters
- Sea country interests
- Totemic species
- Other cultural values or sensitivities of importance.

8.13.1.2 Local governments, communities and industry

Similarly, Santos will use its existing regional engagement program, to support consultation over the life of the activity in regional communities proximate to Santos' existing, proposed and planned activities.

Representative groups identified by Santos for engagement include:

- Local government – Shire of Ashburton, Shire of Carnarvon, Shire of Exmouth and City of Karratha
- Local industry – Carnarvon Chamber of Commerce and Industry, Exmouth Chamber of Commerce and Industry, Karratha and Districts Chamber of Commerce and Industry, and Onslow Chamber of Commerce and Industry
- Community Groups – Exmouth CLG

This regional approach is complementary to Santos existing and ongoing engagement of representative groups for other offshore marine user groups, including commercial fishing organisations.

8.13.2 Post-acceptance consultation implementation strategy – approach

Formal acceptance of the EP will be communicated via the NOPSEMA website. Santos will also provide access to the EP via the NOPSEMA website and will provide details on the Santos website on how to provide ongoing feedback in relation to the Activity.

Activity notifications and reports will be made in accordance with Table 8-4. The notifications and reports are based on legislative requirements, standing arrangements with particular Relevant Persons, Relevant Persons' requests for notification made during OPGGS(E)R 2023 Section 25 consultation, or as otherwise deemed appropriate by Santos.

Following Activity commencement, Santos will provide quarterly updates on the Activity. The updates will be posted on Santos' website, with notifications to registered / subscribed interested parties.

Santos will apply the regional engagement model described in Section 8.13.1.2 to consider the preference of relevant government authorities and other relevant interested persons and organisations when determining the frequency and method of additional updates.

Santos will continue to accept, assess and respond to post acceptance consultation feedback during the life of the Activity. Records of any post acceptance consultation will be maintained in an appropriate Santos consultation database.

If, during the course of post acceptance consultation, Santos receives information demonstrating a new or increased environmental impact or risk that is not provided for in this EP, as in force at the time, Santos will apply its Management of Change process outlined in **Section 8.11.2.**

Santos will maintain a database of relevant authorities, and other relevant interested persons and organisations for this Activity. This includes updating its database in light of post acceptance consultation, including identification of new Relevant Persons.

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Appendix A Santos Environment, Health, and Safety Policy

Santos

Environment, Health and Safety

Policy

Our Commitment

Santos is committed to being the safest gas company wherever we have a presence and preventing harm to people and the environment

Our Actions

We will:

1. Integrate environment, health and safety management requirements into the way we work
2. Comply with all relevant environmental, health and safety laws and continuously improve our management systems
3. Include environmental, health and safety considerations in business planning, decision making and asset management processes
4. Identify, control and monitor risks that have the potential for harm to people and the environment, so far as is reasonably practicable
5. Report, investigate and learn from our incidents
6. Consult and communicate with, and promote the participation of all workers to maintain a strong environment, health and safety culture
7. Empower our people, regardless of position, to "Stop the Job" when they feel it necessary to prevent harm to themselves, others or the environment
8. Work proactively and collaboratively with our stakeholders and the communities in which we operate
9. Set, measure, review and monitor objectives and targets to demonstrate proactive processes are in place to reduce the risk of harm to people and the environment
10. Report publicly on our environmental, health and safety performance

Governance

The Environment Health Safety and Sustainability Committee is responsible for reviewing the effectiveness of this policy.

This policy will be reviewed at appropriate intervals and revised when necessary to keep it current.

Kevin Gallagher

Managing Director and CEO

Document Owner:	David Banks, Chief Operating Officer		
Approved by:	The Board		
Date Approved:	15 August 2022	Version:	3

Appendix B Legislative Framework

Australian Legislation

Commonwealth Legislation	Summary	Relevant to activity?	Administering Authority	Relevant aspects of the activity	EP Section
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	This Act provides for the preservation and protection from injury or desecration areas and objects that are of significance to Aboriginal people, under which the Minister may make a declaration to protect such areas and objects. The Act also requires the discovery of Aboriginal remains to be reported to the Minister.	Yes	Commonwealth – Department of Agriculture, Water, and the Environment	There are no known sites of Aboriginal Heritage Significance within the operational area, but there are within the EMBA. This Act would only apply to the activity if there was a discovery of Aboriginal remains, which is not considered likely to occur given the offshore location of the activity.	Section 3.2.5- Protected and significant areas Section 3.2.7-Socio-economic receptors.
Australian Ballast Water Requirements, Version 7	Australian Ballast Water Management Requirements outline the mandatory ballast water management requirements to reduce the risk of introducing harmful aquatic organisms into Australia's marine environment through ballast water from international vessels. These requirements are enforceable under the *Biosecurity Act 2015*.	Yes	Commonwealth – Department of Agriculture and Water Resources	Potential internationally sourced vessel operating in Australian Waters which could have the potential for introduction of Invasive Marine Species and potential ballast water exchange.	Section 7.2- Introduction of Invasive Marine Species
Australian Heritage Council Act 2003	This Act identifies areas of heritage value listed on the Register of the National Estate and sets up the Australian Heritage Council and its functions.	Yes	Australian Heritage Council	There are a number of national heritage places found on the National Heritage List, within the EMBA, as identified by the Act.	Section 3.2.5- Protected and Significant Areas
Australian Maritime Safety Authority Act 1990 (AMSA Act)	This Act specifies that AMSA's role includes protection of the marine environment from pollution from ships and other environmental damage caused by shipping. AMSA is responsible for administering the Marine Order in Commonwealth Waters. 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	Yes	AMSA	This Act applies to the use of any vessel associated with operations and is relevant to the activity in regard to the unplanned pollution from ships.	Section 7.6-Hydrocarbon spill (MDO)

Commonwealth Legislation	Summary	Relevant to activity?	Administering Authority	Relevant aspects of the activity	EP Section
	emergencies. Requirements are given effect through AMSA. AMSA is the lead agency for responding to oil spills in the marine environment and is responsible for the Australian National Plan for Maritime Environmental Emergencies.				
Aquatic Resources Management Act 2016	This Act will be the primary legislation used to manage fishing, aquaculture, pearling, and aquatic resources in Western Australia. The Act was scheduled for commencement on 1 January 2019; however, this has been deferred while an amendment to the Act is progressed.	Yes	Department of Primary Industries and Regional Development	Vessel movements have the potential to introduce invasive marine species (IMS). This Act was considered during development of the Santos IMS Management Zone and IMS Management Plan (EA 00 RI-10172).	Section 7.2- Introduction of invasive marine species
Marine Orders	Marine Orders (MO) are subordinate rules made pursuant to *the Navigation Act 2012* and *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* affecting the maritime industry. They are a means of implementing Australia's international maritime obligations by giving effect to international conventions in Australian law.	Yes	AMSA	Vessel movements, safety, discharges, and emissions	Section 6 and Section 7- Planned and unplanned events.
Maritime Powers Act 2013	Protects the heritage values of shipwrecks and relics for shipwrecks over 75 years. It is an offence to interfere with a shipwreck covered by this Act. Available historic shipwreck locations covered by international conventions enacted by this legislation have been identified and assessed (as applicable) within this EP.	No	The Department of Immigration and Border Protection	This Act applies to the shipwrecks (over 75 years old) within the EMBA. There is no planned interaction or interference with shipwrecks, and any unplanned impacts is only expected to affect the surface waters.	N/A
Biosecurity Act 2015 Biosecurity Regulations 2016	This Act provides the Commonwealth with powers to take measures of quarantine, and implement related programs as are necessary, to prevent the introduction of any plant, animal, organism or matter that could contain	Yes	Commonwealth – Department of Agriculture and Water Resources	This Act applies to all internationally sources vessels operating in Australian Waters which could have the potential for the introduction of IMS and potential ballast water exchange.	Section 7.2- Introduction of invasive marine species.

Commonwealth Legislation	Summary	Relevant to activity?	Administering Authority	Relevant aspects of the activity	EP Section
	anything that could threaten Australia's native flora and fauna or natural environment. The Commonwealth's powers include powers of entry, seizure, detention and disposal. This Act includes mandatory controls on the use of seawater as ballast in ships and the declaration of sea vessels voyaging out of and into Commonwealth Waters. The Regulations stipulate that all information regarding the voyage of the vessel and the ballast water is declared correctly to the quarantine officers.				
Corporations Act 2001	This Act is the principal legislation regulating matters of Australian companies, such as the formation and operation of companies, duties of officers, takeovers, and fundraising.	Yes	Commonwealth – Australian Securities and Investments Commission	The titleholder has provided ACN details within the meaning of the Act.	Section 1.6-Titleholder
Environment Protection and Biodiversity Conservation Act 1999 EPBC Amendment Regulations 2006	NOPSEMA is the sole assessor for offshore petroleum activities in Commonwealth water (as of 28 February 2014). Under the new arrangements, environmental protection will be met through NOPSEMA's decision-making processes. This Act is the Australian Government's key piece of environmental legislation. The Act focuses on protecting MNES. AMP Management Plans were also developed under this Act.	Yes	Commonwealth – Department of Agriculture, Water, and the Environment	This Act applies to all aspects of the activity that have the potential to impact MNES. Appropriate environmental approvals will be sought from NOPSEMA for all operations (this EP) which outlines compliance with the relevant regulations and plans under the Act. Where activities have existing approvals under the Act, these will continue to apply.	Section 6.3 – Light Emissions Section 6.4- Noise Emissions Section 6.6- Planned operational discharges Section 6.7-Planned chemical and hydrocarbon discharge Section 7.6, Section 7.7 and Section 7.8-Hydrocarbon release Section 7.3-Marine Fauna Interaction
Hazardous Waste (Regulation of Exports and Imports) Act 1989	The main purpose of the Hazardous Waste (Regulation of Exports and Imports) Act 1989 ('the Act') is to regulate the export, import and transit of hazardous waste to ensure that hazardous waste is dealt with appropriately so that human beings and the environment, both within and outside	Yes	Commonwealth – Department of Agriculture, Water, and the Environment	Management of recovered equipment (e.g. DTM, risers, Mooring system, and the damaged portion of Production Line B as its brought onto shore for appropriate recycling or disposal. The export of hazardous waste is not an activity covered by the EP, is off title, and if it does occur (depending on FPSO	Section 8.2 Environment Policy

Commonwealth Legislation	Summary	Relevant to activity?	Administering Authority	Relevant aspects of the activity	EP Section
	Australia, are protected from the harmful effects of the waste.			dismantling/disposal end location), it will be the subject of a separate permit. Santos has engaged with DCCEEW regarding the requirements of the Hazardous Waste (Regulation of Exports and Imports) Act 1989 (the Act) and will comply with requirements under the Act to the extent applicable.	
National Greenhouse and Energy Reporting Act 2007	Introduces a single national reporting framework for the reporting and dissemination of information about greenhouse gas emissions, greenhouse gas projects and energy use and production of corporations.	Yes	Commonwealth – Department of Agriculture, Water, and the Environment	This Act applies to the atmospheric emissions through combustion engine use to operate the vessels associated with the activity. Implementation of the Act will reduce the impact of GHG emissions associated with vessel use for the installation and pre-commissioning activity, through compliance with MARPOL Annex VI (Marine Order Part 97: Marine Pollution Prevention – Air Pollution) and require the use of low sulphur fuel.	Section 6.5- Atmospheric emissions
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.	Yes	Commonwealth, Department of Infrastructure and Regional Development.	Implementation of this Act reduces the impact of GHG emissions associated with vessel use for the installation and pre-commissioning activity, through compliance with MARPOL Annex VI (Marine Order Part 97: Marine Pollution Prevention – Air Pollution) and require the use of low sulphur fuel.	Section 6.5- Atmospheric emissions
Marine Safety (Domestic Commercial Vessel) National Law Act 2012	This Act is a single regulatory framework for the certification, construction, equipment, design, and operation of domestic commercial vessels inside Australia's exclusive economic zone.	Yes	Commonwealth – Australian Maritime Safety Authority	All vessel movements associated with the activity will be governed by AMSA marine safety regulations under the Act.	Section 6.1– Interaction with other marine users Section 7.6 – Hydrocarbon spill – marine diesel oil
Navigation Act 2012	An Act regulating navigation and shipping including SOLAS. A number of Marine Orders enacted under this Act apply directly to offshore petroleum exploration and production activities: Marine Order 21: Safety and Emergency Arrangements Marine Order 27: Safety of Navigation and Radio Equipment Marine Order 30: Prevention of collisions	Yes	AMSA (operational) Department of Infrastructure and Regional Development Minister for Infrastructure and Regional Development	All vessel movements associated with the activity will be governed by marine safety regulations and Marine Orders under the Act.	Section 6.5– Interaction with other marine users Section 7.7 – Hydrocarbon spill – marine diesel oil

Commonwealth Legislation	Summary	Relevant to activity?	Administering Authority	Relevant aspects of the activity	EP Section
	Marine Order 58: Safe Management of Vessels Marine Order 70 – Seafarer Certification.				
Offshore Petroleum and Greenhouse Gas Storage Act 2006 Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023	Petroleum exploration and development activities in Australia's offshore areas are subject to the environmental requirements specified in the OPGGS Act and associated Regulations. The OPGGS Act contains a broad requirement for titleholders to operate in accordance with "good oil-field practice". Specific environmental provisions relating to work practices essentially require operators to control and prevent the escape of wastes and petroleum. The Act also requires that activities are carried out in a manner that does not unduly interfere with other rights or interests, including the conservation of the resources of the sea and sea bed, such as fishing or shipping. In some cases, where there are particular environmental sensitivities or multiple use issues it may be necessary to apply special conditions to an exploration permit area. The holder of a petroleum title must maintain adequate insurance against expenses or liabilities arising from activities in the title, including expenses relating to clean-up or other remedying of the effects of the escape of petroleum. The OPGGS Environment Regulations provide an objective based regime for the management of environmental performance for Australian offshore petroleum exploration and production activities in areas of Commonwealth jurisdiction. Key objectives of the Environment Regulations include: to ensure operations are carried out in a way that is consistent with the principles of ecologically sustainable development	Yes	NOPSEMA	The activity involves cessation of production activities, which is a petroleum activity regulated by NOPSEMA under this Act.	Section 6– Risk Assessments for Planned Events Section 7– Risk Assessments for Unplanned Events

Commonwealth Legislation	Summary	Relevant to activity?	Administering Authority	Relevant aspects of the activity	EP Section
	to adopt best practice to achieve agreed environment protection standards in industry operations to encourage industry to continuously improve its environmental performance.				
Ozone Protection and Synthetic Greenhouse Gas Management Act 1989	Regulates the manufacture, importation, and use of ozone depleting substances (typically used in fire-fighting equipment and refrigerants). Applicable to the handling of any ODS.	Yes	Commonwealth – Department of Agriculture, Water, and the Environment	The activity does not include import, export, or manufacture activities of ODS. This Act applies where ODS is found on vessel refrigeration systems; however, this is a rare occurrence.	Section 6.5– Atmospheric emissions
Protection of the Sea (Powers of Intervention) Act 1981 Protection of the Sea (Powers of Intervention) Regulations 1983	The Act authorises the Commonwealth to take measures for the purpose of protecting the sea from pollution by oil and other noxious substances discharged from ships and provides legal immunity for persons acting under an AMSA direction.	Yes	Commonwealth – Department of Infrastructure and Regional Development	This Act applies to vessel discharges and movements associated with the activity. The Act is relevant to the extent that Santos will comply with MARPOL through the following relevant Marine Orders relating to marine pollution prevention have been put in place to give effect to relevant regulations of Annexes I, II, III, IV, V and VI of MARPOL 73/78: Marine Order 91: Marine Pollution Prevention – Oil Marine Order 93: Marine Pollution Prevention – Noxious Liquid Substances Marine Order 94: Marine Pollution Prevention – Packaged Harmful Substances Marine Order 95: Marine Pollution Prevention – Garbage Marine Order 96: Marine Pollution Prevention – Sewage.	Section 6.1– Interaction with other marine users Section 6.6– Planned operational discharges Section 7.6 to 7.8 Unplanned hydrocarbon and non-hydrocarbon/ chemical spills Section 7.2– Introduction of IMS
Protection of the Sea (Prevention of Pollution from Ships) Act 1983 Protection of the Sea (Prevention of Pollution from Ships) (Orders)	This Act relates to the protection of the sea from pollution by oil and other harmful substances discharged from ships. This Act disallows any harmful discharge of sewage, oil and noxious substances into the sea and sets the requirements for a shipboard waste management plan. The following Marine Orders relating to marine pollution prevention have been put in place to	Yes	Commonwealth – Department of Infrastructure and Regional Development	This Act applies to vessel discharges and movements associated with the activity. The Act is relevant to the extent that Santos will comply with MARPOL through the following relevant Marine Orders relating to marine pollution prevention have been put in place to give effect to relevant regulations of Annexes I, II, III, IV, V and VI of MARPOL 73/78:	Section 6.5– Interaction with other marine users Section 6.6– Planned operational discharges Section 7.6 to 7.8– Unplanned hydrocarbon and non-hydrocarbon/ chemical spills

Commonwealth Legislation	Summary	Relevant to activity?	Administering Authority	Relevant aspects of the activity	EP Section
Regulations 1994	give effect to relevant regulations of Annexes I, II, III, IV, V and VI of MARPOL 73/78: Marine Order 91: Marine Pollution Prevention – Oil Marine Order 93: Marine Pollution Prevention – Noxious Liquid Substances Marine Order 94: Marine Pollution Prevention – Packaged Harmful Substances Marine Order 95: Marine Pollution Prevention – Garbage Marine Order 96: Marine Pollution Prevention – Sewage Marine Order 97: Marine Pollution Prevention – Air Pollution.			Marine Order 91: Marine Pollution Prevention – Oil Marine Order 93: Marine Pollution Prevention – Noxious Liquid Substances Marine Order 94: Marine Pollution Prevention – Packaged Harmful Substances Marine Order 95: Marine Pollution Prevention – Garbage Marine Order 96: Marine Pollution Prevention – Sewage.	Section 7.2– Introduction of IMS
Protection of the Sea (Civil Liability of Bunker Oil Pollution Damage) Act 2008	This Act implements the requirements for the International Convention on Civil Liability for Bunker Oil Pollution Damage.	Yes	AMSA	This Act applies to diesel refuelling which may be undertaken at sea as part of the activity. Compliance with the Act reduces the risk of bunker oil pollution.	Section 7.6- Hydrocarbon spill – marine diesel oil
Protection of the Sea (Harmful Antifouling Systems) Act 2006	This Act relates to the protection of the sea from the effects of harmful anti-fouling systems. It prohibits the use of harmful organotin in ant-fouling paints used on ships. This is enacted by Marine Order 98 (Marine Pollution – Anti-fouling Systems) 2013.	Yes	Commonwealth, Department of Infrastructure and Regional Development and AMSA	This Act applies to vessel movements in Australian Waters associated with the activity. Vessels are required to have biofouling systems in place to prevent introduction of IMS/harmful impact on Australian biodiversity. This is enacted by Marine Order 98 (Marine Pollution – Anti-fouling Systems) 2013.	Section 7.2– Introduction of IMS
Underwater Cultural Heritage Act 2018	This Act replaces the Historic Shipwrecks Act 1976 and extends protection to other wrecks such as submerged aircraft and human remains. It also increases penalties applicable to damaged sites. The Act came into effect on 1 July 2019.	Yes		No planned interaction or interference to shipwrecks. Potential impact could be due to a hydrocarbon spill, but the credible spill is to surface, and therefore shipwrecks are highly unlikely to be impacted. Numerous shipwrecks identified within EMBA.	Section 7.6, Section 7.7 and Section 7.8- Hydrocarbon release

Commonwealth Legislation	Summary	Relevant to activity?	Administering Authority	Relevant aspects of the activity	EP Section
State Legislation					
Fish Resources Management Act 1994 Fish Resources Management Regulations 1995	This Act establishes a framework for management of fishery resources and is the nominated lead agency responsible for implementing Western Australian marine biosecurity management requirements through implementation of the Fish Resources Management Act 1994 (FRMA 1994) and associated regulations.	Yes	Department of Primary Industries and Regional Development	Introduction of invasive marine species.	Section 7.2- Introduction of IMS

International Agreements and Conventions

International Agreements and Conventions	Summary	Relevant to Activity?	Relevant Aspects	EP Section
1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972	Implemented in WA Marine (Sea Dumping) Act and Environmental Protection (Sea Dumping) Act 1981.	Yes	Sewage, grey water, and putrescible wastes generated from vessels. Deck drainage/deck wash-down, cooling, brine, ballast, and bilge water from support vessels. Hydraulic fluid released by valve operation on subsea infrastructure. Various discharges from planned maintenance activities.	Section 6.6– Planned operational discharges
Agreement Between the Government of Australia and the Government of Japan for the Protection of Migratory Birds in Danger of Extinction and Their Environment 1974 (commonly referred to as the Japan Australia Migratory Bird Agreement or JAMBA)	This agreement recognises the special international concern for the protection of migratory birds and birds in danger of extinction that migrate between Australia and Japan. Implemented in EPBC Act.	Yes	Only relevant in so far as the credible spill scenario may result in impact to migratory seabirds foraging in area.	Section 7.6, 7.7 and 7.8– Hydrocarbon release
Agreement Between the Government of Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and Their	This agreement recognises the special international concern for the protection of migratory birds and birds in danger of	Yes	Only relevant in so far as the credible spill scenario may result in impact to migratory seabirds foraging in area.	Section 7.6, 7.7 and 7.8 – Hydrocarbon release

International Agreements and Conventions	Summary	Relevant to Activity?	Relevant Aspects	EP Section
Environment 1986 (commonly referred to as the China Australia Migratory Bird Agreement or CAMBA)	extinction that migrate between Australia and China. Implemented in EPBC Act.			
Convention for the Control of Transboundary Movements of Hazardous Wastes and Their Disposal 1989 (Basel Convention)	This convention deals with the transboundary movement of hazardous wastes, particularly by sea. Implemented in Hazardous Waste (Regulation of Exports and Imports) Act 1989.	No	Activity will be compliant with any transboundary movement requirements on hazardous waste.	**Section 6.6** – Operational discharges
United Nations Convention on Biological Diversity -1992	An international treaty to sustain life on earth.	Yes	Relevant only insofar as the activity may interact with MNES (threatened and migratory species) protected under the EPBC Act.	Section 6.2– Seabed disturbance Section 6.3– Light emissions Section 6.4 – Noise emissions Section 7.3 – Interaction with marine fauna Section 7.6 to 7.8– Unplanned hydrocarbon and non-hydrocarbon/ chemical spills
Convention on Oil Pollution Preparedness, Response and Co-operation 1990 (OPRC 90)	This convention comprises national arrangements for responding to oil pollution incidents from ships, offshore oil facilities, sea ports and oil handling. The convention recognises that in the event of pollution incident, prompt and effective action is essential.	Yes	In the event that worse-case credible spill scenarios may enact a national arrangement for response.	Section 7.6, 7.7 and 7.8– Hydrocarbon release Section 6.8– Spill response operations
Convention on the Conservation of Migratory Species of Wild Animals 1979 (Bonn Convention)	The Bonn Convention aims to improve the status of all threatened migratory species through national action and international agreements between range states of particular groups of species.	Yes	Only relevant in so far as the credible spill scenario may result in impact to MNES protected migratory species.	Section 7.6, 7.7 and 7.8 – Hydrocarbon release Section 6.8– Spill response operations
Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 15 May 2009.	The Hong Kong Convention is aimed at ensuring that ships, when being recycled after reaching the end of their operational lives, do not pose any unnecessary risk to human health and safety or to the environment.	Yes	The Hong Kong Convention, while not formally ratified, provides the overarching requirements of what is required by a ship recycling facility, to recycle with an ALARP approach to the environment, and to human health and safety. Accordingly, ship recycle facilities are required to provide a Ship Recycling Plan (SRP) demonstrating how the FPSO will be recycled based on the FPSO characteristics.	Section 2.9

International Agreements and Conventions	Summary	Relevant to Activity?	Relevant Aspects	EP Section
International Convention for the Establishment of an International Fund for Compensation for Oil Pollution Damage (Fund 92)	This convention ensures compensation is provided for damage caused by oil pollution.	No	Relevant to oil tankers, not supply or support vessels.	N/A
International Convention for the Prevention of Pollution from Ships 1973/1978 (MARPOL 73/78)	This Convention and Protocol (together known as MARPOL 73/78) build on earlier conventions in the same area. MARPOL is concerned with operational discharges of pollutants from ships. It contains six Annexes, dealing respectively with oil, noxious liquid substances, harmful packaged substances, sewage, garbage and air pollution. Detailed rules are laid out as to the extent to which (if at all) such substances can be released in different sea areas. The legislation giving effect to MARPOL in Australia is the *Protection of the Sea (Prevention of Pollution from Ships) Act 1983*, the *Navigation Act 2012* and several Parts of Marine Orders made under this legislation.	Yes	Already dealt with through the Protection of the Sea (Prevention of Pollution from Ships) Act 1983 – refer to legislation table.	N/A
International Convention for the Safety of Life at Sea 1974	This convention is generally regarded as the most important of all international treaties concerning the safety of merchant ships Implemented in the *Air Navigation Act 1920.*	Yes	Only relevant in so far as SOLAS relates to safety aspects of the activity, such as navigation aids which reduce potential for vessel collision and hydrocarbon release to the environment.	Section 6.1– Interaction with other marine users
International Convention on Civil Liability for oil pollution damage (1969)	This convention provides a mechanism for ensuring the payment of compensation for oil pollution damage.	No	Relevant to oil tankers.	N/A
International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Convention) 2004	The IMO has been addressing the problem of invasive marine species in ship's ballast water since the 1980s. Ballast water and sediments guidelines were adopted in 1991 and the ballast water convention was adopted in 2004. Recent accession by Finland has triggered the final entry into force of these international requirements. As a result, the International Convention for the Control and Management of Ships Ballast Water and Sediment will enter into force on 8th September 2017 (IMO Briefing 22 2016). It aims to prevent the spread of	Yes	Potential internationally sourced vessel operating in Australian Waters which could have the potential for introduction of Invasive Marine Species and potential ballast water exchange.	Section 7.2 – Introduction of invasive marine species

International Agreements and Conventions	Summary	Relevant to Activity?	Relevant Aspects	EP Section
	harmful aquatic organisms from one region to another, by establishing standards and procedures for the management and control of ships' ballast water and sediments. Ballast Water Management systems must be approved by the Administration in accordance with this IMO Guidelines.			
Minamata Convention on Mercury (Australia ratified the convention on 7 December 2021)	The Minamata Convention on Mercury 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 covers all aspects of the life cycle of mercury, controlling and reducing mercury across a range of products, processes, and industries.	Yes	Relevant to the contaminant limit concentrations in barite. Santos have committed to H2-DC-CM-030Quality Control limits for Barite (relevant to mercury): Mercury (Hg) – 1 mg/kg dry weight in stock barite +Cadmium (Cd) – 3 mg/kg dry weight in stock barite	Section 6.7 – Planned chemical and hydrocarbon discharges
United Nations Convention on the Law of the Sea (UNCLOS) (1982)	Part XII of the convention sets up a general legal framework for marine environment protection. The convention imposes obligations on State Parties to prevent, reduce and control marine pollution from the various major pollution sources, including pollution from land, from the atmosphere, from vessels and from dumping (Articles 207 to 212). Subsequent articles provide a regime for the enforcement of national marine pollution laws in the many different situations that can arise. Australia signed the agreement relating to the implementation of Part XI of the Convention in 1982, and UNCLOS in 1994.	Yes	Only relevant to the extent that Santos will comply with MARPOL through the following relevant Marine Orders relating to marine pollution prevention have been put in place to give effect to relevant regulations of Annexes I, II, III, IV, V and VI of MARPOL 73/78: Marine Order 91: Marine Pollution Prevention – Oil Marine Order 93: Marine Pollution Prevention – Noxious Liquid Substances Marine Order 94: Marine Pollution Prevention – Packaged Harmful Substances Marine Order 95: Marine Pollution Prevention – Garbage Marine Order 96: Marine Pollution Prevention – Sewage Marine Order 97: Marine Pollution Prevention – Air Pollution.	Section 6.6– Operational discharges Section 7.6 to 7.8– Unplanned hydrocarbon and non-hydrocarbon/ chemical spills Section 7.2 – Introduction of invasive marine species
United Nations Framework Convention on Climate Change (1992)	The objective of the convention is to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous interference with the climate system. Australia ratified the	Yes	Only relevant to the extent that to reduce impact of GHG emissions associated with vessel use, Santos will comply with MARPOL Annex VI (Marine Orders Part 97: Marine Pollution Prevention – Air Pollution) and require the use	Section 6.5– Atmospheric emissions

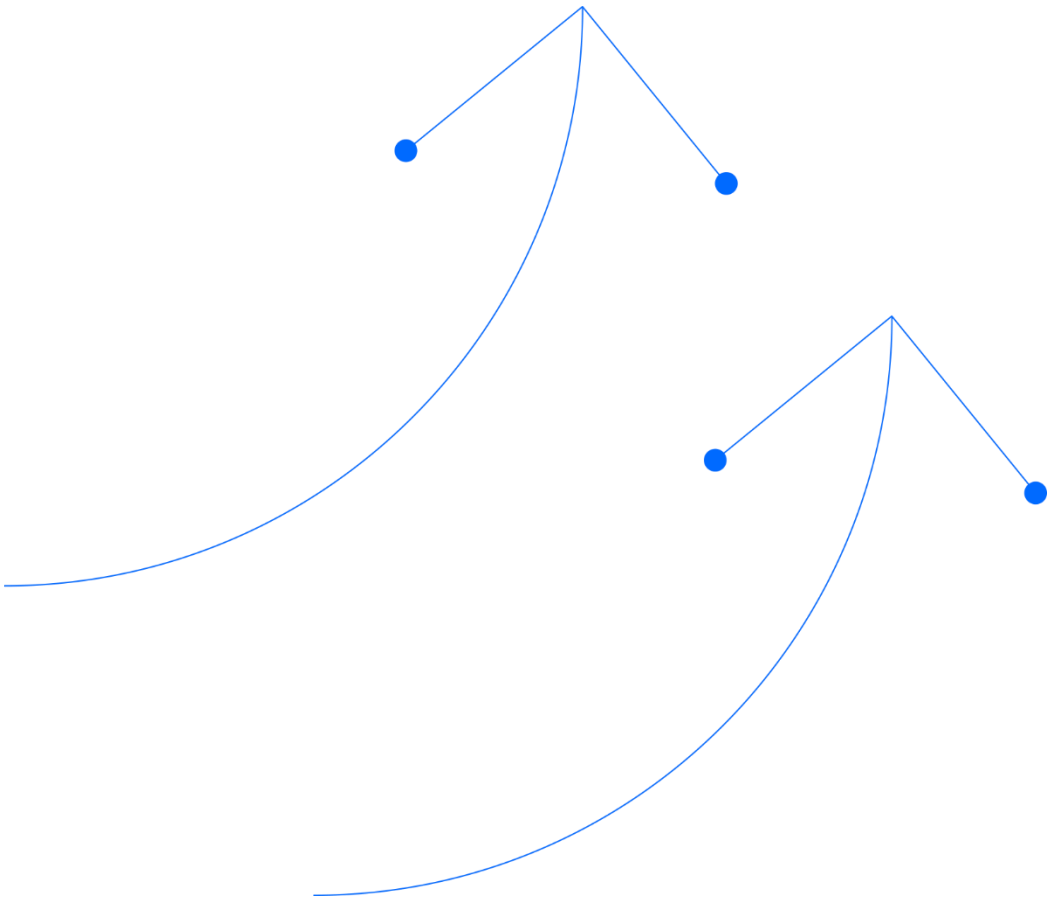
International Agreements and Conventions	Summary	Relevant to Activity?	Relevant Aspects	EP Section
	convention in December 1992 and it came into force on 21 December 1993.		of low sulphur fuel. The vessels will use diesel, which is a low sulphur fuel.	

Appendix C Ningaloo Vision CoPFAR Values and Sensitivities of the Marine and Coastal Environment

Santos

NINGALOO VISION COPFAR VALUES AND SENSITIVITIES OF THE MARINE AND COASTAL ENVIRONMENT

October 2024



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1. Introduction

1.1. Overview

Santos WA PVG Pty LTD (Santos), on behalf of the Coniston-Van Gogh Production Joint Venture titleholders (Santos WA PVG Pty Ltd [52.501% ownership] and INPEX Alpha Ltd [47.499% ownership]) operates the Van Gogh, Coniston and Novara fields located in WA-35-L which recovers oil in production licence area WA-35-L using the Ningaloo Vision floating production, storage and offloading (FPSO) vessel.

Santos is planning for decommissioning of the Ningaloo Vision FPSO and Van Gogh and Coniston and Novara subsea assets. The CoPFAR EP covers the cessation of production phase of the Ningaloo Vision facilities, the removal of floating assets and a damaged section of production flowline B. The cessation phase will commence at when the FPSO disconnects from the DTM. Production will have ceased, suspension of operations activities will been completed (expected in Q2 2025) and the last hydrocarbon cargo and slops will have been removed with an offtake under the Operations EP.

The petroleum activities covered in this EP include:

- disconnection and permanent sail away of the FPSO
- the presence of all infrastructure on title and in the water column, up until subsea infrastructure is decommissioned (subject to a future decommissioning EP)
- implementation of inspection, monitoring, maintenance, repair (IMMR) activities until all wells are plugged and abandoned (subject to future and separate P&A EP) and subsea infrastructure is decommissioned (subject to a future decommissioning EP)
- floating asset removal (DTM, risers and wet parking of the DTM mooring lines). If deemed safe and practicable to do so, the unburied section of the DTM mooring lines may be removed as part of the FAR activities covered by the EP
- removal of a 910 m damaged section of production flowline B between DC2 and DC3
- flushing of both production flowlines A and B between DC3 and DC4, and DC2 and DC3.

This document supports the CoPFAR EP and describes the existing environment that may be affected (EMBA) by the Activity, and includes details of the relevant values and sensitivities of that environment, as required by the Commonwealth Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2009 (OPGGS (E) Regulations).

Section 3.1 of the CoPFAR EP describes the EMBA and how it was determined for the Activity. It is important to note that the EMBA is used to identify the full range of environmental and socioeconomic receptors, however, it is not considered representative of potential ecological impacts (NOPSEMA, 2019).

This document is informed by the protected matters report (Appendix D of the Ningaloo Vision CoPFAR EP, Document No. 7750-650-EIS-0007), stated values in the Marine Bioregional Plans for the North-West Marine Region (NWMR) (DSEWPaC, 2012a,b), published scientific literature and studies and information obtained through consultation. Marine and coastal species identified in the protected matters report (Appendix D of the Ningaloo Vision CoPFAR EP) are described, with a focus on protected species that are threatened and migratory. It is important to note that this document describes the environmental values and sensitivities that occur within the boundaries of the EMBA, whereas the protected matters report incorporates an in-built buffer and hence may report on matters that are actually outside the EMBA.

1.2. Geographical Extent

The Van Gogh, Coniston and Novara fields and associated infrastructure and equipment are located within Production Licence WA-35-L in Commonwealth waters, approximately 45 km north-northwest off the Cape Range Peninsula in Western Australia. The FPSO and DTM are located approximately 58 km north-northwest of the

Exmouth township. Water depths range from 340 m in the east of the production licence to 400 m in the west, with the DTM located in a water depth of approximately 341 m.

The EMBA is located entirely within Australian coastal waters in north west Western Australia, and is located entirely within the North-West Marine Region (NWMR). Based on the Integrated Marine and Coastal Regionalisation of Australia (IMCRA) Version 4.0 spatial framework, there are four provincial-scale bioregions that occur within the EMBA. These bioregions are based on the characteristics of fish assemblages, benthic habitats, and oceanographic data (IMCRA v. 4.0). Where relevant, the physical, biological, and social environments within the EMBA are discussed with reference to the IMCRA Provincial Bioregions. The bioregions within the EMBA are (Figure 1) :

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

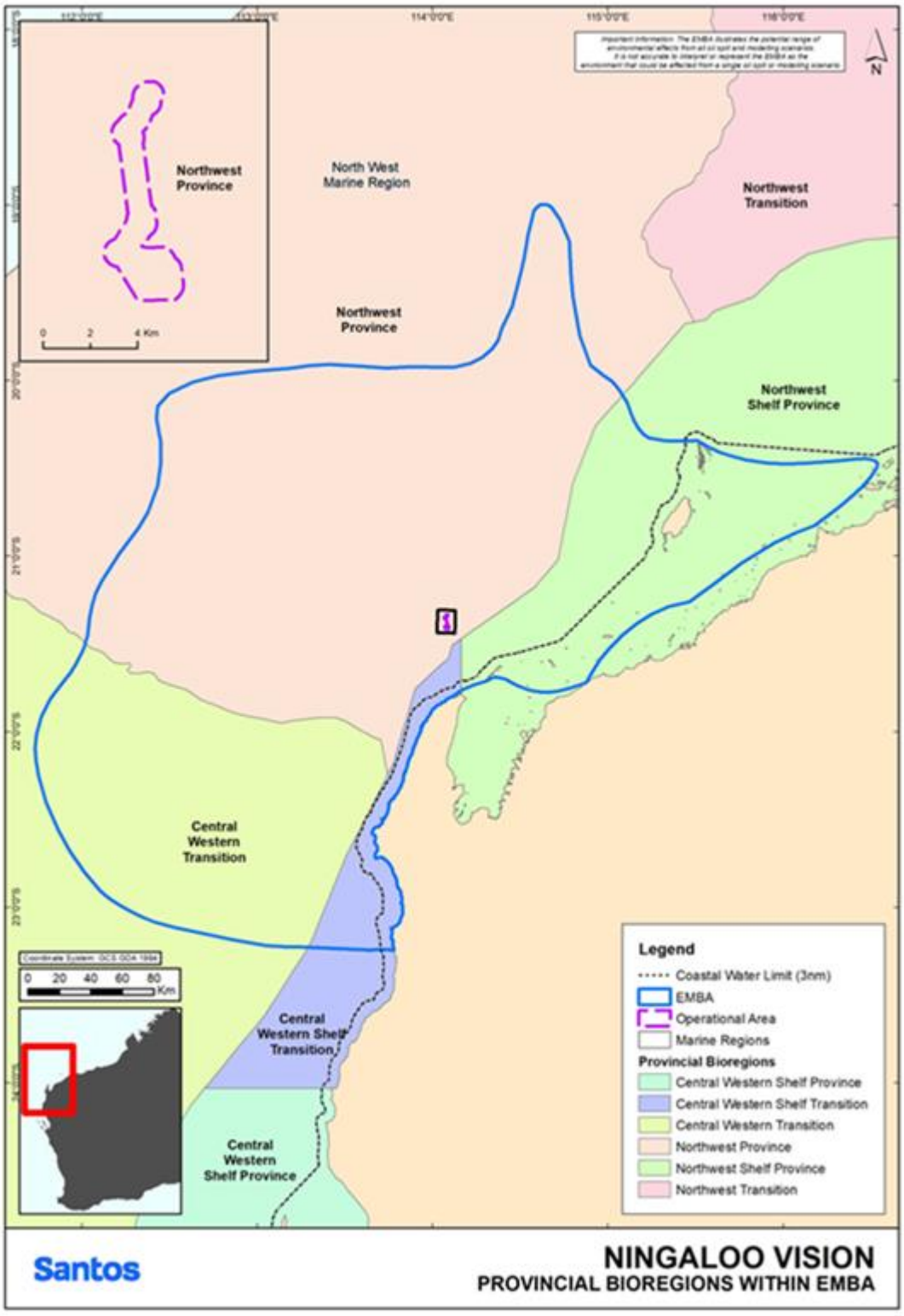


Figure 1: IMCRA 4.0 Provincial Bioregions within the EMBA

2. Physical Environment

2.1. Geomorphology

2.1.1. Formation History

Approximately 550–160 million years ago, the northern and western parts of the present-day Australian continent formed part of the northern margin of Gondwana. About 300 million years ago, crustal stretching, rifting and breakup initiated the development of an extensive basin that became the site for deposition of sediments (Baker et al. 2008 in Department of the Environment, Heritage, Water, and the Arts (DEWHA) 2008a). Approximately 135 million years ago the continent broke up resulting in the separation of greater India and Australia. Ocean spreading associated with the continental break-up resulted in the creation of the Argo and Cuvier abyssal plains. Subsidence of the rifted margin resulted in the formation of the Exmouth and Scott plateaux and the Rowley Terrace. The narrow shelf south of North West Cape was formed approximately 130 million years ago as a result of the separation of India and sea floor spreading (Baker et al. 2008 in DEWHA 2008a).

2.1.2. Present Day Geological Features

The EMBA consists of five major landform features: continental shelf, continental slope, continental rise, Exmouth plateau and abyssal plain. Most of the area consists of either continental shelf or continental slope (DEWHA 2008a).

Limited surveys have shown that the continental slope in the EMBA comprises diverse geological features such as canyons, plateaux, terraces, ridges, reefs, banks and shoals (DEWHA 2008a. These features are significant in that over half of the total area of banks and shoals across Australia's entire marine jurisdiction occurs in the Commonwealth waters from the South Australian border to the Northern Territory border, as well as 39 % of terraces and 56 % of deeps, holes and valleys (DEWHA 2008a).

An important characteristic of the EMBA is the significant narrowing of the continental shelf around North West Cape from the broad continental shelf in the north. At North West Cape the shelf is only 7 km wide – the narrowest of anywhere on the Australian continental margin (DEWHA 2008a). Shelf width affects oceanography with flow on effects to productivity and ecosystem functioning.

Several geomorphic formations within the EMBA have been associated with Key Ecological Features (DEWHA 2008a) and these are discussed in Section 10.

2.1.3. Central Western Transition

The Central Western Transition is characterised by large areas of continental slope, with sediments dominated by muds and sands that decrease in grain size with increasing depth. The slope is incised by numerous topographic features such as terraces (i.e. the Carnarvon Terrace), canyons (i.e. Cloates Canyon and Carnarvon Canyon) and rises. A large part of the bioregion consists of the Cuvier Abyssal Plain. The Wallaby Saddle is another important feature of this bioregion, and it is the most extensive area of this type of topographic feature in the North-west Marine Region (DEWHA, 2008a).

2.1.4. Central Western Shelf Transition

The Central Western Shelf Transition is located entirely on the continental shelf and is comprised mainly of sandy sediments. The close proximity of the coast to the shelf break is a significant feature of this bioregion and is an important factor in determining its biodiversity (DEWHA, 2008a).

Ningaloo Reef is the most significant geomorphic feature in the bioregion. It extends south of North West Cape along the Cape Range Peninsula, and stretches for over 260 km. It is the only example in the world of an extensive fringing coral reef on the west coast of a continent (DEWHA, 2008a).

2.1.5. Northwest Province

The bioregion occurs entirely on the continental slope and is comprised of muddy sediments. It is distinguished by a number of topographic features, such as the Exmouth Plateau, terraces and canyons (including the Swan and Cape Range canyons), as well as deep holes and valleys on the inner slope. The Montebello Trough occurs on the eastern side of the Exmouth Plateau and represents more than 90 per cent of the area of troughs in the North-west

Marine Region. Significantly, this bioregion contains the steepest shelf break of the North-west Marine Region, along the Cape Range Peninsula near Ningaloo Reef (DEWHA, 2008a).

2.1.6. Northwest Shelf Province

The Northwest Shelf Province is located almost entirely on the continental shelf, except for a small area to the north of Cape Leveque that extends onto the continental slope. This bioregion includes more than 60 % of the continental shelf in the North-west Marine Region (DEWHA, 2008a). The shelf gradually slopes from the coast to the shelf break but displays a number of sea floor features such as banks/shoals and holes/valleys. These are thought to be morphologically distinct from other features of these types found elsewhere in the North-west Marine Region, and have a different sedimentology (DEWHA, 2008a). For example, the Glomar Shoals occur approximately 30–40 km offshore of Dampier in water depths of between 26–70 m and are distinguished by highly fractured molluscan debris, coralline rubble, and coarse carbonate sand. The province also includes the Leveque Rise, a large plateau, and one of only two shelf plateaux within the North-west Marine Region (DEWHA, 2008a).

2.1.7. Sediments

Terrestrial environments are not a major source of sediment to the EMBA and terrigenous sediments tend to be confined to the inner shelf (generally less than 100 m water depth), particularly in areas adjacent to rivers. Sediments in the area generally become finer with increasing water depth, ranging from sand and gravels on the shelf to mud on the slope and abyssal plain. Joseph Bonaparte Gulf is an exception to this pattern, as sediments with high mud content extend across the inner and mid shelf within the Gulf, graduating to sands and gravels in the Bonaparte Depression.

The distribution and resuspension of sediments on the inner shelf is strongly influenced by the strength of tides across the continental shelf as well as episodic events such as cyclones. Further offshore, on the mid to outer shelf and on the slope itself, sediment movement is primarily influenced by ocean currents and internal tides. Internal tides describe the tidal movement across a slope of water stratified by marked differences in density. Internal tides cause resuspension and net down-slope deposition of sediments on the North West Shelf (DEWHA 2008a).

Surveys conducted over the North West Shelf indicate that similar sediments occur extensively over this geographic region, but with spatial variation in the grain size and origin of the surface sediments.

The ecology of the southwest is also greatly influenced by the lack of river discharge into the Region. The few significant rivers adjacent to the Region flow intermittently and their overall discharge is low. The low discharge of rivers and the generally low rate of biological productivity also results in low turbidity (suspended sediments), making the waters of the Region relatively clear (McLoughlin & Young 1985). Surface sediments in the area are predominantly composed of skeletal remains of marine fauna, with lenses of weathered sands (McLoughlin & Young 1985).

Shoals and banks are naturally forming, submerged and made of consolidated material such as sand. Normally, the shoal or bank rises close to the water surface having been created when an ocean current deposits sediment. Shoals and banks are found within the EMBA.

2.2. Climate

Waters in northern Western Australia predominantly lie in the arid tropics, experiencing high summer temperatures and periodic tropical cyclones in summer. Rainfall in the region is low, although intense rainfall may occur during the passage of summer tropical cyclones and thunderstorms (Condie et al. 2006). Mean air temperatures range from a minimum of 11°C in winter to a maximum of 36°C in summer (Condie et al. 2006). Due to the arid climate, daytime visibility in the area is generally greater than 5 nautical miles (SSE 1991).

The summer and winter seasons fall into the periods September–March and May–July, respectively. Winters are characterised by clear skies, fine weather, predominantly strong east to southeast winds and infrequent rain (calculated from the National Centres for Environmental Prediction and National Centre for Atmospheric Research (NCEP-NCAR) dataset measured from 1982 to1999; Condie et al. 2006; Figure 2).

Summer winds are more variable, with strong south-westerlies dominating. Transitional wind periods, during which either pattern may predominate, can be experienced in April–May and September of each year.

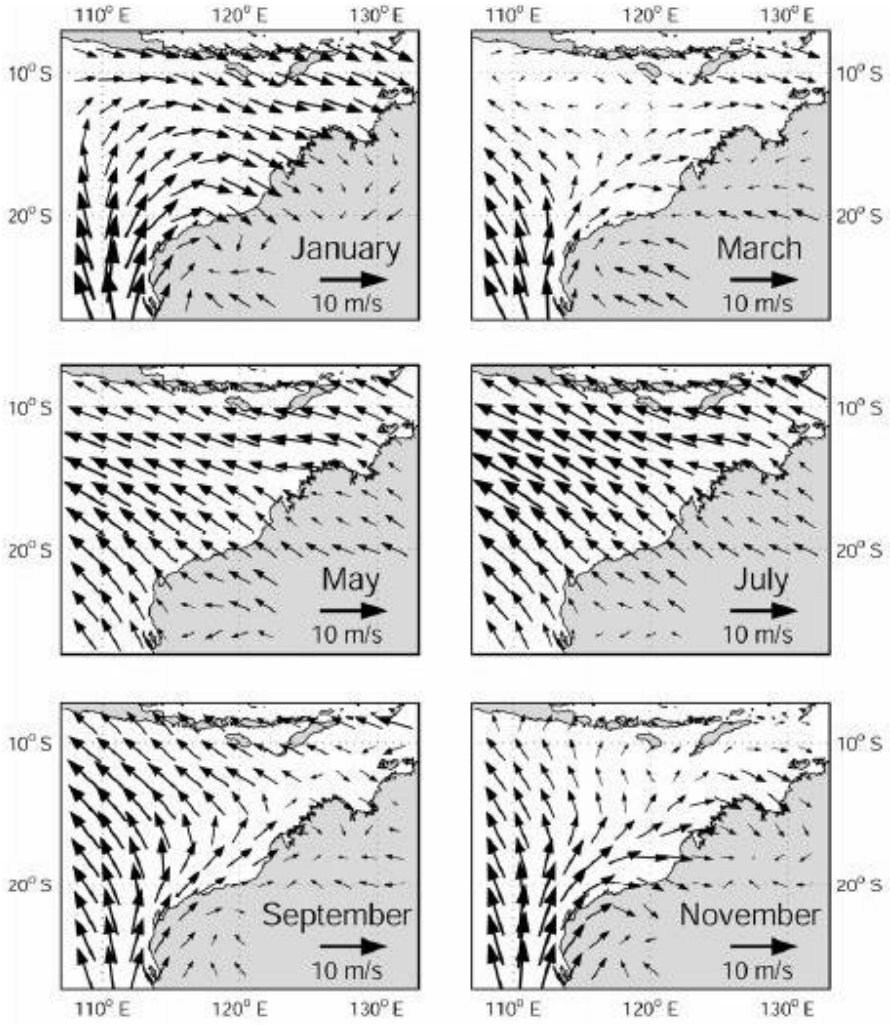


Figure 2: Seasonally averaged winds at 10 m above mean sea level

Calculated from NCEP-NCAR dataset measured from 1982 to 1999. Source: Condie et al. (2006)

Tropical cyclones generate the most significant storm conditions in the area (SSE 1993). These clockwise-spiralling storms have generated wind speeds 50–120 knots (SSE 1991). Tropical cyclones develop in the eastern Indian Ocean, and the Timor and Arafura Seas during the summer months. Three to four cyclones per year are typical, with the official cyclone season being November through to April (Bureau of Meteorology (BoM) 2013). In Indonesia, the main variable in climate is not temperature or pressure, but rainfall, which varies greatly by month and place, ranging from 997 millimetres (mm) to 4,927 mm.

2.3. Oceanography

Major drivers of marine ecosystems include ocean currents, tides, waves, temperature and salinity. The dominant offshore sea surface current is the Leeuwin Current (Figure 3), which carries warm tropical water south along the edge of Western Australia's continental shelf, reaching its peak strength in winter and becoming weaker and more variable in summer (Condie et al. 2006). The current is typically located seaward of the shelf break (200 m isobath) and is a narrow, surface current, extending to a depth of 150 m (BHPB 2005, Woodside 2005) and a width of 50–100 km (DEWHA 2008a). The formation of meanders and eddies are also a feature of the Leeuwin Current and a number of eddies occur south of Shark Bay (DEWHA 2008a). The strength of the Leeuwin Current is influenced by seasonal variability in the pressure gradient (DEWHA 2008a). The Holloway Current is the prevailing seasonal current, travelling south-west along the north West Australian coast in winter and north-east in summer (Brewer et al. 2007). It is a relatively narrow boundary current that flows along the north-west shelf at between 100 m and 200 m depth, flowing towards the north-east in summer and the south-west in winter (Fugro, 2015).

The Indonesian Throughflow is the other important current influencing the upper 200 m of the outer North West Shelf (Woodside 2005). This current brings warm and relatively fresh water to the region from the western Pacific via the Indonesian Archipelago (Figure 3). Modelling undertaken by Woodside and Commonwealth Scientific and Industrial Research Organisation (CSIRO) Marine and Atmospheric Research indicates that significant east–west flows occur across the North West Shelf to the north of the North West Cape, possibly linking water masses in the area (Woodside 2005, Condie et al. 2006).

Currents in the coastal zone and over the inner to mid-shelf are largely driven by tides and winds, whereas offshore, over the continental shelf, slope and rise are influenced by large scale regional circulation (DEWHA 2008a). Large-scale currents of the Timor and Arafura seas in the north are dominated by the Indonesian Throughflow. Christmas and Cocos (Keeling) Islands territories are located in the eastern Indian Ocean, in the path of the South Equatorial Current that carries the Indonesian Throughflow waters into the Indian Ocean. During summer, monsoon winds are highly influential in driving water movement and water column mixing (O'Hara 2023).

The nearshore Ningaloo Current flows northwards opposite to the Leeuwin Current, along the outside of the Ningaloo Reef and across the inner shelf from September to mid-April (BHPB 2005, Woodside 2005). The nearshore Capes Current, which is to the south of the Ningaloo Current, is a seasonal current that appears strongest between Cape Leeuwin and Cape Naturaliste, in the southwest of Western Australia (Pearce and Pattiaratchi 1999). Strong northwards winds between November and March slow the Leeuwin Current and increase the strength of the Capes Current. Localised upwelling is also known to occur in the area (Pearce and Pattiaratchi 1999).

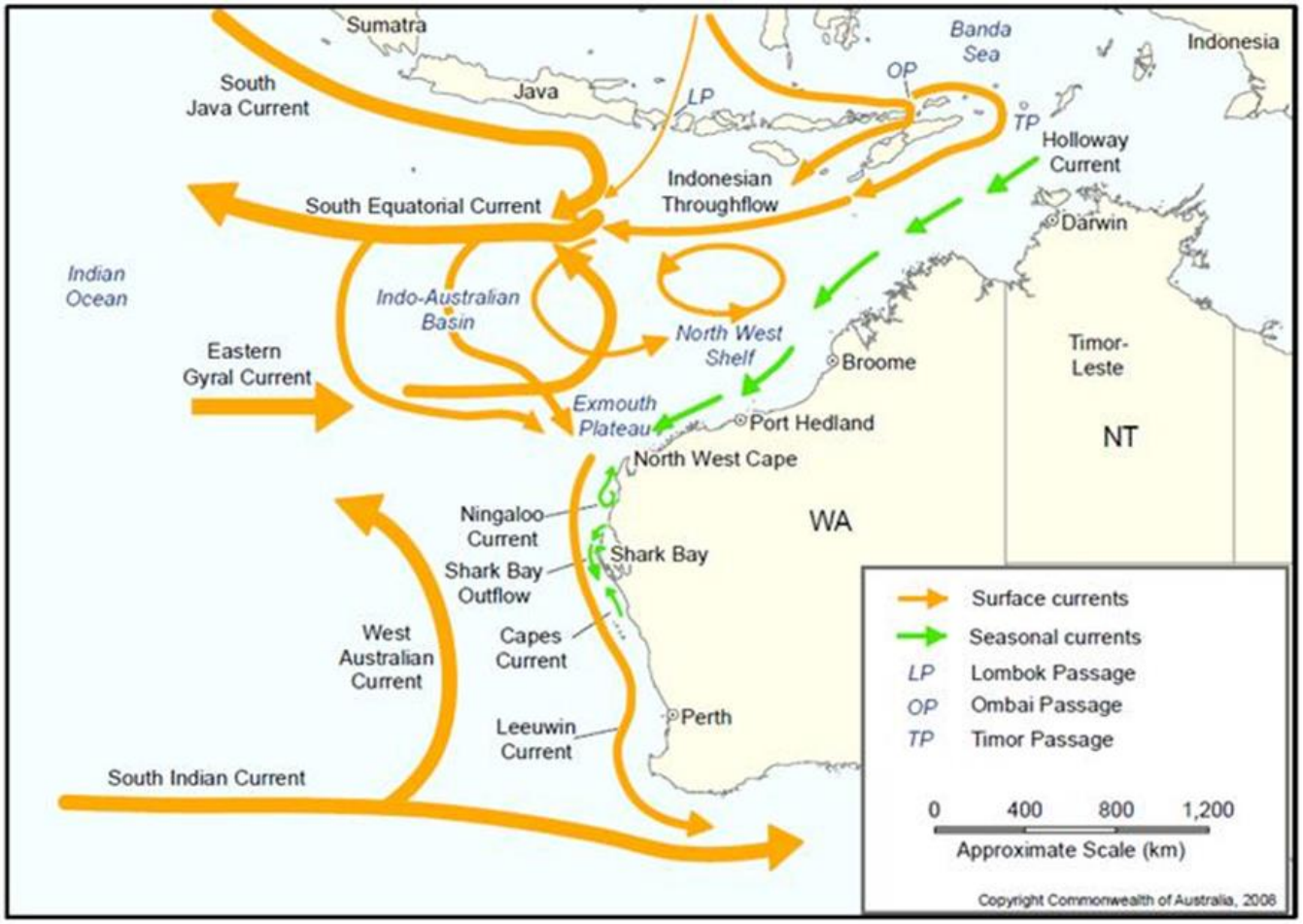
Tides in the area are generally semi-diurnal (i.e. two high tides and two low tides per day) with a spring/neap cycle. Mid-shelf tidal currents are predicted to have average speeds of approximately 0.25 knots during neap tides and up to 0.5 knots during spring tides (NSR 1995, WNI 1995).

The wave climate in the northwest is composed of locally-generated wind waves (seas) and swells that are propagated from distant areas (WNI 1995). In summer the seas typically approach from the west and southwest, while in winter the seas typically approach from the south and east. Mean sea wave heights are typically less than 1 m and peak heights of less than 2 m are experienced in all months of the year (WNI 1995). Cyclones and tropical storms can greatly increase wave heights by up to 8 m in the outer Timor Sea during the cyclone season (Przeslawski et al. 2011).

Waters on the continental shelf are usually thermally-stratified, with a marked change in water density at approximately 20 m (SSE 1993). Surface temperatures vary annually, being warmest in March (32°C) and coolest in August (19°C). Vertical gradients are related to the seasonality of sea surface temperatures and are greatest during the warm-water season (SSE 1991). Near-bottom water temperature on the North West Shelf is approximately 23°C, with no discernible seasonal variation.

Salinity is relatively uniform at 34–35 ppt throughout the water column and across the North West Shelf. Due to the low rainfall there is little freshwater run-off from the adjacent mainland (Blaber et al. 1985).

Pronounced shifts in water column characteristics can occur following the passage of tropical cyclones (McKinnon et al. 2003). Changes in water temperature and salinity characteristics can result from changes in local heating and evaporation following the southward movement of warmer water due to southward-moving cyclones and can have flow-on effects to primary and secondary productivity (McKinnon et al. 2003).



Source: DEWHA (2008b)

Figure 3: Surface currents in WA and the NT

3. Benthic and Pelagic Habitats

Benthic habitats are defined as those subtidal habitats lying below the lowest astronomical tide (LAT). The benthic habitats within waters in the EMBA lie at depths ranging from LAT down to more than 1,000 m.

Benthic habitats are partially driven by light availability. Primary producers (photosynthetic corals, seagrasses and macroalgae) are limited to the photic zone, whereas benthic invertebrates including filter feeding communities may be found in deeper waters. The depth of the photic zone varies spatially and temporally and is predominantly dependent on the volumes of suspended material in the water column. The photic zone in the offshore Pilbara is approximately 70 m (DEWHA 2008b).

The following section broadly categorises benthic habitats as four biological communities: coral, seagrasses, macroalgae and non-coral benthic invertebrates. These communities are discussed in terms of the 18 IMCRA v. 4.0 bioregions.

3.1. Coral Reefs

Corals are both primary producers and filter feeders and thus play a role in the provision of food to marine fauna and in nutrient recycling to support ecosystem functioning (Conservation and Land Management (CALM) & Marine Parks and Reserves Authority (MPRA) 2005a).

Corals create settlement substrate and shelter for marine flora and fauna. Studies have shown that declines in the abundance, or even marked changes in species composition of corals, has a marked impact on the biodiversity and

productivity of coral reef habitats (Pratchett et al. 2008). As part of the reef building process, Scleractinian corals are also important for protection of coastlines through accumulation and cementation of sediments and dissipation of wave energy (CALM & MPRA 2005a).

The waters in the EMBA contain extensive coral communities. Coral reefs in the area fall into two general groups: the fringing reefs around coastal islands and the mainland shore; and large platform reefs, banks and shelf-edge atolls offshore (Woodside 2011). The distribution of corals is governed by the availability of hard substrate for attachment and light availability.

Coral reefs are dynamic environments that regularly undergo cycles of disturbance and recovery. Depending on how frequent and severe the disturbances are, recovery can take a few years or more than a decade. Disturbances can include bleaching, cyclones and disease outbreaks (Australian Institute of Marine Science (AIMS) 2011).

Corals in the northwest province have experienced bleaching events and subsequent recovery. Bleaching is the process where symbiotic algae are expelled from the coral tissue, often leading to the death of the colony. Causes of bleaching include high temperatures (Ningaloo; 2011 and Scott Reef; 1998 and 2016) (information available at AIMS.gov.au), anoxic conditions (Bill's Bay; 2008) or smothering (Waples & Hollander 2008, Gilmour et al. 2013). Coral susceptibility to bleaching and their ability to recover is an important consideration in the context of potential anthropogenic impacts.

Two bioregions (Northwest Province and Central Western Transition) lie in deep waters below the photic zone. Photosynthetic corals are not present in these locations and hence these bioregions are not discussed further.

3.1.1. Central Western Shelf Transition

A significant proportion of this bioregion is covered by the Ningaloo Reef. The Ningaloo Reef is unique in that it is the largest fringing reef in Australia and is the only large reef found on the western side of a continent in the southern hemisphere.

A 300 km section of the coast, from Red Bluff to North West Cape and extending to Bundegi in Exmouth Gulf, is included in the Ningaloo Marine Park. Ningaloo Reef supports variable lagoonal, intertidal and subtidal coral communities along its length. Ningaloo Reef is characterised by a high diversity of hard corals with at least 217 species representing 54 genera of hermatypic (reef building) corals recorded to date (Veron & Marsh 1988). The most diverse coral communities are found in the shallow relatively clear water, high energy environment of the fringing barrier reef and low energy lagoonal areas to the west of North West Cape (CALM & MPRA 2005a).

Coral diversity reduces with increasing depth, and corals are uncommon at depths greater than 40 m (Waples & Hollander 2008). At depths between 20 and 30 m hard corals have been found to be more dominant in the northern areas of the Ningaloo Marine Park, whereas in southern areas other sessile invertebrates such as sponges, are more prevalent (Waples & Hollander 2008).

3.1.2. Northwest Shelf Province

This province contains numerous small coastal islands in addition to larger archipelago and offshore island groups. Many of these features are surrounded by shallow waters with small barrier and fringing reefs that support coral communities. Key areas recognised for coral communities in this bioregion are discussed below.

The Dampier Archipelago supports coral reefs in shallow waters near islands and submerged pinnacles. The most significant coral reefs have formed along the seaward slopes of Delambre Island, Hamersley Shoal, Sailfish Reef, Kendrew Island and north-west Enderby Island (CALM & MPRA 2005). Field trips in the Dampier Archipelago between 1972 and 1998 recorded 229 species of corals from 57 genera (Griffith 2004). Surveys of the Dampier Port and inner Mermaid Sound recorded approximately 120 coral species from 43 genera (Blakeway & Radford 2005) with coral reefs dominated by acroporids and pocilloporids. The greatest coral cover (up to 70%) was recorded in the eastern half of the archipelago (Wells et al. 2003).

The Montebello, Lowendal and Barrow islands include 315 islands associated with extensive coral reefs, the most significant of which occur in the sheltered waters on the eastern side of the islands. Examples of these significant reefs include Dugong Reef, Batman Reef and reefs along the Lowendal Shelf (DEC & MPRA 2007a). Dominant corals include acroporids and poritids, with greater than 70% cover recorded for some areas (Chevron 2010). Subtidal coral reef communities around the islands are highly diverse, with at least 150 species of hard corals recorded from fringing and patch coral reef areas (DEC & MPRA 2007a).

Coral distribution near the mainland is restricted by lack of light due to natural turbidity. Corals may exist as sparse coral colonies in some locations, rather than extensive coral communities. Within Exmouth Gulf, coral communities

are less common but are present on fringing reefs surrounding islands, as solitary corals distributed across areas of hard substrate, or on larger isolated patch reefs.

An epibenthic dredge survey of nearshore areas north of Broome identified 14 species of hard corals from six families (Keesing et al. 2011). Limited coral surveys conducted at Broome (15 species) and the Lacepede Islands (ten species) (Veron & Marsh 1988) suggest the species diversity in this locality may be low. However, low species diversity observed during the dredge survey may reflect the limited sampling frequency, limited depth range (11–23 m) or inadequate sampling in habitats considered favourable for the proliferation of hard corals (hard substrate). In contrast, other surveys of nearshore locations in the region have recorded much higher levels of species diversity. Veron and Marsh (1988) stated that 102 species of hard corals have been recorded from the Kimberley coast and nearshore reefs and Cairns (1998) recorded 87 species of azooxanthellate hard coral species from north-western Australian waters.

3.2. Seagrasses

Seagrasses are biologically important for four reasons:

- As sources of primary production
- As habitat for juvenile and adult fauna such as invertebrates and fish
- As a food resource
- For their ability to attenuate water movement and trap sediment (Masini et al. 2009).

Twenty-five species of seagrass have been recorded in WA, the highest diversity in the world, and over 30 species of seagrasses have been recorded as occurring within Australian waters (Masini et al. 2009). Waters extending from Busselton to the NT border support predominantly tropical species although temperate species are also found, particularly between Busselton and Exmouth (Walker 1987). One species, *Cymodocea angustata*, is endemic to WA (Department of Parks and Wildlife (DPAW) 2013).

Two bioregions (Northwest Province and Central Western Transition) lie entirely in deep waters below the photic zone. Seagrasses are not present hence these bioregions are not discussed further.

3.2.1. Central Western Shelf Transition

Nine species of seagrasses have been found throughout Ningaloo Reef (van Keulen & Langdon 2011). Some delineation of temperate and tropical species exists; however, several species were found throughout the Ningaloo Reef. Halophila ovalis was the most commonly found seagrass at Ningaloo and was generally found growing in sandy patches between coral bomboras. *Amphibolis antarctica* is a large meadow forming species that has been found growing in large clumps in Bateman Bay, north of Coral Bay (van Keulen & Langdon 2011).

3.2.2. Northwest Shelf Province

In the Northwest Shelf Province, seagrasses are present but sparsely distributed to depths of approximately 30 m (LEC & Astron 1993, URS 2009, CALM 2005a). The abundance and distribution of tropical (and subtropical) seagrass species can vary greatly due to seasonal changes in water quality (turbidity, light penetration) and conditions (wave action, temperature), with biomass tending to peak in summer (Lanyon & March 1995).

Studies between Quondong and Coulomb Points north of Broome identified seagrass communities of *Halophila* spp. patchily distributed across large areas, from the lower intertidal and out to a depth of approximately 20 m (DEC 2008, Fry et al. 2008). Similarly, *Halophila decipiens* was the only seagrass collected from epibenthic dredge studies at five localities near Broome from Gourdon Bay to Packer Island (Keesing et al. 2011).

Roebuck Bay is located south of Broome and includes large areas of intertidal mudflats. Extensive seagrass meadows occur in the northern regions of Roebuck Bay and are dominated by *Halophila ovalis* and *Halodule uninervis*. *Halophila minor* and *Halodule pinifolia* have also been reported at this location (Prince 1986, Walker & Prince 1987, Seagrass-Watch 2019).

In the Dampier Archipelago seagrass occurs in the larger bays and sheltered flats of the area (CALM & MPRA 2005). Six species of seagrass, including three Halophila species, have been recorded on the subtidal soft sediment habitats (CALM & MPRA 2005). Seagrasses do not form extensive meadows within the proposed reserves, but rather form interspersed seagrass/macroalgal beds. The largest areas of seagrass are found between Keast and Legendre islands, and between West Intercourse Island and Cape Preston (CALM & MPRA 2005).

Surveys near Onslow found that *Halophila* spp. were the most widespread of the seagrasses in that region. Seagrasses were found to be generally sparsely distributed (<10 % cover), occurring in small patches within larger areas of suitable substrate. Small areas of higher (>50 %) seagrass cover occurred in shallow clear water areas but were not common (URS 2009, URS 2010b, Chevron 2010).

Similarly, in the Montebello/Barrow Islands Marine Conservation Reserves, seagrasses appear not to form extensive meadows but are sparsely interspersed between macroalgae. Seven seagrass species have been recorded in the Reserves (DEC & MPRA 2007a) with *Halophila* spp. the most common seagrass species on shallow soft substrates and sand veneers. Distributions of these species extend from the intertidal zone to approximately 15m water depth (DEC & MPRA 2007a). Surveys to the northwest and southeast of Barrow Island from 2002 to 2004 did not identify any significant seagrass meadows but confirmed the presence of sparse coverage of *Halophila* and *Halodule* spp. in shallow areas east of Barrow Island (RPS BBG 2005).

A significant meadow of large seagrasses at Mary Anne Reef east of Onslow was identified almost 30 years ago and its presence today is unconfirmed. The meadow was several hundred hectares (ha) of *Cymodocea angustata* at 30–50 % cover, occurring primarily at a depth of 2–3 m (Walker & Prince 1987).

3.3. Macroalgae

Macroalgae are important contributors to primary production and nutrient cycling in the EMBA, providing food and habitat for vertebrate and invertebrate fauna. Macroalgae are also recognised for their role in spatial subsidies; the movement of nutrients or energy between neighbouring habitats. Spatial subsidies involving macroalgae include the movement of wrack from macroalgal beds to seagrass meadows, bare substrates and shorelines (Orr 2004, Mellbrand et al. 2011).

Macroalgae are primarily associated with hard substrates. They occur in moderate to high cover on exposed hard substrates, but typically have lower cover on hard substrates that are covered with a veneer of sediment (SKM 2009, BHPBIO 2011). Macroalgae exhibit very high seasonal and interannual variation in biomass (Heyward et al. 2006) and distribution, abundance, and biodiversity (Rio Tinto 2009, BHPBIO 2011). The distribution of hard substrates therefore indicates areas that may support macroalgal communities, although abundance and diversity may fluctuate annually.

Macroalgae are susceptible to disturbance from factors such as sedimentation, scouring and turbidity but the marked seasonality in biomass, abundance, diversity, and distribution suggests macroalgae are likely to be resilient to acute, short-term disturbance acting at local scales. Macroalgae may be more susceptible to impacts acting over longer time scales (years) and at certain times of the year, where recruitment at a regional scale could be affected. Indirect impacts affecting the numbers, distribution and community structure of herbivorous fish can also be expected to have impacts (either positive or negative) on macroalgal habitats (Vergès et al. 2011).

Two bioregions (Northwest Province and Central Western Transition) lie entirely in deep waters below the photic zone. Macroalgae are not present hence these bioregions are not discussed.

3.3.1. Central Western Shelf Transition

Macroalgal beds along the Ningaloo coastline are generally found on the shallow limestone lagoonal platforms and occupy about 2,200 ha of the Ningaloo Marine Park and Muiron Islands Marine Management Area (CALM & MPRA 2005a). Macroalgal communities within the area have been broadly described (Bancroft & Davidson 2000). The dominant genera are the brown algae *Sargassum*, *Padina*, *Dictyota* and *Hydroclathrus* spp. (McCook et al. 1995).

3.3.2. Northwest Shelf Province

Macroalgae are diverse and widespread throughout the Northwest Shelf Province. They are restricted to depths where sufficient light penetrates to the substrate and therefore tend to be most common in shallow subtidal waters down to approximately 20 m depth.

In the nearshore regions of the Pilbara, macroalgae are often a dominant component of the mosaic of benthic organisms found on hard substrates in shallow water. In these shallow waters, regular disturbance to reef habitats from seasonal changes in sedimentation/ erosion patterns and the less frequent impacts of cyclones and storms through sedimentation and scouring may substantially alter the distribution and composition of the benthic communities associated with reefs, including macroalgal habitats (BHPBIO 2011).

Macroalgae dominate shallow (<10 m) submerged limestone reefs and also grow on stable rubble and boulder surfaces in the Dampier Archipelago (CALM & MPRA 2005). Huisman and Borowitzka (2003) reported

approximately 200 species of macroalgae from the Dampier Archipelago. Low relief limestone reefs that are dominated by macroalgae, account for 17 % (approximately 35,460 ha) of the marine habitats within the proposed Marine Management Area (CALM 2005a).

Epibenthic dredge surveys along the coastline north of Broome identified 43 species of algae from 22 families (Keesing et al. 2011). The lower species diversity collected by this study is attributed to the method of collection and limited depth range (11–23 m) (Keesing et al. 2011).

Macroalgae occur around the numerous small offshore islands within this bioregion (including Thevenard Island, Airlie Island and Serrurier Island) associated with limestone pavement and protected areas of soft sediments. Dominant species are consistent with those described for the Dampier Archipelago (Woodside 2011).

In the shallow offshore waters of the Pilbara region, macroalgae are the dominant benthic habitat on hard substrates in both the Montebello and Barrow Islands Marine Parks and are the main primary producers (DEC & MPRA 2007a, Chevron 2010). Shallow water habitats outside these marine parks are also likely to support substantial areas of macroalgal habitat wherever conditions are suitable.

Macroalgae occupy approximately 40% of the benthic habitat area in the Montebello/ Lowendal/ Barrow Island region (CALM 2005b). At least 132 macroalgal taxa occur around Barrow Island, with most thought to be widely distributed in the tropical Indo-Pacific region (Chevron 2005).

Macroalgae monitoring around the Lowendal and Montebello Islands since 1996 (The Ecology Lab 1997, IRCE 2002 2003 2004 2006 2007, URS 2009) has found macroalgal cover and biomass to be naturally spatially and temporally variable. *Sargassum* spp. represented 70% of the macroalgal assemblage in 2009, compared to 96% in 2002 (URS 2009). Sargassum spp. cover as a percentage of total macroalgae cover was significantly lower in 2009 than in previous years, primarily due to an increase in filamentous algae at a number of sites (URS 2009).

3.4. Non-Coral Benthic Invertebrates

The offshore marine environment of the Northwest Shelf is overwhelmingly dominated by soft sediment seabeds; sandy and muddy substrates, occasionally interspersed with hard substrates covered with sand veneers, and rarely, exposed hard substrate. In shallow waters, non-coral benthic invertebrates may form part of the mosaic of benthic organisms found on hard substrates, alongside macrophytes and coral colonies. As light reduces with water depth, non-coral benthic invertebrates are the dominant community, albeit at low densities.

Non coral benthic invertebrates feed by filtering small particles from the seawater, typically by passing the water over a specialised filtering structure. Examples of filter feeders are sponges, soft and whip corals and sea squirts.

3.4.1. Central Western Transition

The Central Western Transition extends from the shelf break to the continental slope with some parts of the bioregion occurring on the abyssal plain. Water depths range from 80 m to almost 6,000 m. Sediments are dominated by muds and sands that decrease in grain size with increasing depth. The present level of understanding of the marine environment in this bioregion is generally poor. The harder substrate of the slope in waters of 200–2,000 m deep is likely to support populations of epibenthic fauna including bryozoans and sponges. These support larger infauna and benthic animals such as crabs, cephalopods, echinoderms and other filter feeding epibenthic organisms. In the deeper waters of the abyss, the benthic communities are likely to be sparse (DEWHA 2008a).

3.4.2. Central Western Shelf Transition

The Central Western Shelf Transition is located entirely on the continental shelf and is comprised mainly of sandy sediments in depths between 0 and 80 m (DEWHA 2008a).

Some sponge species and filter-feeding communities found in deeper waters offshore from the Ningaloo Reef appear to be significantly different to those of the Dampier Archipelago and Abrolhos Islands, indicating that the Commonwealth waters have some areas of potentially high and unique sponge biodiversity (Rees et al. 2004).

3.4.3. Northwest Province

The Northwest Province is located entirely on the continental slope in water depths of predominantly between 1,000–3,000 m and is comprised of muddy sediments. Despite the present poor knowledge of the benthic communities on the Exmouth Plateau, information on sediments in the bioregion indicates that benthic communities are likely to include filter feeders and epifauna. Soft-bottom environments are likely to support patchy distributions of mobile epibenthos, such as sea cucumbers, ophiuroids, echinoderms, polychaetes and sea pens.

3.4.4. Northwest Shelf Province

This bioregion is located primarily on the continental shelf in water depths from 0 to 200 m (DEWHA 2008a). The sandy substrates on the shelf within this bioregion are thought to support low density benthic communities of bryozoans, molluscs and echinoids (DEWHA 2008a). Sponge communities are also sparsely distributed on the shelf but are found only in areas of hard substrate. The region between Dampier and Port Hedland has been described as a hotspot for sponge biodiversity (Hooper & Ekins 2004).

Epibenthic dredge surveys in nearshore areas around Broome covered 1,350 m^2 of seabed in depths between 11 and 23 m. The survey recorded 357 taxa comprising 52 sponges, 30 ascidians, 10 hydroids, 52 cnidarians (not including scleractinian corals), 69 crustaceans, 73 molluscs and 71 echinoderms. The most important species on soft bottom habitats in terms of biomass was the heart urchin *(Breynia desorii)*, whilst sponges were the dominant fauna by biomass on hard bottom habitats. The biomass of other filter feeders, especially ascidians, soft corals, gorgonians was also high, indicating the importance of these groups in characterising hard bottom habitats.

In 2007, CSIRO conducted extensive benthic habitat mapping surveys and epibenthic fauna (living on the surface and ≥1 cm body size) sampling in deep waters (100–1,000 m) spanning thirteen sites between Barrow Island and Ashmore Reef running along the continental shelf and across the continental slope of the North West Shelf (Williams et al. 2010). At the continental shelf margin (approximately 100 m water depth) Williams et al. (2010) reported that similar benthic habitats occurred at each survey site across the breadth of the North West Shelf. Benthic habitats at this depth comprised a mix of riffled muddy sand (sometimes as a veneer over rocky sub-crops) together with gravel to pebble-sized rubble, cobbles, boulders and some rock outcrops. Typical epifauna found at these depths included scattered isolated hydroids, sea fans and soft corals and often small sponges. Other fauna observed at some of the sites included scattered isolated sea whips, crinoids, sea pens, urchins and anemones. Epibenthic fauna along the continental shelf margin were quantified as sparse and low diversity (Williams et al. 2010). Modelling indicated that a trawl sample of 1 km length would generally be expected to yield approximately 80 individuals represented by 15 species (Williams et al. 2010) in 100 m depth waters.

At the shelf edge (approximately 200 m water depth), two sites were surveyed. Both sites were similar to the continental shelf margin, except the northern site mainly comprised coarse material. Epifauna observed at the northern site was similar at 200 m as at 100 m. At the southern site, epifauna included sparse and scattered individual soft corals, anemones, glass sponges and stalked crinoids (Williams et al. 2010). Modelling indicated epibenthic fauna were sparse and had low diversity, numbering approximately 20–40 individuals in a 1 km long trawl sample represented by approximately 5–10 species (Williams et al. 2010).

Baseline studies undertaken in nearshore areas of the Pilbara (SKM 2009, Rio Tinto 2009, BHPBIO 2011) and offshore areas around Barrow Island (Chevron 2010) have shown that filter feeder communities are a dominant component of benthic habitats in depths >10 m where reduced light appears to inhibit extensive development of hard corals and macroalgae. The pavement habitats between Barrow Island and the mainland are covered by a sediment veneer that appears to periodically move, exposing areas of pavement reef. Sessile benthic organisms that require hard substrates for attachment, such as gorgonians, are frequently seen emerging through a shallow veneer of sand. This type of substrate (sediment veneer) with sparse filter feeder communities is common throughout this area (Skm^{2}009, Rio Tinto 2009, BHPBIO 2011).

4. Shoreline Habitats

Shoreline habitats are defined as those habitats that are adjacent to the water along the mainland and of islands that occur above the Lowest Astronomical Tide (LAT) and most often in the intertidal zone.

The following section broadly categorises shoreline habitats as the following biological communities; mangroves, intertidal mud/sand banks, beaches, and rocky shores. These communities are discussed in Sections 4.1- 4.5, in terms of the 18 IMCRA v. 4.0 bioregions where relevant and where information is available.

4.1. Mangroves

Mangroves commonly occur in sheltered coastal areas in tropical and sub-tropical latitudes (Kathiresan and Bingham 2001). Up to eight species of mangroves are found in the Central Western Shelf Transition region, but at most locations the dominant mangrove (in terms of area of intertidal zone occupied) is *Avicennia marina*, with the stilt rooted mangrove *Rhizophora stylosa* often occurring as thin zones of dense thickets within the broad zone of *A. marina*. Mangroves are found wherever suitable conditions are present including wave dominated settings of deltas, beach/dune coasts, limestone barrier islands and ria/archipelago shores (Semeniuk 1993). Mangrove plants have evolved to adapt to fluctuating salinity, tidal inundation and fine, anaerobic, hydrogen sulfide rich sediment (Duke et al. 1998).

Mangroves are important primary producers and have a number of ecological and economic values. For example, they play a key role in reducing coastal erosion by stabilising sediment with their complex root systems (Kathiresan and Bingham 2001). They are also recognised for their capacity to help protect coastal areas from the damaging effects of erosion during storms and storm surge. Mangroves are also important in the filtration of run-off from the land which helps maintain water clarity for coral reefs which are often found offshore in tropical locations (National Oceanic and Atmospheric Administration (NOAA) 2010). The intricate matrix of fine roots within the soil also binds sediments together.

Mangroves play an important role in connecting the terrestrial and marine environments (Alongi 2009). Numerous studies (e.g. Nagelkerken et al. 2000, Alongi 2002, Alongi 2009, Kathiresan and Bingham 2001) have shown mangroves to be highly productive and an important breeding and nursery areas for juvenile fish and crustaceans, including commercially important species (Kenyon et al. 2004). They also provide habitat for many juvenile reef fish species.

Mangroves also play an important ecosystem role in nutrient cycling and carbon fixing (NOAA 2010). The trees absorb carbon dioxide from the atmosphere and the organic matter such as fallen leaves forms nutrient rich sediments creating a peat layer that stores organic carbon (Alongi 2009, Ayukai 1998).

The muddy sediments that occur in mangrove forests are home to a variety of epibenthic, infaunal and meiofaunal invertebrates (Kathiresan and Bingham 2001). Crustaceans known to inhabit the mud in mangrove systems include fiddler crabs, mud crabs, shrimps and barnacles. Within the water channels of the estuary, various finfish are found from the smaller fish such as gobies and mudskippers (which are restricted to life in the mangroves) through to larger fish such as barramundi (*Lates calcarifer*) and the mangrove jack (*Lutjanus argentimaculatus).* Mangroves and their associated invertebrate-rich mudflats are also an important habitat for migratory shorebirds from the northern hemisphere, as well as some avifauna that are restricted to mangroves as their sole habitat (Garnet and Crowley 2000).

The two key State regulatory documents relevant to the protection and management of mangroves in WA are:

- EPA (2001) Guidance Statement for Protection of Tropical Arid Zone Mangroves along the Pilbara Coastline. Guidance Statement No. 1
- EPA (2016) Technical Guidance – Protection of Benthic Communities and Habitats.

4.1.1. Central Western Shelf Transition

The regional mangroves from Exmouth to Broome (within the Central Western Shelf Transition and southern part of the Northwest Shelf Province) represent Australia's only 'tropical-arid' mangroves. The most significant stand of mangroves in the Central Western Shelf Transition is Mangrove Bay on the western side of the Cape Range Peninsula in the Ningaloo Marine Park. This small area of mangrove (37 ha) represents the largest area of mangrove

habitat within the Ningaloo Marine Park and is considered extremely important from a biodiversity conservation perspective (CALM 2005).

4.1.2. Northwest Shelf Province

In the Pilbara region, the coast is a complex of deltas, limestone barrier islands and lagoons, with a variable suite of substrates. As a result, mangroves in this region form relatively diverse fringing stands, albeit often stunted in stature but at times quite extensive in area. The mangroves along the Pilbara coastline are the largest single unit of relatively undisturbed tropical arid zone habitats in the world. The area has nine mangrove taxa and a total of 632 km^2 mangroves (MangroveWatch 2014). As with most arid zone mangroves, Pilbara mangroves are characterised by open woodlands and shrublands that are of relatively lower productivity than the mangrove communities of the wet tropics because of the extreme water and salinity stresses that affect the intertidal zone in the Pilbara (EPA 2001). Significant stands of mangroves in the Pilbara include:

- Exmouth Gulf: mangrove assemblages within the Bay of Rest on the western shore of the Gulf and the extensive mangrove system on the eastern shore of the Gulf that extends as a series of tidal flats and creek channels from Giralia Bay to Yanrey Flats (Astron 2014). These areas of mangrove are also designated as 'regionally significant' by the EPA (2001). The importance of these mangroves to the Exmouth Prawn Fishery is discussed in Kangas et al. (2006)
- Mainland coast and nearshore islands: mangrove assemblages at Ashburton River Delta, Coolgra Point, Robe River Delta, Yardie Landing, Yammadery Island and the Mangrove Islands are all designated as 'regionally significant' by the WA EPA (2001) and the EPA will give these mangrove formations the highest degree of protection with respect to geographical distribution, biodiversity, productivity and ecological function
- Montebello, Barrow and Lowendal Islands: mangrove assemblages all lay within designated reserves. The mangrove communities of the Montebello Islands are considered globally unique as they occur in lagoons of offshore islands (DEC 2007). Mangrove stands identified on Varanus Island occur on the west coast in discrete patches within the tidal and supratidal zones, at South Mangrove Beach and a small embayment (Astron 2016). Mangrove stands on Varanus Island have been identified as healthy, with similar stands also identified as present on Bridled Island to the north of Varanus Island (Astron 2016).

4.2. Intertidal Mud/Sand Flats

Intertidal mudflats form when fine sediment carried by rivers and the ocean is deposited in a low energy environment. Tidal mudflats are highly productive components of shelf ecosystems responsible for recycling organic matter and nutrients through microbial activity. This microbial activity helps stabilise organic fluxes by reducing seasonal variation in primary productivity which ensures a more constant food supply (Robertson 1988). Intertidal sand and mudflats support a wide range of benthic infauna and epifauna which graze on microscopic algae and microbenthos, such as bivalves, molluscs, polycheate worms and crustaceans (Zell 2007).

The high abundance of invertebrates found in intertidal sand and mudflats provides an important food source for finfish and shellfish which swim over the area at high tide. Mudflats have also been shown to be significant nursery areas for flatfish. During low tide, these intertidal areas are also important foraging areas for indigenous and migratory shorebirds. Mudflats also play a vital role in protecting shorelines from erosion (Wade and Hickey 2008).

No intertidal mud/sand flats are known to occur within the EMBA.

4.3. Intertidal Platforms

Intertidal platforms are areas of hard bedrock and/or limestone with or without a sediment veneer of varying thickness. These platforms can vary from low to high relief and provide a habitat for a diverse range of intertidal organisms (Morton and Britton in Jones 2004, SKM 2009, 2011, Hanley and Morrison 2012) and some species of shore birds (Garnet and Crowley 2000). They are common within each of the coastal bioregions within the EMBA.

4.3.1. Central Western Shelf Transition

Limestone pavements extend out from the beach into subtidal zones, e.g. along the Ningaloo Coast and North West Cape; and higher relief platforms (>0.5 m off high water mark) are also present at several headlands along the North West Cape.

4.3.2. Northwest Shelf Province

Large tidal regimes are likely to be the defining environmental factor influencing the distribution of intertidal flora and fauna in the Northwest Shelf Province. The intertidal area of the Kimberley has an extreme tidal range (hypertidal) which creates unique environmental conditions and habitats not seen else anywhere else in the world. As a remote area many of the habitats are untouched and they are recognised as having significant conservation value (DPaW 2013). DPaW (2013) reports that as a result of the monsoonal influxes of freshwater and land-derived nutrients distinctive tropical marine ecosystems have occurred.

4.4. Sandy Beaches

Sandy beaches are those areas within the intertidal zone where unconsolidated sediment has been deposited (and eroded) by wave and tidal action. Sandy beaches can vary from low to high energy zones; the energy experienced influences the beach profile due to varying rates of erosion and accretion. Sandy beaches are found within the EMBA and vary in length, width, and gradient. They are interspersed among areas of hard substrate (e.g. sandstone) that form intertidal platforms and rocky outcrops.

Sandy beaches provide habitat to a variety of burrowing invertebrates and subsequently provide foraging grounds for shorebirds (Garnet and Crowley 2000). The number of species and densities of benthic macroinvertebrates that occur in the sand are typically inversely correlated with sediment grain-size and exposure to wave action, and positively correlated with sedimentary organic content and the amount of detached and attached macrophytes (Wildsmith et al. 2005). However, the distributions of these faunas among habitats will also reflect differences in the suite of environmental variables that characterize those habitats (Wildsmith et al. 2005).

Sandy habitats are important for both resident and migratory seabirds and shorebirds. While sand flats and beaches generally support fewer species and numbers of birds than mudflats of similar size; some species are commonly associated with sandy beaches (Garnet and Crowley 2000). Sandy beaches can also provide an important habitat for turtle nesting and breeding (see marine turtles Section 6.1).

4.5. Rocky Shorelines

Rocky shorelines are found across the EMBA and are often indicative of high energy areas (wave action) where sand deposition is limited or restricted (perhaps seasonally or during a cyclone). They are formed from limestone pavement extending out from the beach into subtidal zones, for example along the Ningaloo Coast and North West Cape; higher relief platforms (>0.5 m off high water mark) are also present at a number of headlands along the North West Cape.

Rocky shores can include pebble/ cobble, boulders, and rocky limestone cliffs (often at the landward edge of reef platforms). Rocky outcrops typically consist of hard bedrock, but some of the coastline has characteristic limestone karst cliffs with an undercut notch. Rocky shorelines can vary from habitats where there is bedrock protruding from soft sediments to cliff like structures that form headlands. Rocky shorelines are an important foraging area for seabirds and habitat for invertebrates found in the intertidal splash zone (Morton and Britton cited in Jones 2004). For example, oyster catchers and ruddy turnstones feed along beaches and rocky shorelines (see seabirds in Section 8.2.2).

5. Fishes and Sharks

Fish distributions in the EMBA are discussed with respect to the IMCRA Provincial Bioregions which were defined using CSIRO's 1996 regionalisation of demersal fish on the continental shelf to the shelf break, and their 2005 regionalisation of demersal fish on the continental slope to approximately 1,200 m depth (DEH 2006). The EPBC species listed as threatened and migratory found in the EMBA, according to the Protected Matters search (Appendix D of the Ningaloo Vision CoPFAR EP), are shown in Table 1**,** along with their WA conservation listings (as applicable) and discussed in Section 5.2 below.

The following WA conservation codes apply to WA conservation significant fauna:

- Threatened species (listed under the *Biodiversity Conservation Act 2016* (WA) (BC Act)):
  - Critically endangered
  - Endangered
  - Vulnerable
- Specially protected species (listed under BC Act):
  - Migratory
  - Species of special conservation interest (conservation dependant fauna)
  - Other specially protected species
- Priority species (non-statutory state based administrative process):
  - Priority 1, 2 and 3: poorly-known species – possible threatened species that do not meet survey criteria or are otherwise data deficient. Ranked in order of priority. In urgent need of further survey.
  - Priority 4: species that are adequately known, are either: rare but not threatened; meet criteria for near threatened; or delisted as threatened species within last five years for reasons other than taxonomy. Requiring regular monitoring.

A detailed account of commercial and recreational fisheries that operate in the region is provided in the Commercial Fisheries Section 14.5 and detailed in *The State of the Fisheries Report* 2021/2022 (Newman et al., 2023).

Table 1: EPBC listed fish and shark species in the EMBA

Species	Conservation Status			Likelihood of occurrence in EMBA	BIA[1] in EMBA
	EPBC Act 1999	BC Act 2016[2]	Other WA Conservation Code		
Blind cave eel (Ophisternon candidum)	Vulnerable	Vulnerable	-	Species or species habitat known to occur within area.	None - No BIA defined
Grey nurse shark (*Carcharias taurus*)	Vulnerable	Vulnerable	-	Congregation or aggregation known to occur within area.	None - BIA not found in EMBA
White shark, Great white shark (*Carcharodon carcharias*)	Vulnerable & Migratory	Vulnerable & Migratory	-	Species or species habitat known to occur within area	None - No BIA defined
Whale shark (Rhincodon typus)	Vulnerable & Migratory	Migratory	-	Foraging, feeding, or related behaviour known to occur within area. Overlaps with BIA for foraging)	Yes – Refer to Table 3
Northern river shark, New Guinea river shark (*Glyphis garricki*)	Endangered	-	Priority 1	Species or species habitat may occur within area	None - No BIA defined
Dwarf sawfish, Queensland sawfish *(Pristis clavata*)	Vulnerable & Migratory	Migratory	Priority 1	Species or species habitat known to occur within area	Yes – Refer to Table 3
Freshwater sawfish, Largetooth sawfish, River sawfish, Leichhardt's sawfish, Northern sawfish (*Pristis pristis)*	Vulnerable & Migratory	Migratory	Priority 3	Species or species habitat likely to occur within area	Yes – Refer to Table 3
Narrow sawfish, Knifetooth sawfish (*Anoxypristis cuspidata*)	Migratory	Migratory	-	Species or species habitat likely to occur within area	None - No BIA defined
Green sawfish, Dindagubba, Narrowsnout sawfish (*Pristis zijsron*)	Vulnerable & Migratory	Vulnerable	-	Species or species habitat known to occur within area	Yes – Refer to Table 3
Oceanic whitetip shark (*Carcharhinus longimanus*)	Migratory	-	-	Species or species habitat likely to occur within area.	
Shortfin mako, Mako shark (*Isurus oxyrinchus*)	Migratory	Migratory	-	Species or species habitat likely to occur within area.	
Longfin mako (*Isurus paucus*)	Migratory	Migratory	-	Species or species habitat likely to occur within area.	None - No BIA defined
Reef manta ray, Coastal manta ray (*Manta alfredi*)	Migratory	Migratory	-	Species or species habitat known to occur within area.	None - No BIA defined
Giant manta ray (*Manta birostris*)	Migratory	Migratory	-	Species or species habitat known to occur within area.	None - No BIA defined
Porbeagle, Mackerel shark *(Lamna nasus*)	Migratory	Migratory	-	Species or species habitat may occur within area	None - No BIA defined
Scalloped hammerhead shark (*Sphyrna lewini)*	Conservation Dependent	-	-	Species or species habitat known to occur within area	None - No BIA defined
Southern bluefin tuna *(Thunnus maccoyii)*	Conservation Dependent	-	-	Breeding known to occur within area	None - No BIA defined

[1] Biologically Important Area
[2] The Wildlife Conservation (Specially Protected Fauna) Notice 2018 has been transitioned under regulations 170, 171 and 172 of the Biodiversity Conservation Regulations 2018 to be the lists of threatened, extinct and specially protected species under Part 2 of the BC Act.

5.1. Regional Surveys

Within the EMBA a number of important geographical areas for fish exist, including Ningaloo Marine Park, Montebello/Barrow Island Marine Park, Abrolhos Marine Park and the Rowley Shoals.

5.1.1. Central Western Shelf Transition

Ningaloo is the largest fringing coral reef in Australia, forming a discontinuous barrier that encloses a lagoon that provides habitat for many fish species. Gaps that regularly intercept the main reef line provide channels for water exchange with deeper, cooler waters (CALM 2005). Ningaloo Reef is a well-known biodiversity hotspot, supported by the direct link between the reef and the ancient reef systems found closer to the equator by the Leeuwin Current (Kemps 2010). Approximately 500 species of fish have been reported to inhabit the reef (Kemps 2010). The Piercam project from inception in 2005 to 2013, identified 165 fish species from 50 families at the Point Murat Navy Pier alone, located within the Ningaloo Marine Park (Whisson & Hoschke 2013).

Seasonal aggregations of whale sharks occur at Ningaloo each year (CALM 2005). There is limited data available on species diversity and distribution of sharks in the Ningaloo area as chondrichthyan biodiversity for the area has not been specifically recorded. Despite this, it is possible that the Ningaloo Reef Marine Park contains the largest and most diverse collection of sharks on the Australian coastline (Stevens et al. 2009). It was estimated in 2009 by Last and Stevens (cited in Stevens et al. 2009), that there are likely to be 118 species of chondrichthyan fishes occurring in the park. Of these species, 59 are shark species predicted to be found at depths of less than 200 m (Stevens et al. 2009).

The lagoon at Ningaloo Reef appears to provide a juvenile habitat and nursery area for shark species such as the grey nurse shark (*C. taurus*), black-tipped reef shark (*Carcharhinus melanopterus*) and other reef sharks (Carcharhinidiae) (Stevens et al. 2009). A study conducted on the distribution and abundance of elasmobranches in the Ningaloo Marine Park, in 2009, tracked the movements of six key shark species. Species such as *Galeocerdo cuvier* (tiger shark) and *Sphyrna mokarran* (great hammerhead) were found to remain for brief time periods in the park, in contrast to other species found to re-visit the Ningaloo area (Stevens et al. 2009). Several species of sharks within Ningaloo have been identified as key indicator species for the health of the system (Stevens et al. 2009).

Barrow Island includes Biggada Reef, an ecologically significant fringing reef, and the Montebello Islands comprise over 100 islands, the majority of which are rocky outcrops; providing fish habitat (DEC 2007a). Within the Barrow/Montebello region, at least 380 fish species have been recorded (de Lestang & Jankowski 2017). Most species exhibit wide distributions, with local species composition closely resembling that of the Dampier Archipelgao. Coral habitats support the most diverse fish community in this region, comprising, among others, many species of damselfish (Pomacentridae), parrotfish (Scaridae), snappers (Lutijanidae) and groupers (Serranidae) (de Lestang & Jankowski 2017). The region's macroalgal habitats are considered important nursery areas for a diverse range of fish species, such as emperor (Lethrinidae), threadfin bream (Nemipteridae), tuskfish (Labridae) and trevally (Carangidae) (de Lestang & Jankowski 2017).

Ramsar wetlands within the area (e.g. Eighty Mile Beach and Ashmore Reef National Nature Reserve) can also provide important habitat for fish (see Section 9.2).

5.1.2. Central Western Transition

The biological communities of the Central Western Transition are thought to be distinctive owing to the proximity of deep oceans areas to the continental slope and shelf, resulting in close interaction between pelagic species of the Cuvier Abyssal Plain and those of the slope and shelf (DEWHA 2008a).

The present level of understanding of the marine environment in this bioregion is generally poor. The diversity of fish and cephalopod species changes with depth, generally decreasing species numbers with increasing depth. The demersal slope fish bioregionalisation identified some endemism in communities in this bioregion (Last et al. 2005), however, it is lower than other areas of the North-west Marine Region (DEWHA 2008a).

Bentho-pelagic fish, such as deep-water snappers (e.g. *Paracaesio* spp, and *Eletis* spp.), hatchetfish (*Argyropelecus* spp.), dragonfish (*Melacosteus* spp.), viperfish (*Chauliodus* spp.) and a number of eels species migrate between the benthic and pelagic systems, forming an important link between these systems (DEWHA 2008a).

Transient fish species through the Central Western Transition bioregion include southern bluefin tuna (migrating to and from spawning grounds), broadbill swordfish (*Xiphius gladius*), bigeye tuna (*Thunnus obesus*), yellowfin tuna

(*Thunnus albacares*) and striped marlin (*Tetrapturus audax*). Pelagic sharks also range across the bioregion following schools of pelagic fish (DEWHA 2008a).

5.1.3. Northwest Shelf Province and Northwest Province

The demersal zone of the North West Shelf (which includes the Northwest Province and Northwest Shelf Province) hosts a diverse assemblage of fish of tropical Indo-west Pacific affinity, with up to 1,400 species known to occur, with a great proportion of these occurring in shallow coastal waters (Allen et al. 1988). Last et al. (2005) and Fox and Beckley (2005) described the North-west Province as being characterised by a high level of endemism and species diversity. Certain areas of increased biological activity (e.g. Glomar Shoals) attract demersal fish species such as Rankin cod, red emperor, crimson snapper and spangled emperor that are exploited by commercial trawl and trap fisheries (Sainsbury et al. 1992, Fletcher and Santoro 2013).

The shallow waters (<30 m) of the Dampier Archipelago, in the Northwest Shelf Province, support a characteristic and rich fish fauna of 650 species from a variety of habitats including coral and rocky reefs, mangroves, sand and silty bottoms and sponge gardens (Hutchins 2003 & 2004). The majority of these species are found over hard substrate, but significant numbers are also found from soft bottom and mangrove areas. The outer islands of the Archipelago are inhabited predominantly by coral reef fishes whereas inner areas close to the mainland are occupied by mangrove and silty-bottom dwellers. The inter-island passages have a relatively rich soft bottom fauna. EPBC Act protected fish species within the Dampier Archipelago include the dwarf sawfish (*Pristis clavata*), freshwater sawfish (*Pristis pristis*) and narrow sawfish (*Anoxypristis cuspidate*).

The fish fauna of the archipelago is less diverse than the islands of the West Pilbara to the south but are closely related to the fauna at the offshore Montebello Islands (Hutchins 2004). The fish fauna of Barrow/ Lowendal/ Montebello Islands are widespread throughout the Indo-west Pacific region.

Within the southern portion of the Northwest and Northwest Shelf Province, small pelagic fish (e.g. lantern fishes) comprise a third of the total fish biomass (Bulman 2006) and inhabit a range of marine environments, including inshore and continental shelf waters. These small pelagic fish play an important ecological role, not only for this particular area but for the entire NWMR. They feed on pelagic phytoplankton and zooplankton and provide a food source for a wide variety of predators such as marine mammals, sharks, large pelagic fish and seabirds, thus providing a vital link between many of the region's trophic systems (Mackie et al. 2007).

Pelagic fish in the Northwest and Northwest Shelf Province include tuna, mackerel, herring, pilchard and sardine, and game fish such as marlin and sailfish (BBG 1994, Brewer et al. 2007), some of which are targeted by both commercial and recreational fishers. In particular, adult and juvenile southern bluefin tuna are thought to migrate through the North West Shelf on their way to and from spawning grounds in the north-eastern Indian Ocean. However, the timing of these migrations and the use of regional currents to assist their migration is still unclear. The oceanic waters of the North West Shelf are also believed to provide important spawning and nursery grounds for a number of large pelagic fish species. Table 2 provides a summary of the key fish species and likely timing of their spawning in the region (DoF correspondence).

Table 2: Spawning and aggregation times of key commercially caught fish species within the North West Shelf

Species		Month											
Species Common Name	Species Latin Name	J	F	M	A	M	J	J	A	S	O	N	D
Blacktip shark	*Carcharhinus tilstoni and C. limbatus*	■										■	■
Goldband snapper	*Pristipomoides multidens*	■	■	■	■	■					■	■	■
Rankin cod	*Epinephelus multinotatus*		■	■			■	■	■	■	■	■	■
Red emperor	*Lutjanus sebae*	■	■	■	■	■	■		■	■	■	■	■
Sandbar shark	*Carcharhinus plumbeus*		■		■								
Spanish mackerel	*Scomberomorus commerson*									■	■	■	■

Species		Month											
Species Common Name	Species Latin Name	J	F	M	A	M	J	J	A	S	O	N	D
Pink snapper	*Pagrus auratus*												
Baldchin groper	*Choerodon rubescens*												
Crystal (snow) crab	*Chaceon spp.*												
King George whiting	*Sillaginodes punctatus*												
Spangled emperor	*Lethrinus nebulosus*												
Pearl oyster	*Pinctada maxima*												
Blue-spotted emperor	*Charaxes cithaeron*												
Dusky whaler	*Carcharhinus obscurus*	May occur throughout the year											
Whiskery shark	*Furgaleus macki*												
Gummy shark	*Mustelus antarcticus*	Peak pupping periods unknown											
Fish	Other species	Timing of spawning activity varies between species											

5.2. Fish Species

Two species of fish listed as Threatened under the EPBC Act (Table 1) were identified in the Protected Matters search (Appendix D of the Ningaloo Vision CoPFAR EP):

- Blind cave eel (Ophisternon candidum)
- Southern bluefin tuna *(Thunnus maccoyii)*

5.2.1. Blind Cave Eel

Both the blind gudgeon (*Milyeringa veritas*) and blind cave eel (*Ophisternon candidum*) are known to occur on the Cape Range Peninsula (in the Central Western Shelf Transition) (Humphreys and Feinberg 1995), and a related species of the genus Milyeringa, the Barrow cave gudgeon *(Milyeringa justitia*) has also been noted at Barrow Island (Humphreys 1999). The Barrow cave gudgeon is listed as Vulnerable under the WA BC Act. They have been recorded in waters ranging from fresh to seawater at depths of up to 33 m in caves and 50 m in wells and bores. Both species are restricted to either caves or groundwater (Humphreys and Blyth 1994) and are the only two vertebrate animals known from Australia for this (DoE 2014a).

The Balston's pygmy perch distribution ranges from Moore River (75 km north of Perth) at the northern extent to Two Peoples Bay near Albany. This freshwater species is typically associated with shallow waters near riparian vegetation and is considered to have low salinity tolerance, making it unlikely to occur in estuarine conditions (DoEE, 2016).

5.2.2. Southern Bluefin Tuna

The southern bluefin tuna (SBT; *Thunnus maccoyii)* is listed as conservation dependent under the EPBC Act and may be found within the EMBA (DCCEEW, 2024c). In Australia, SBT are distributed throughout temperate and tropical waters, primarily from northern WA through southern Australia, with a spawning ground identified between Java and northern WA. As the species is long-lived and slow to mature, it is vulnerable to overfishing and stocks have undergone a significant decline. As SBT are pelagic and highly migratory, and are commercially targeted internationally, a cooperative management approach was necessary to manage the fishery. Established in 1995, the Commission for the Conservation of Southern Bluefin Tuna utilises an international approach to manage the status of the species, through national allocations of total allowable catch and prescribing additional management measures as required (DCCEEW, 2024c).

No southern bluefin tuna BIAs were identified in the EMBA.

5.3. Sharks, Rays and Sawfishes

The diversity of marine environments in the waters within the NWMR has led to a rich fauna of cartilaginous fish (sharks and rays). Of the approximately 500 shark species found worldwide, 19% (94) are found in the region (DEWHA 2008a). The EPBC Act Protected Matters search (Appendix D of the Ningaloo Vision CoPFAR EP) identified five species of shark and three species of sawfishes listed as threatened within the search area between southwest WA and northern NT (Table 1), including:

- Grey nurse shark (*Carcharias taurus*)
- Great white shark (*Carcharodon carcharias*)
- Northern river shark (*Glyphis garricki*)
- Whale shark (*Rhincodon typus*)
- Dwarf sawfish (*Pristis clavata*)
- Freshwater sawfish (*Pristis pristis*)
- Green sawfish (*Pristis zijsron*).
- Scalloped hammerhead shark (*Sphyrna lewini)*

The Biologically Important Areas (BIAs) for relevant species detailed above are illustrated in Figure 4**.**

5.3.1. Grey Nurse Shark

The grey nurse shark (*Carcharias taurus*) is listed as vulnerable under the EPBC Act and the BC Act *and* may be found within the EMBA. In Australia, the grey nurse shark is now restricted to two populations, one on the east coast from southern Queensland to southern NSW and the other is predominantly found around the southwest coast of WA but has been recorded on the North West Shelf (DEWHA 2012b, Pogonoski et al. 2002). It is believed that the east and west coast populations do not interact, and ongoing research will probably confirm that the populations are genetically different (Last and Stevens 2009).

While it is thought that grey nurse sharks have a high degree of site fidelity, some studies (McCauley 2004) suggest that grey nurse sharks move between different habitats and localities, exhibiting some migratory characteristics. In certain areas grey nurse sharks are vulnerable to localised pressure due to high endemism. The status of the west coast population is poorly understood although they are reported to remain widely distributed along the WA coast and are still regularly encountered, albeit with low and indeterminate frequency (Chidlow et al. 2006).

Grey nurse sharks are often observed hovering motionless just above the seabed, in or near deep sandy-bottomed gutters or rocky caves, and in the vicinity of inshore rocky reefs and islands (Pollard et al. 1996). The species has been recorded at varying depths but is generally found between 15–40 m (Otway & Parker 2000). Grey nurse sharks have also been recorded in the surf zone, around coral reefs, and to depths of around 200 m on the continental shelf (Pollard et al. 1996). Grey nurse sharks feed primarily on a variety of teleost and elasmobranch fishes and some cephalopods (Gelsleichter et al. 1999, Smale 2005).

No grey nurse shark BIAs were identified in the EMBA.

5.3.2. Great White Shark

The great white shark (*Carcharodon carcharias*) is listed as vulnerable and migratory under the EPBC Act and is listed as vulnerable under the BC Act. In Australia, great white sharks have been recorded from central Queensland around the south coast to northwest WA but may occur further north on both coasts (Last and Stevens 2009). There are no known aggregation sites for white sharks in the North-west marine region, but the species has been recorded in North West Shelf waters during humpback migrations (DEWHA 2012b). They are widely but not evenly distributed in Australian waters and are considered uncommon to rare compared to most other large sharks (CITES 2004).

Study into great white shark populations is difficult (Cailliet 1996) given the uncertainty about their movements, emigration, immigration, and difficulty in estimating the rates of natural or fishing mortality.

Great white sharks can be found from close inshore around rocky reefs, surf beaches and shallow coastal bays to outer continental shelf and slope areas (Pogonoski et al. 2002). They also make open ocean excursions and can cross ocean basins (for instance from South Africa to the western coast of Australia and from the eastern coast of Australia to New Zealand). Great white sharks are often found in regions with high prey density, such as pinniped colonies (DEWHA 2009). No great white shark BIAs are found in the EMBA.

5.3.3. Northern River Shark

The northern river shark (*Glyphis garricki*) is listed as endangered under the EPBC Act and is one of the rarest species of shark in the world. Adults only recorded in marine habitats, whereas neonates, juveniles and subadults recorded in freshwater, estuarine and marine environments. It is also listed as a Priority 1 conservation species in WA and as Endangered under the NT TPWC Act.

The associated recovery plan (Sawfish and River Sharks Multispecies Recovery Plan, Commonwealth of Australia 2015) identifies adults and juveniles are being known in WA marine waters north of Derby. Pupping and juvenile sharks are identified as known to occur in Cambridge Gulf and pupping is also identified as likely to occur in King Sound. Under the associated recovery plan all areas where aggregations of individuals have been recorded displaying biologically important behaviours such as breeding, foraging, resting or migrating are considered critical to the survival of the species unless population data suggests otherwise.

5.3.4. Whale Shark

The whale shark (*Rhincodon typus*) is listed as vulnerable and migratory under the EPBC Act and is also listed as a specially protected species under the BC Act as a species of special conservation interest (conservation dependent fauna). The species is also classified as vulnerable on the World Conservation Union's Red List of Threatened Species (Norman 2005) and are protected under the WA *Conservation and Land Management Act 1984,* NT TPWC Actand WA *Fish Resources Management Act 1994*.

The whale shark is the largest of all fish (>18 m; Borrell et al. 2011; Chen et al. 1997, Compagno 2001) and is a migratory species with worldwide geographical ranges between 30º N and 35º S (Last and Stevens 2009). Whale sharks are mostly epipelagic, whereby they spend a large amount of time in the top 200 m of the ocean (Tyminski et al. 2015), with a significant portion being spent at surface (<20 m) (Rowat & Brooks, 2012). This leads to an increased potential risk of vessel collision, which has been demonstrated from tracking data of 348 individuals (across all areas of distribution) showing a 92% horizontal and nearly 50% vertical space overlap with persistent large vessel (>300 gross tons) traffic (Womersley et al. 2022). There is a general lack of knowledge on many aspects of whale shark biology, however, the species is known to have a slow rate to sexual maturity, with field-based studies from the Maldives estimating male sexual maturity to be approximately 25 years (Perry et al. 2018), with females potentially maturing even later (Pierce et al. 2021). This 'slow' life-history strategy places whale sharks at increased vulnerability to anthropogenic impacts (Pierce et al. 2021).

The species is oceanic but often forms aggregations in coastal waters at sites throughout the tropics. Typically, these aggregations are seasonal and often coincide with specific productivity events that are a focus of feeding for the animals. For example, whale sharks aggregate to feed on dense swarms of copepods in Baja California (Clark and Nelson 1997), fish spawn off Belize (Heyman et al. 2001) and red crab larvae at Christmas Island (Meekan et al. 2009). However, recent studies analysing fatty acids within whale shark tissue, suggest the species may also feed on benthic food sources, such as floating macroalgae (Meekan et al*.,* 2022; Courturier et al*.,* 2013*; Marcus et al.*, 2016).

One of the best-known aggregation sites for whale sharks occurs along the central and NW coast of Western Australia from March to July and is focused on Ningaloo Reef, within the Exmouth region. The small size and general absence of female whale sharks from Ningaloo Reef suggests that the region may be important for feeding rather than breeding (Norman and Stevens 2007). The timing of this aggregation coincides with a pulse in seasonal productivity that results in large abundances of tropical krill on which these filter feeding sharks feed (Meekan et al. 2006, Jarman and Wilson 2004). At Ningaloo Reef, whale sharks are often found swimming close to the reef front, within a few kilometres of the shore and in water of less than 50 m deep. A tourist industry based on snorkelling with the sharks in this area has developed over the last 15 years and is now estimated to be worth over $4 million annually to the local economy of the Ningaloo region.

Estimates of the size of the population participating in the Ningaloo aggregation are between 300 and 500 individuals (Meekan et al. 2006), but research indicates that the Ningaloo population of whale sharks is declining (Bradshaw et al. 2007).

Whale sharks are known to be highly migratory with migrations of 13,000 km being recorded (Eckert and Stewart 2001). Research on the migration patterns of whale sharks in the western Indian Ocean, and isolated and infrequent observations of individuals, indicate that a small number of the Western Australian population migrate through the North West Shelf. Wilson et al. (2006) tagged 19 whale sharks in 2003 and 2004, with long term movements patterns successfully recorded from six individuals. All travelled north-east into the Indian Ocean after departing Ningaloo Reef, with one tracked to Ashmore Reef and another to Scott Reef. Whale sharks are occasionally observed from Santos'' offshore oil and gas facilities on the North West Shelf (Harriet Alpha and Stag platforms). In general,

migration along the northern WA coastline broadly follows the 200 m isobath and typically occurs between July and November (DoE 2015). Whale sharks are well known to occur in the Christmas Island territory. There is evidence that the Christmas Island territory is on the migration route for many individuals, but they are rarely sighted within the Cocos (Keeling) Islands territory.

A common method for monitoring individual whale sharks is the use of variations in spot patterns, which has recently been tested to be 100% successful based on 154 photographic and genetic markers (Meenakshisundaram, 2021).

A biologically important area for whale sharks is located in northern WA, offshore of the Pilbara and Kimberley coastline, and broadly follows the 200 m isobath. The whale shark BIA within the EMBA is detailed in Table 3 and is shown on Figure 4.

DBCA has a wildlife management program to manage whale shark interactions in reserves - Whale shark management with particular reference to Ningaloo Marine Park, Wildlife Management Program no. 57 (2013).

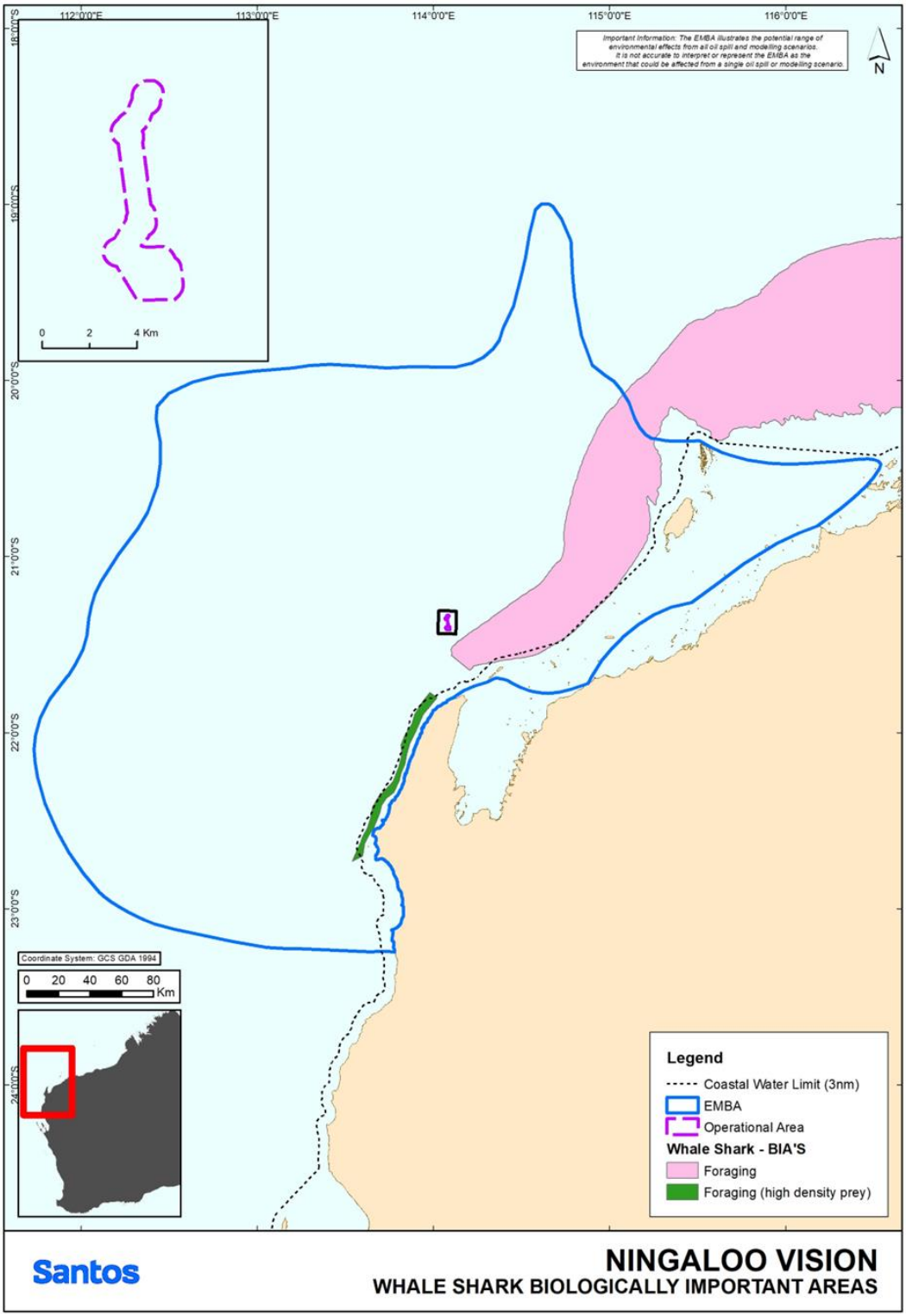


Figure 4: Biologically important areas for protected whale sharks within the vicinity of the environment that may be affected and operational area

5.3.5. Dwarf Sawfish

The dwarf sawfish (*Pristis clavata*) is listed as vulnerable under the EPBC Act and thought to be restricted to Australia (DoE 2014b). It is also listed as a Priority 1 conservation species in WA and as Vulnerable in the NT. The Australian distribution of the dwarf sawfish is considered to extend across northern Australia and along the Kimberley and Pilbara coasts (Last and Stevens 2009, Stevens et al. 2005). However, the majority of records of dwarf sawfish in WA and the NT have come from shallow estuarine waters of the Kimberley region which are believed to be nursery (pupping) areas, with immature juveniles remaining in these areas up until three years of age (Thorburn et al. 2004). Adults are known to seasonally migrate back into inshore waters (Peverell 2007); although it is unclear how far offshore the adults travel as captures in offshore surveys are very uncommon. The species' range is restricted to brackish and salt water (Thorburn et al. 2007).

The recovery plan identifies pupping as known to occur in the King Sound, the Cambridge Gulf and 80 Mile Beach, with pupping likely to occur identified at a number of locations along the Pilbara and Kimberly Plan (Commonwealth of Australia, 2015). Under the associated recovery plan all areas where aggregations of individuals have been recorded displaying biologically important behaviours such as breeding, foraging, resting or migrating are considered critical to the survival of the species unless population data suggests otherwise.

There are no sawfish BIAs in the EMBA.

5.3.6. Freshwater and Green Sawfish

The freshwater sawfish (*Pristis pristis) (*also previously listed as the Largetooth sawfish*)* and green sawfish (*Pristis zijsron)* are listed as vulnerable under the EPBC Act. The freshwater sawfish is listed as a Priority 3 conservation species in WA, while the green sawfish is listed as Vulnerable under the BC Act and both species are listed as Vulnerable in the NT under the TPWC Act.

The freshwater species are wider-ranging than the dwarf sawfish and are also found in the Indo-west Pacific (DoE 2014c, DoE 2014d). Important areas for sawfishes include King Sound, and the Fitzroy, Durack, Robinson and Ord rivers for the freshwater sawfish; and Cape Keraudren for the green sawfish (Stevens et al. 2008, Thorburn et al. 2007, 2008).

Sawfishes generally inhabit inshore coastal, estuarine and riverine environments. The freshwater sawfish has been recorded in north-west Australia from rivers (including isolated water holes), estuaries and marine environments (Stevens et al. 2005). Newborns and juveniles primarily occur in the freshwater reaches of rivers and in estuaries, while most adult freshwater sawfish have been recorded in marine and estuarine environments (Peverell 2005, Thorburn et al. 2007). It is believed that mature freshwater sawfish enter less saline waters during the wet season to give birth (Peverell 2005) and freshwater river reaches play an important role as nursery areas (DoE 2014c).

The green sawfish has predominantly been recorded in inshore coastal areas, including estuaries and river mouths with a soft substrate, although there have been records of sawfish offshore in depths up to 70 m (Stevens et al. 2005). This species does not occupy freshwater habitats (DoE 2014d).

Short-term tracking has shown that green sawfish appear to have limited movements that are tidally influenced, and they are likely to occupy a restricted range of only a few square kilometres within the coastal fringe, with a strong association with mangroves and adjacent mudflats (Stevens et al. 2008). Sawfishes feed close to the benthos on a variety of teleost fishes and benthic invertebrates, including cephalopods, crustaceans and molluscs (Compagno & Last 1999, Last & Stevens 2009, Pogonoski et al. 2002, Thorburn et al. 2007, 2008).

Baseline surveys undertaken for Chevron's Wheatstone project identified green sawfish habitat and nursery area for juveniles within the north-eastern lagoon of the Ashburton Delta and in Hooley Creek near Onslow. Distribution of sawfish in these creeks is spatially and seasonally variable due to changing tidal and environmental conditions. However, they typically return to inshore waters to breed and pup during the wet season (i.e. January) (Chevron 2011).

There are no sawfish BIAs in the EMBA.

5.3.7. Scalloped Hammerhead Shark

The scalloped hammerhead shark (*Sphyrna lewini*) is listed as conservation dependent under the EPBC Act and may be found within the EMBA. Globally distributed, in Australia, scalloped hammerhead sharks are found in both coastal and oceanic environments, in warm-temperate to tropical waters typically across the northern coastline. There are no aggregation sites identified for scalloped hammerhead sharks in the EMBA, however juveniles of the species utilise shallower nearshore habitats of northern Australia, and there are some indications that there may be important nursery habitats in the area. As a species that is slow to mature and has low fecundity, the scalloped

hammerhead shark is vulnerable to overfishing, with its unique head morphology also increasing its likelihood of capture as bycatch in net fisheries. Although no longer targeted by commercial fisheries, global population declines have prompted recent changes to national and state-based approaches to stock management, including total allowable catch limits (Northern Territory) or complete prohibition of take (Queensland) (DCCEEW, 2024d).

No scalloped hammerhead shark BIAs were identified in the EMBA.

5.3.8. Narrow Sawfish

The narrow sawfish (*Anoxypristis cuspidata*) is listed as migratory under the EPBC Act. It is a marine or marginal (brackish water) species found from inshore waters to a depth of 40 m (Compagno et al. 2006). Though details of its ecology are not precisely known, it probably spends most of its time on or near the bottom in shallow coastal waters and estuaries. A study showed the narrow sawfish to be the most abundant amongst the sawfish sampled in the Gulf of Carpentaria (Peverell, 2005) which holds some consistency with the offshore distribution of the species as shown by a study of Northern Prawn Fishery by-catch. Peverell (2005) also used catch data of offshore surface net fisheries to conclude that narrow sawfish also inhabit the mid-water column and can thus be described as a benthopelagic animal. The narrow sawfish is known to form aggregations of mature females during the months of October to November. Its Australian distribution is unclear though it is most common in the Gulf of Carpentaria with southward ranges extending to Broad Sound in Queensland and the Pilbara Coast (circa 116°E), Western Australia (Last & Stevens 2009).

5.3.9. Giant Manta Ray / Reef Manta Ray

The giant manta ray appears to be a seasonal visitor to coastal or offshore sites. Giant manta rays are often seen aggregating in large numbers to feed, mate, or clean. Sightings of these giant rays are often seasonal or sporadic but in a few locations their presence is a more common occurrence. This species is not regularly encountered in large numbers and, unlike some other rays do not often appear in large schools (>30 individuals) when feeding. Overall, they are encountered with far less frequency than the smaller manta species, despite having a larger distribution across the globe (IUCN 2019).

The giant manta ray (*Mobula birostris*) occurs in tropical, sub-tropical and temperate waters of the Atlantic, Pacific and Indian Oceans. They are commonly sighted along productive coastlines with regular upwelling, oceanic island groups and particularly offshore pinnacles and seamounts. The giant manta ray is commonly encountered on shallow reefs while being cleaned or is sighted feeding at the surface inshore and offshore. It is also occasionally observed in sandy bottom areas and seagrass beds (IUCN 2019).

The reef manta ray (*Mobula birostris*) has a circumtropical and sub-tropical distribution, existing in the Pacific, Atlantic and Indian Oceans. Within this broad range, however, actual populations appear to be sparsely distributed and highly fragmented. This is likely due to the specific resource and habitat needs of this species.

Overall population size is unknown, but subpopulations appear, in most cases, to be small (about 100–2,000 individuals). A proportion of the individuals in some populations undertake significant coastal migrations (IUCN 2019). Since the species is migratory it is possible that individuals may be encountered in the operational area, however, given that they generally do not aggregate in large groups, high numbers are not expected to be encountered during the activities.

5.3.10. Oceanic Whitetip Shark

The oceanic whitetip shark (*Carcharhinus longimanus*) is listed as migratory under the EPBC Act. The oceanic whitetip shark is widespread throughout tropical and subtropical waters of the world (30° N to 35° S) (IUCN 2020). They are an oceanic and pelagic species that regularly occurs in waters of 18 to 28°C, usually >20°C (IUCN 2020). Within Australian waters, they are found from Cape Leeuwin (Western Australia) through parts of the Northern Territory, down the east coast of Queensland and New South Wales to Sydney (Last and Stevens 2009). They are usually found in surface waters, though can reach depths of >180 m (Castro et al. 1999). They have occasionally been recorded inshore but are more typically found offshore or around oceanic islands and areas with narrow continental shelves (Fourmanoir 1961, Last and Stevens 1994).

5.3.11. Shortfin Mako and Longfin Mako Sharks

The shortfin mako and longfin mako sharks are listed as migratory under the EPBC Act. The longfin mako is widely distributed but rarely encountered oceanic shark that ranges from Geraldton around the north coast to at least Port Stephens in New South Wales (DSEWPaC 2012). The shortfin mako is an oceanic and pelagic species, although they are occasionally seen inshore. They are found throughout temperate seas but are rarely found in waters colder than 16°C.

5.3.12. Porbeagle (Mackerel Shark)

The porbeagle (mackerel shark) (Lamna nasus) is listed as migratory under the EPBC Act. The porbeagle is wide-ranging, typically occurring in oceanic waters off the continental shelf, although they occasionally enter coastal waters (Francis et al. 2002 cited in DoE 2014e). The porbeagle is known to undertake seasonal migrations, although the timing and details of these migratory movements are not well understood (Saunders et al. 2011 cited in DoE 2014e).

5.4. Biologically Important Areas / Critical Habitat – Fishes and Sharks

BIAs are spatially defined areas where aggregations of individuals of a species are known to display biologically important behaviour such as reproduction, foraging, resting or migration**.** BIAs are identified by DCCEEW; however, they have no legal status, but are designed to assist decision making under the EPBC Act. They are not designed to identify protected areas but may inform such processes. Table 3 below provides an overview of BIAs in the EMBA for fish.

The DCCEEW may make recovery plans for threatened fauna listed under the EPBC Act. The EPBC Act requires that 'habitat critical to the survival of the listed threatened species' is identified in recovery plans, and summary of relevant recovery plans is listed in Section 13.2. BIAs may overlap these sites but may be identified for other purposes. DCCEEW state that the criteria used to identify 'habitat critical to the survival of the species' are more complex than those used to identify BIA.

In addition, both the EPBC Act and WA BC Act and associated regulations (2018) provide for the listing of critical habitat - habitat 'critical to the survival of the threatened species. To date no critical habitat in WA has been listed under either Act.

Table 3: Biologically important areas – Fishes and Sharks

Species	Scientific name	Aggregation area and use	Specific geographic locations for species
Whale shark	*Rhincodon typus*	Foraging – Ningaloo Reef and wider Ningaloo region	Ningaloo Marine Park and adjacent Commonwealth waters Northward from Ningaloo along 200 m isobath

6. Marine Reptiles

Seven species of listed marine reptiles under the Commonwealth EPBC Act are known to occur in the EMBA, according to the Protected Matters search (Appendix D of the Ningaloo Vision CoPFAR EP). An examination of the species profile and threats database (DoEE 2019) showed that some listed reptile species are not expected to occur in significant numbers in the marine and coastal environments in the EMBA due to their terrestrial distributions. Hence, these species are not discussed further.

Of the remaining reptile species identified in the Protected Matters search (Appendix D of the Ningaloo Vision CoPFAR EP), five are listed as threatened and migratory and one is listed as threatened. These species are show in Table 4 along with their WA and NT conservation listings (as applicable)[3]. BIAs within the EMBA area discussed in Table 6.

Table 4: EPBC listed marine reptile species in the EMBA

Species	Conservation Status			Likelihood of occurrence in EMBA	BIA in EMBA
	EPBC Act 1999	BC Act 2016	Other WA Conservation Code		
Green turtle (*Chelonia mydas*)	Vulnerable Migratory	Vulnerable	-	Breeding known to occur within area. Overlaps with BIAs for aggregation, foraging and reproduction,	Yes – refer to Table 6
Flatback turtle (*Natator depressus*)	Vulnerable Migratory	Vulnerable	-	Breeding known to occur within area. Overlaps with BIA for aggregation, foraging and reproduction	Yes – refer to Table 6
Hawksbill turtle (*Eretmochelys imbricata*)	Vulnerable Migratory	Vulnerable	-	Breeding known to occur within area. Overlaps with BIA for foraging and reproduction	Yes – refer to Table 6
Loggerhead turtle (*Caretta caretta*)	Endangered Migratory	Endangered	-	Breeding known to occur within area. Overlaps with BIA for reproduction	Yes – refer to Table 6
Leatherback turtle (*Dermochelys coriacea*)	Endangered Migratory	Vulnerable	-	Species or species habitat known to occur within area	None
Short-nosed seasnake (*Aipysurus apraefrontalis*)	Critically Endangered	Critically Endangered	-	Species or species habitat known to occur within area	None - No BIA defined

6.1. Marine Turtles

Five species of marine turtle occur in, use the waters, and nest on sandy beaches, in and around the EMBA. These are the green turtle (*Chelonia mydas*), flatback turtle (*Natator depressus*), hawksbill turtle (*Eretmochelys imbricata*), loggerhead turtle (*Caretta caretta*) and leatherback turtle (*Dermochelys coriacea*) (Table 4).

These six species are listed on the EPBC Act List of Threatened Species as either ‘endangered’ or ‘vulnerable’ and all six species are also listed as ‘migratory’. They are also listed as threatened species under the BC Act and the hawksbill turtle, loggerhead turtle and leatherback turtle are also protected under the NT TPWC Act.

A summary of the different habitat types used during the various life stages of marine turtle species identified in the EMBA is given in Table 5.

Table 5: Summary of habitat types for the life stages of the six marine turtle species in the EMBA (DSEWPaC, 2012b)

Life Stage		Green turtle	Flatback turtle	Hawksbill turtle	Loggerhead turtle	Leatherback turtle
Post-hatchling		Open ocean pelagic habitats (poorly studied for Australian populations)	Coastal waters (poorly studied for Australian populations)	Open ocean pelagic habitats (poorly studied for Australian populations)	Pelagic (poorly studied for Australian populations)	Pelagic (no data for Australian populations)
Adult	Mating	Offshore from nesting beaches.	Currently unknown for North West Shelf region.	Offshore from nesting beaches.	Little is known for North West Shelf region but expected to occur either en-route or adjacent to nesting beaches.	Not recorded within North West Shelf region.
	Nesting	Typically, high energy, steeply sloped beaches with deep sand and deep-water approach.	Typically, low-energy beaches that are narrow with a low to moderate slope. Beach approach obstructed by broad intertidal mud or limestone platforms.	Typically beaches close to nearshore coral reefs and sediment comprised of coarse sand and coral rubble.	Poorly studied for North West Shelf region by generally prefer high energy, relatively narrow, steeply sloped, coarse-grained beaches.	Not recorded within North West Shelf region.
	Internesting	Shallow coastal waters within several km of nesting beach. Internesting buffers of 20 km identified around all nesting habitats.	Shallow nearshore waters within 5-60 km of nesting beach. Internesting buffers of 40-60 km identified around all nesting habitats.	Shallow coastal waters within several kilometres of nesting beach. Internesting buffers of 20 km identified around all nesting habitats.	Shallow coastal waters within several kilometres of nesting beach. Internesting buffers of 20 km identified around all nesting habitats.	Danger Point, Cobourg Peninsula. 20 km internesting buffer around nesting sites
	Foraging	Neritic habitats associated with seagrass and algae, and mangrove habitats.	Turbid, shallow inshore waters, subtidal, soft-bottomed habitats of the continental shelf.	Subtidal and intertidal coral and rocky reef habitats of the continental shelf.	Subtidal and intertidal coral and rocky reefs, seagrass and deeper soft-bottomed habitats of the continental shelf.	Mostly pelagic but will forage close to shore and over continental shelf in temperate waters.

6.1.1. Loggerhead Turtle

The loggerhead turtle (*Caretta caretta*) has a worldwide distribution, living and breeding in subtropical to tropical locations (Limpus 2008b). Breeding aggregations in Australia occur on both the east coast (Queensland and NSW) and the west. The annual nesting population in Western Australia is thought to be 3,000 females annually (Baldwin et al. 2003), and this is considered to support the third largest population in the world (Limpus 2008b). Loggerhead turtles have one genetic breeding stock within Western Australia (Commonwealth of Australia 2017a).

The WA distribution of sandy beach nesting areas extends from Shark Bay to the southern area of the North West Shelf, with occasional late summer nesting crawls recorded as far north as Barrow and Varanus Islands and the Lowendal and Rosemary Islands (DSEWPaC 2012d). Major nesting locations include the Muiron Islands, the Ningaloo Coast south to Carnarvon and the islands around Shark Bay, which includes Dirk Hartog Island, one of the principal nesting and internesting sites in WA (Limpus 2008). The Recovery Plan for Marine Turtles in Australia (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 2017a).

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). Earlier surveys found higher proportions of nesting loggerheads in the southern areas of the reserves (CALM 2005a). Aerial surveys conducted in 2000 and 2001 in the Exmouth region recorded only 12 sightings in Commonwealth waters and these turtles were most likely loggerheads (BHP 2005). In a survey commissioned by Santos around the islands in the Exmouth Region, loggerhead turtles were recorded nesting on Flat Island north of the Exmouth Gulf which was the first time they had been recorded in that location (Astron 2014). Loggerhead nesting and breeding occurs from November to March, with a peak in late December/early January (Limpus 2008b).

Figure 5 illustrates the BIAs and habitat critical (draft) for loggerhead turtles within the EMBA (as defined in the Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia 2017a).

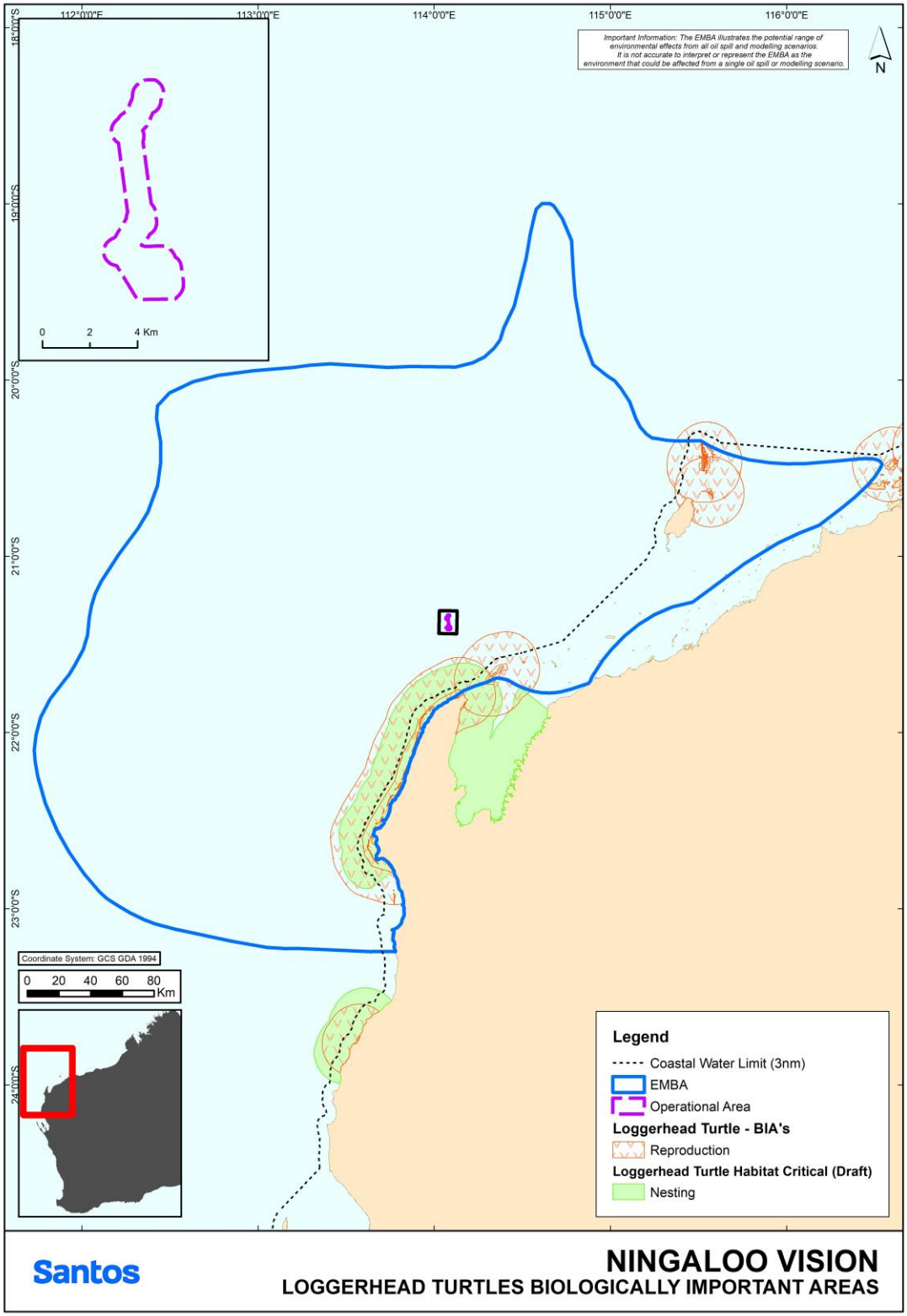


Figure 5: Biologically important areas for loggerhead turtles within the vicinity of the environment that may be affected and operational area

6.1.2. Green Turtle

Australian population of green turtles is estimated to be approximately 70,000 and is divided into seven genetically distinct breeding aggregations. The species is widespread and abundant in WA and NT waters with an estimated 20,000 individuals occurring, arguably the largest population in the Indian Ocean (Limpus 2008a). There are three distinct breeding stocks in WA waters which include: the North west Shelf stock, the Scott-Browse stock and the Ashmore Stock (Commonwealth of Australia 2017a).

The North west Shelf population 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, DSEWPaC 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).

Lower density green turtle nesting has also been recorded on Jurabi coast, Thevenard Island, Lowendal Islands and in Exmouth Gulf (Limpus 2008a). Only low numbers of green turtles have been observed nesting on Varanus Island, as well as Airlie Island (Pendoley Environmental 2011). From monitoring undertaken in 2016/17 by Santos on Varanus Island; three green turtles were observed to nest over a four-week tagging effort (Astron 2017).

Green turtle nesting abundance and timing fluctuates significantly from year to year depending on environmental variables, locality and food availability (Pendoley Environmental 2011). Nesting of green turtles has been recorded from August to March on Serrurier Island (Woodside 2002), from December to March along coast adjacent to Ningaloo (CALM 2005a) and from October to February on Varanus Island (Pendoley Environmental 2011). On Barrow Island, mating aggregations may commence from October with peak nesting from December to January, with hatchlings emerging through summer and early autumn. However, nesting on Barrow Island has been recorded all year round (Chevron 2005 and 2008, Pendoley 2005). Nesting on the Scott Reef-Sandy Islet and Browse Island has been observed all year round with peaks between December and January (Commonwealth of Australia 2017a).

The re-nesting period for female green turtles is approximately five years (Hamann et al. 2002).

Green turtles spend the first five to ten years of their life drifting on ocean currents, before moving to reside in shallower benthic habitats, including tropical coral and rocky reefs and seagrass beds. Green turtles have been known to migrate more than 2,600 km between feeding and breeding grounds (Limpus 2008a).

Green turtles are omnivores, mainly feeding in shallow benthic habitats on seagrass and/ or algae, but are also known to feed on sponges, jellyfish and mangroves (Limpus 2008a). Green turtles are unlikely to forage or dwell within deeper offshore waters due to the water depths; however, they may occasionally migrate through it with 86 % of post-nesting turtles being found to migrate to neritic foraging grounds and 14 % having local residency to their rookery in Western Australia (Ferriera et al., 2020).

Ferriera et al. (2020) spatial examination of inter-nesting green turtles found the existing BIA encompassed the spatial extent, however the BIA is likely largely underestimated for foraging areas.

Figure 6 illustrates the BIAs and habitat critical (draft) for green turtles within the EMBA (as defined in the Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia 2017a).

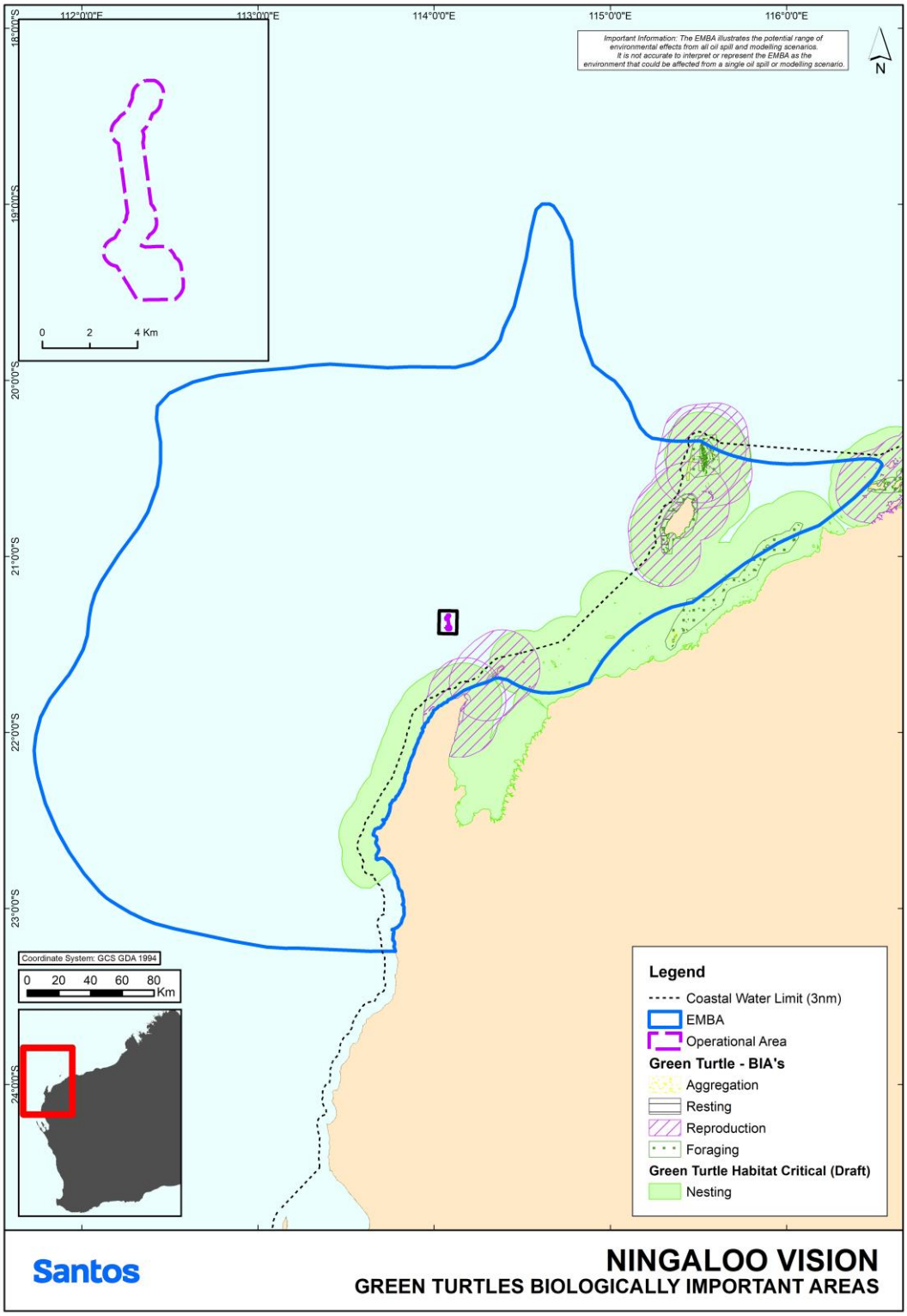


Figure 6: Biologically important areas for green turtles within the vicinity of the environment that may be affected and operational area

6.1.3. Hawksbill Turtle

Hawksbill turtles (*Eretmochelys imbricata*) have a global distribution throughout tropical and sub-tropical marine waters. The Western Australian stock is concentrated on the North West Shelf (Dampier Archipelago) (Limpus 2009a) and is considered to be one of the largest hawksbill populations remaining in the world. The estimated number of nesting hawksbill turtles in WA waters is between 2,000 and 4,500 individuals (Morris 2004). There is a second major population of Hawksbill turtles in Australia, which is genetically isolated from the North West Shelf population located along the Northern Territory coast and north-eastern Queensland (Northern Territory Government, n.d).

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, 2009a).

The largest known nesting area for the North West Shelf population is the sandy shoreline of Rosemary Island, within the Dampier Archipelago, particularly on the north-western side of the Island. It is believed that 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 2009a). Nesting hawksbills have also been found on NE Regnard Island and SW Regnard Island, confirming the Regnard Islands as hawksbill rookeries (Pendoley Environmental 2009).

The hawksbill turtle nesting population within the Exmouth region is also considered important as the populations in Western Australia represent the largest remaining population in the Indian Ocean (CALM 2005). The best estimate of numbers within the Ningaloo Marine Park and Muiron Islands Marine Management Area is between 20–700 individuals (Waayers 2010).

A snapshot survey of Varanus Island and the Lowendal Islands conducted for Santos during October 2012 found the five most frequented beaches by hawksbills, based on the track counts, were Beacon Island (*n*=43), Parakeelya (*n*=41), Kaia (*n*=40), Rose (*n*=30) and Pipeline (*n*=28). Results of the October 2012 three-day track census program showed that Beacon Island also hosted the highest daily number of overnight emergences by hawksbills and is therefore an important nesting beach for hawksbill turtles (Pendoley Environmental 2013).

On Varanus Island, hawksbill turtle nesting activity is predominantly distributed on the island's east coast, including Pipeline, Harriet, and Andersons beaches (Pendoley Environmental 2019). Individual hawksbill turtles appear to show a strong fidelity to these beaches, often returning to the same beach to nest within the season (Pendoley Environmental 2019). Between 1986 and 2019, a total of 571 individual hawksbill turtles were tagged on Varanus Island. Recent baseline data was collected at the Montebello and Dampier AMPs by Keesing, 2019 showing that only one hawksbill turtle was identified during the survey at the Dampier AMP only. No marine turtle species were identified during the survey at Montebello AMP.

Nesting is reported to occur between October and February in WA (Commonwealth of Australia 2017a). Hawksbill turtles have been observed breeding on the North West Shelf between July and March with peak nesting activity around the Lowendal Islands between October and December (Limpus 2009a).

Female hawksbills skip annual breeding opportunities (Kendall & Bjorkland 2001), presumably due to high energy demands of breeding (Chaloupka & Prince 2012).

Individuals may migrate up to 2,400 km between their nesting and foraging grounds (DSWEPaC 2012a), however a recent tagging study showed that turtles migrating from WA rookeries remain on the continental shelf (< 200 m depth) and within Australian waters during their inter-nesting, migrating and foraging phases (Fossette et al. 2021). Satellite tracking of nesting turtles on Varanus Island (32 km) and Rosemary Island has shown adult turtles to feed between 50 and 450 km from their nesting beaches (DSWEPaC 2012a).

Adults tend to forage in tropical tidal and sub-tidal coral and rocky reef habitat where they feed on an omnivorous diet of sponges, algae, jelly fish and cephalopods (DSWEPaC 2012a). Hawksbill turtles are unlikely to spend significant time within offshore waters as it is too deep to act as a feeding ground. However, it is likely they may migrate through those areas.

In order to better quantify and map the important areas used by Hawksbill turtles, AIMS was engaged in 2020 to lead the North West Shoals to Shores Research Program. During this program, AIMS combined available existing satellite tracking data for 20 adult turtles with data from newly deployed satellite tags on 20 adults in the Lowendal Islands and Dampier Archipelago (AIMS, 2021). Results showed that critical habitat designated by the Australian Government for inter-nesting largely protects the nesting areas calculated (AIMS, 2021), however the existing

foraging BIAs do not include the majority of foraging areas calculated (AIMS, 2021). While approximately 23% of the hawksbill turtles foraging distribution occurred within MPAs, the existing BIAs are largely underestimating the important foraging areas for the turtles (AIMS, 2021). This supports the results of a joint study conducted by Fossette et al. (Fossette et aI. 2021), which found only 10% of foraging areas utilised by 42 nesting turtles (between 2000 and 2017) were encompassed by the designated foraging BIA. Fossette et al. (2021) found that the highest overlap of individual turtles occurred within the Migratory BIA corridor.

Figure 7 illustrates the BIAs and habitat critical (draft) for hawksbill turtles within the EMBA (as defined in the Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia 2017a).

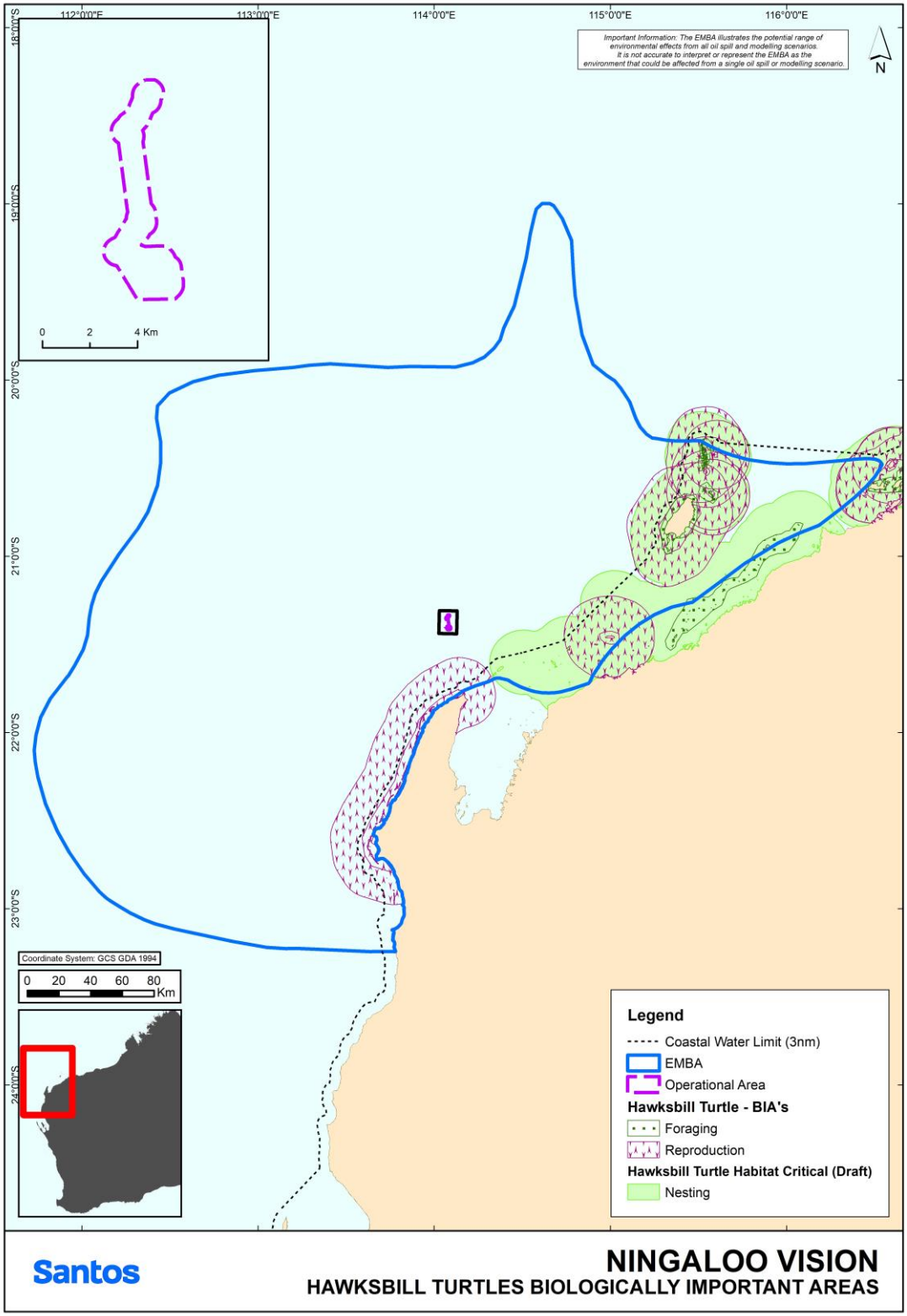


Figure 7: Biologically important areas for hawksbill turtles within the vicinity of the environment that may be affected and operational area

6.1.4. Flatback Turtle

The flatback turtle (*Natator depressus*) 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 Western Australia (WA) (Limpus, 2007). The management of the flatback turtle in Australia is broken up into five stocks currently described around Australia; eastern Queensland, Arafura Sea, Cape Domett, South-west Kimberley and Pilbara stocks (Commonwealth of Australia 2017). The Pilbara stock nests throughout the North West Shelf and is characterised by summer nesting (October to March), and the northern stock at Cape Domett breeds mainly in winter (July to September) (Commonwealth of Australia 2017a). The South-west Kimberley stock is also characterised by summer nesting. Populations in western NT are thought to nest all year round with nesting density reaching its peak in July. Populations in northern Australia also nest all year round, with nesting density reaching its peak between June and August (Limpus, 2007).

The southern WA nesting population of flatback turtles occurs from Exmouth to the Lacepede Islands off the Kimberley coast (DSEWPaC 2012c). On the North West Shelf, significant rookeries are centred on Barrow Island especially the east coast beaches (DSEWPaC 2012b). NT populations are typically found in the Gulf of Carpentaria, western Torres Strait, Wellesley Islands Group and Sand Islet.

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). Nesting is also widespread along the mainland beaches from Mundabullangana on the Pilbara coast north, including Cemetery Beach near Port Hedland, Eighty Mile Beach and to Broome (Limpus 2007, DSEWPaC 2012b).

Long term monitoring of flatback turtles nesting in the Port Hedland area, specifically at Cemetery Beach and Pretty Pool Beach, was undertaken between 2004 and 2014. Monitoring results indicated the main nesting season of flatback turtles in the area was between mid-October and January, which is consistent with other rookeries in the Pilbara region including Barrow Island, Mundabullangana, Karratha and Onslow (Waayers and Stubbs 2016). The onset of the nesting season appears to be relatively consistent each year and is thought to be associated with the southern movement of warmer sea surface temperatures along the northern WA coast.

There have 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, Table and Round Island in previous surveys (Pendoley Environmental 2009). Flatback turtle tracks have been seen on Forty Mile beach and evidence of flatback nesting was recorded on the same beach the next day (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. (2014a, b) reported both Barrow Island and Mundabullangana flatback turtles as substantial reproductive populations with estimates of 1,512 and 1,461 nesting females annually respectively. . Thevenard Island and Port Hedland were also identified as rookeries, but turtle nesting numbers are not known. .

Satellite tracking of adult (female) flatback turtles shows they use a variety of inshore and offshore marine areas off the east and west coasts of Barrow Island. Females inter-nest close to their nesting beaches, typically in 0–10 m of water (Chevron 2008). However, flatback turtles also travel approximately 70 km and inter-nest in shallow nearshore water off the adjacent mainland coast, before returning to Barrow Island to lay another clutch of eggs. The average inter-nesting period is 13–16 days.

From long-term tagging studies on Varanus Island and Pendoley's observations, it appears that the nesting season for flatback turtles peaks in December and January with subsequent peak hatchling emergence in February and March. Flatbacks have been observed to nest on Varanus Island between November and February (Chevron 2008, Pendoley Environmental 2011 & 2013). Population monitoring of flatback turtles on Varanus Island, calculated from 16 seasons, indicates a mean population estimate of 226 (+/- 97). Modelled flatback turtle populations have shown a slight decline from 2008/09 to 2016/17, which is considered to be part of fluctuations in the natural cycle (Astron 2017). Flatback turtles tend to nest on all beaches on Varanus Island (Astron 2017). Flatback hatching and emergence success is noted as higher compared to that reported for other Western Australian rookeries (Pendoley et al. 2014; cited Astron 2017).

Unlike other sea turtles, the flatback turtle lacks a wide oceanic dispersal phase and adults tend to be found in soft sediment habitats within the continental shelf of northern Australia (DSEWPaC 2012b). Despite having geographically large foraging ranges (>1500 km), genetic differentiation suggests strong natal homing for both males and females (Turner Tomaszewicz et al., 2022). Little information is known on the diets of flatback turtles (DSEWPaC 2012b); however, they are believed to forage on primarily soft-bodied invertebrates (Commonwealth of Australia 2017a). Flatback turtles also differ from other species of sea turtles in maturing at a larger size and a likely younger age (<20 years) in comparison to other sea turtle species, indicating they may have a more rapid growth

rate in their juvenile (similar to the leatherback turtle, a species with their own family) (Turner Tomaszewicz et al., 2022). This information from Turner Tomaszewicz et al., 2022 may provide valuable insight for ongoing population assessments and future recovery plans (Turner Tomaszewicz et al., 2022).

Figure 8 illustrates the BIAs and habitat critical (draft) for flatback turtles within the EMBA (as defined in the Recovery Plan for Marine Turtles in Australia (Commonwealth of Australia 2017a).

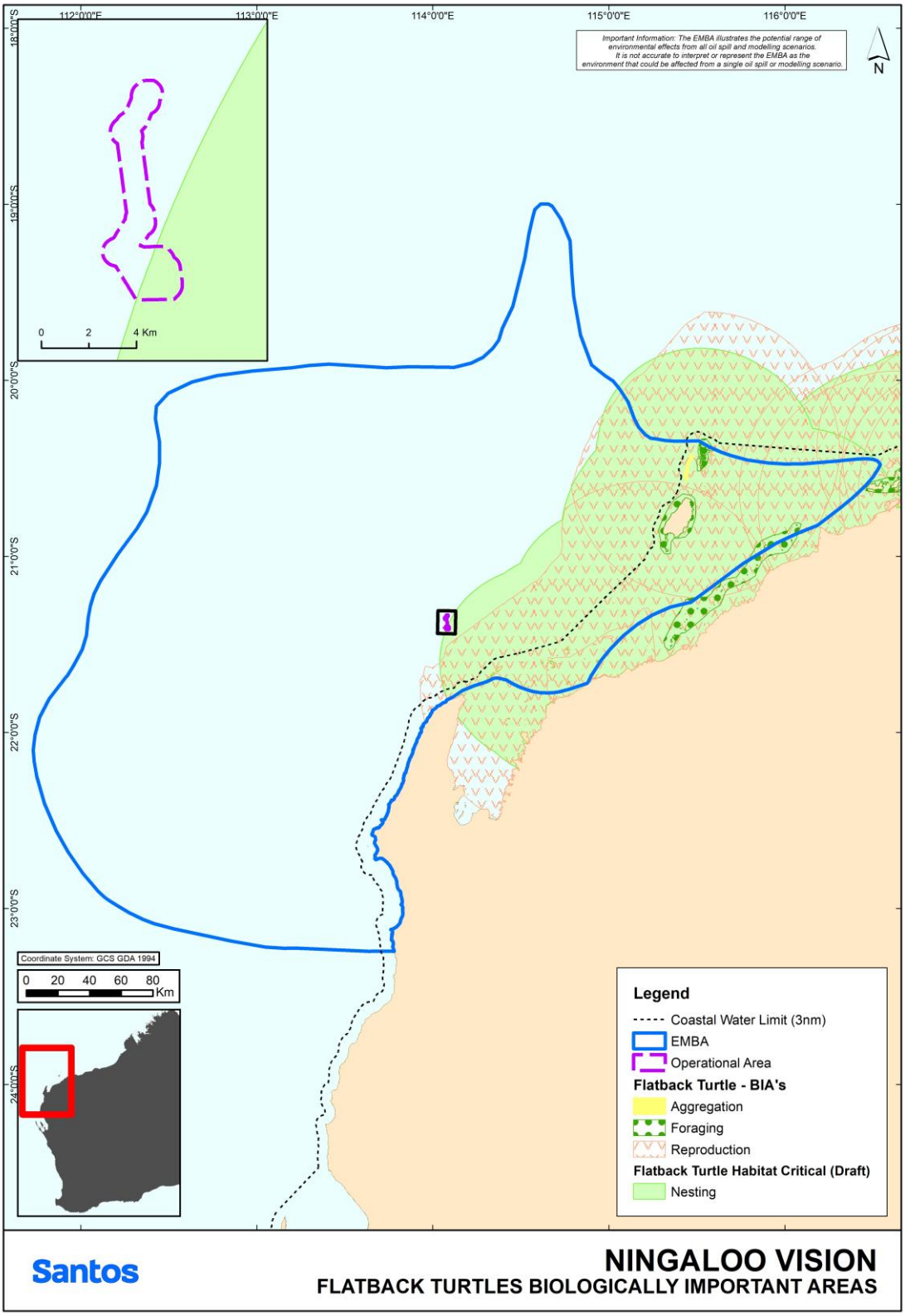


Figure 8: Biologically important areas for flatback turtles within the vicinity of the environment that may be affected and operational area

6.1.5. Leatherback Turtle

The leatherback turtle *(*Dermochelys coriacea) has the widest distribution of any marine turtle and can be found from tropical to temperate waters throughout the world (Márquez 1990). There are no major leatherback turtle centres of nesting activity that have been recorded in Australia, although scattered isolated nesting (one to three nests per annum) occurs in southern Queensland and the Northern Territory (Limpus and McLachlin 1994).

There have been several records of leatherback turtles off the coast of WA, but no confirmed nesting sites (Limpus 2009c). Turtle observations have mainly occurred south of the North West Shelf area and in open waters (>200 m deep) (Limpus 2009c). Due to the lack of nesting sites around Australian coastal waters, it is presumed that leatherback turtles observed in Australian waters are migrating from neighbouring countries to utilise feeding grounds in Australia (Limpus 2009c).

The leatherback turtle will feed at all levels of the water column and is carnivorous feeding mainly on pelagic, soft-bodied marine organisms such as jellyfish, which occur in greatest concentrations in areas of upwelling or convergence (DSEWPaC 2012d). The leatherback turtle is a highly pelagic species with adults only going ashore to breed.

No BIAs for this species were identified within the EMBA.

6.2. Seasnakes

Storr et al. (1986) estimate nine genera and 22 species of sea snakes occur in WA waters, with two listed marine seasnake species being recorded in the search area for the EMBA (Appendix D of the Ningaloo Vision CoPFAR EP). Little is known of the distribution of individual species, population sizes or aspects of their ecology. Seasnakes are essentially tropical in distribution, and habitats reflect influences of factors such as water depth, nature of seabed, turbidity and season (Heatwole and Cogger 1993). Seasnakes are widespread throughout waters of the North West Shelf in offshore and nearshore habitats. They can be highly mobile and cover large distances or they may be restricted to relatively shallow waters and some species must return to land to eat and rest. In the north-west region of Western Australia, no BIAs have been designated for seasnakes. However, both Ashmore Reef and Cartier Island are characterised for both a high density and high diversity of seasnakes (DSEWPaC 2012b). The limited evidence available suggests that there are no sea snakes in at least the coastal waters of Cocos (Keeling) Islands, and few sea snake sightings in the waters of the Christmas Island territory (Brewer et al., 2009).

Two species of seasnakes listed as threatened under the EPBC Act were identified in the Protected Matters search within the EMBA (Appendix D of the Ningaloo Vision CoPFAR EP):

- Short-nosed seasnake (Aipysurus apraefrontalis)
- Leaf-scaled seasnake (*Aipysurus foliosquama*).

6.2.1. Short-nosed Seasnake

The short-nosed seasnake (*Aipysurus apraefrontalis*) is listed as critically endangered under the EPBC Act and the BC Act. It is a fully aquatic, small snake and is endemic to WA. It has been recorded from Exmouth Gulf, WA to the reefs of the Sahul Shelf, in the eastern Indian Ocean. This species is believed to show strong site fidelity to shallow coral reef habitats in less than 10 m of water, with most specimens having been collected from Ashmore and Hibernia reefs (Minton & Heatwole 1975, Guinea and Whiting 2005).

The species prefers the reef flats or shallow waters along the outer reef edge in water depths to 10 m (McCosker 1975, Cogger 2000). The species has been observed during daylight hours, resting beneath small coral overhangs or coral heads in 1–2 m of water (McCosker 1975). Guinea and Whiting (2005) reported that very few short-nosed seasnakes moved even as far as 50 m away from the reef flat and are therefore unlikely to be expected in high numbers in offshore, deeper waters.

6.2.2. Leaf-scaled Seasnake

The leaf-scaled seasnake *(Aipysurus foliosquama)* is listed as critically endangered under the EPBC Act and the BC Act. It occurs in shallow water (less than 10 m in depth), in the protected parts of the reef flat, adjacent to living coral and on coral substrates (DoE 2014). The species is found only on the reefs of the Sahul Shelf in WA, especially on Ashmore and Hibernia Reefs (Minton and Heatwole 1975). The leaf-scaled seasnake forages by searching in fish burrows on the reef flat (DoE 2014).

6.3. Biologically Important Areas/Habitat Critical – Marine Reptiles

Table 6 provides an overview of BIAs in the EMBA for marine reptiles, as identified by the DCCEEW (Commonwealth) and critical habitats identified in associated recovery plans. The DCCEEW may make recovery plans for threated fauna listed under the EPBC Act. The EPBC Act requires that 'habitat critical to the survival of the listed threatened species' is identified in recovery plans, relevant recovery plans are listed in Section 13.2.In addition, both the EPBC Act and WA BC Act and associated regulations (2018) provide for the listing of habitat critical - habitat 'critical to the survival of the threatened species. To date no habitat critical in WA has been listed under either Act. No provision is made under the TPWC Act for listing critical habitat.

Table 6: Biologically Important Areas/Habitat Critical and geographic locations - reptiles

Species	Scientific name	Aggregation area and use	BIAs within EMBA	Habitat Critical within EMBA
Loggerhead turtle	*Caretta caretta*	Reproduction, migration and foraging – islands and coastline of the Kimberley region and islands of the North West Shelf, Ningaloo coast and Jurabi coast	Lowendal Island Montebello Island Muiron Island Ningaloo Coast and Jurabi coast Rosemary Island	Exmouth and Ningaloo coast. 20 km internesting buffer
Green turtle	*Chelonia mydas*	Reproduction, migration foraging, and aggregation – Offshore islands in the Browse Basin, North West Shelf and Kimberley/Pilbara coastlines Reproduction – Dampier Archipelago Basking – Middle Island	Barrow Island Coral reef habitat west of the Montebello group. Extends the entire length of Montebellos Greens - inshore tidal and shallow subtidal areas around Barrow Island Hawksbills - shallow water coral reef and artificial reef (pipeline) habitat Middle Is. West Coast Barrow Island West Coast and North Coast Montebello Island - Hermite Island, NW Island, Trimouille Island Montebello Islands North and South Muiron Island North West Cape String of islands between Cape Preston and Onslow, inshore of Barrow Island	. 20 km internesting buffer Barrow Island, Montebello Islands, Serrier Island and Thevenard Island. 20 km internesting buffer Exmouth Gulf and Ningaloo coast. 20 km internesting buffer
Hawksbill turtle	*Eretmochelys imbricata*	Reproduction, migration, foraging and internesting – Offshore islands in the Browse Basin, North West Shelf and Kimberley/Pilbara coastlines Reproduction – Lowendal group, Montebello Islands	Barrow Island Greens - inshore tidal and shallow subtidal areas around Barrow Island Hawksbills - shallow water coral reef and artificial reef (pipeline) habitat Lowendal Island Group Montebello Island - Hermite Island, NW Island, Trimouille Island Montebello Island, Trimoulle and NW islands Ningaloo coast and Jurabi coast Rosemary Island String of islands between Cape Preston and Onslow, inshore of Barrow Island Thevenard Island Varanus Island	Cape Preston to mouth of Exmouth Gulf (including Montebello Islands and Lowendal Islands). 20 km internesting buffer Rosemary Island 20 km internesting buffer
Flatback turtle	*Natator depressus*	Reproduction, migration, aggregation, foraging – Islands of the North West Shelf and the Pilbara/ Kimberley coastlines Reproduction – Barrow Island	Barrow Island Coral reef habitat west of the Montebello group. Extends the entire length of Montebellos Montebello Island - Hermite Island, NW Island, Trimouille Island String of islands between Cape Preston and Onslow, inshore of Barrow Is Thevenard Island - South coast	Barrow Island, Montebello Islands, coastal islands from Cape Preston to Locker Island. 60 km internesting buffer
Leatherback turtle	*Dermochelys coriacea*	None within EMBA		

7. Marine Mammals

Twenty one species of listed marine mammals are known to occur in the EMBA, according to the Protected Matters search (Appendix D of the Ningaloo Vision CoPFAR EP). An examination of the species profile and threats database (DAWE 2020a) showed that some listed mammal species are not expected to occur in significant numbers in the marine and coastal environments in the EMBA due to their terrestrial distributions. Hence, these species are not discussed further.

Of the remaining listed species, four are listed as threatened and migratory and nine are listed as migratory under the Commonwealth EPBC Act (BIAs for marine mammals are discussed in Table 9. These species are shown in Table 7 along with their conservation listing under the WA BC Act and TPWC Act (as applicable).

The section below gives further details on marine mammal species listed as threatened and migratory and a summary is presented in Table 8. Identified BIAs are presented in Table 9.

Table 7: Marine mammals listed as threatened or migratory under the EPBC Act

Species	Conservation Status			Likelihood of occurrence in EMBA	BIA in EMBA
	EPBC Act 1999	BC Act 2016	Other WA Conservation Code		
Sei Whale	Endangered Migratory	Endangered	-	Foraging, feeding or related behaviour likely to occur within area	None - No BIA defined
Blue whale (Balaenoptera musculus)	Endangered Migratory	Endangered	-	Foraging, feeding or related behaviour known to occur within area Migration route known to occur within area	Yes – Refer to Table 9
Fin whale (Balaenoptera physalus)	Vulnerable Migratory	Endangered	-	Foraging, feeding or related behaviour likely to occur within area	None - No BIA defined
Southern right whale (Eubalaena australis)	Endangered Migratory	Vulnerable	-	Breeding known to occur within area	None - BIA not found in EMBA
Humpback whale (Megaptera novaeangliae)	Migratory	Special conservation interest and Migratory	-	Breeding known to occur within area. Overlap with BIA for migration and resting	Yes – Refer to Table 9
Sperm whale (Physeter macrocephalus)	Migratory	Vulnerable	-	Species or species habitat may occur within area	None - No BIA defined
Antarctic minke whale (Balaenoptera bonaerensis)	Migratory	Migratory	-	Species or species habitat likely to occur within area	None - No BIA defined
Bryde's whale (Balaenoptera edeni)	Migratory	Migratory	-	Species or species habitat likely to occur within area	None - No BIA defined
Killer whale (Orcinus orca)	Migratory	Migratory	-	Species or species habitat may occur within area	None - No BIA defined
Australian Humpback Dolphin (*Sousa sahulensis*)	Migratory (as *Sousa chinensis*)	Migratory	Priority 4	Species or species habitat known to occur within area	None - BIA not found in EMBA

Species	Conservation Status			Likelihood of occurrence in EMBA	BIA in EMBA
	EPBC Act 1999	BC Act 2016	Other WA Conservation Code		
Spotted bottlenose dolphin (Arafura/Timor Sea populations) (Tursiops aduncus)	Migratory	Migratory	-	Species or species habitat known to occur within area	None - BIA not found in EMBA
Australian Snubfin Dolphin (Orcaella heinsohni)	Migratory	Migratory	-	Species or species habitat known to occur within area	None - BIA not found in EMBA
Dugong (Dugong dugon)	Migratory	Migratory	-	Breeding known to occur within area	Yes – Refer to Table 9

7.1. Threatened and Migratory Species

7.1.1. Sei Whale

Sei whales have a worldwide, oceanic distribution and migrate between low-latitude tropical and subtropical regions during the winter and temperate and subpolar latitudes in summer (Leaper et al. 2008). Sei whales tend to be found further offshore than other species of large whales (Bannister et al. 1996).

Sei whales move between Australian waters and Antarctic feeding areas; however, they are only infrequently recorded in Australian waters (Bannister et al. 1996) and their movements and distribution in Australian waters is not well known (DAWE 2020a). There are no known mating or calving areas in Australian waters (Parker 1978 in DAWE 2020a). The National Conservation Values Atlas currently record no BIAs for this species (DAWE 2020b). Surveys of the Bonney Upwelling (outside of the EMBA) between 2000 and 2003 recorded sightings of sei whales feeding during summer and autumn, indicating that this is potentially an important feeding ground (DAWE 2020b).

7.1.2. Blue Whale

Two sub-species of blue whale are recorded in Australian waters: the southern (or true) blue whale (*Balaenoptera musculus intermedia*) and the pygmy blue whale (*Balaenoptera musculus brevicauda*). Southern blue whales are believed to occur in waters south of 60°S and pygmy blue whales occur in waters north of 55°S (i.e. not in the Antarctic) (DEWHA 2008a). By this definition all blue whales in waters from Busselton to the NT are assumed to be pygmy blue whales and are discussed below.

Pygmy blue whale populations are distinguishable only acoustically as they do not display morphological differences (Leroy et al. 2021). Prior to 2020 there were believed to be three populations of the pygmy blue whale (B. m. brevicauda), however, evidence for a fourth pygmy blue whale acoustic population were found by Cerchio, S. et al. (2020), and a fifth was identified by Leroy et al. (2021).

Pygmy blue whales have a southern hemisphere distribution, migrating from tropical water breeding grounds in winter to temperate and polar water feeding grounds in summer (Bannister et al. 1996, Double et al. 2014), such as the Perth Canyon and adjacent waters (Rennie et al., 2009) and the Great Southern Australian Coastal Upwelling System (Möller et al., 2020). The WA migration path takes pygmy blue whales down the WA coast to coastal upwelling areas along southern Australia (Gill 2002) and south at least as far as the Antarctic convergence zone (Gedamke et al. 2007).

Tagging surveys have shown pygmy blue whales migrating northward relatively near to the Australian coastline (100 km) until reaching North West Cape after which they travelled offshore (240 km) to Indonesia (Double et al., 2014). Passive acoustic data documented pygmy blue whales migrating along the Western Australian shelf break (Woodside 2012). Tagging data collected by Gales et al. (2010) has provided the first definitive link between the blue whales that feed off the Perth Canyon and those that occur around Indonesia. This is movement is concordant with the proposed ‘Tasmania to Indonesia’ population described by Branch et al. (2007).

The northern migration passes the Perth Canyon from January to May and north bound animals have been detected off Exmouth and the Montebello Islands between April and August (Double et al. 2012a, McCauley & Jenner 2010). A noise monitoring study conducted in 2014-15 recorded pygmy blue whales moving in a northward direction in August 2014 and between late-May to early July 2015 (JASCO Applied Sciences, 2016; McPherson, Craig et al., 2015). During the southern migration, pygmy blue whales pass south of the Montebello Islands and Exmouth from October to the end of January, peaking in late November to early December (Double et al. 2012b). No detections of the species were made during the period of their southward migration during the noise monitoring study.

Generally, they appear to travel as individuals or in small groups based on acoustic data. For example, analysis of pygmy blue whale calls from noise loggers deployed around Scott Reef (2006 to 2009) for the Woodside Browse project showed that 78% of the calls were from lone whales, 18% were from two whales and 4% were from three or more whales (McCauley 2011; Woodside 2014).

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, located within the EMBA include Ningaloo Reef. 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 (C. Jenner & M-N Jenner, unpublished data, 2001 in Double et al. 2014). Outside of the recognised feeding areas, possible foraging areas for pygmy blue whales include the greater region around the Perth Canyon, off Exmouth and Scott Reef in WA (DoE 2015a). These steep gradient features tend to stimulate upwelling and, therefore increased productivity (seasonally variable) (ConocoPhillips 2018). Hence, they provide a favourable foraging area.

Breeding areas have not yet been identified; however, it is likely that pygmy blue whales calve in tropical areas of high localised production such as deep offshore waters of the Banda and Molucca Seas in Indonesia (Double et al. 2014, DAWE 2020a). There are no known breeding areas of significance to blue whales within the EMBA.

The BIAs for blue whale and pygmy blue whale are detailed in Table 9 and depicted in Figure 9**.** However, a recent study by Thums et al. (2022) used a combination of passive acoustic monitoring of the Northwest Australian coast (46 instruments from 2006 to 2019) and satellite telemetry data (22 tag deployments from 2009 to 2021) to model the spatial extent of pygmy blue whale high use areas for foraging and migration and compared these areas to the BIAs. The synthesis of data indicated that pygmy blue whales extensively use the continental slope habitat rather than the continental shelf habitat off Western Australian coast compared to southern Australia.

Thums et al. (2022) described three important foraging (and/or resting/breeding) areas, including; The Perth Canyon and vicinity, the shelf edge off Geraldton and; the shelf edge from Ningaloo Reef to the Rowley Shoals (not continuous).The study found that the Foraging BIA off the south-west of Western Australia encompassed 83 % of the most important areas in that region, however; the 'Annual High Use Foraging' BIA within that BIA only encompassed 7 % of the most important area.

The most significant overlaps were seen with the Migration BIAs, whereby the most important migration area had an 82 % overlap with the part of the Migration BIA that occurs in Australia. Thums et al. (2022) also stated that the available data indicated that the East Indian Ocean pygmy blue whales spent up to 124 days in Indonesian and Timorese waters (34 % of annual cycle) and this area may also be the calving ground for this population.

The Australian Government may now have to consider this quantitative assessment of important areas in future reviews of the BIAs (Thums et al. 2022).

7.1.3. Fin Whale

Fin whales have a worldwide distribution generally in deeper waters, with oceanic migrations between warm water breeding grounds and cold-water feeding grounds.

The fin whale distribution in Australia is not clear due to the sparsity of sightings. Information is known primarily from stranding events and whaling records. According to the Species Profile and Threats database (DAWE 2020a); fin whales are thought to be present from Exmouth, along the southern coastline, to southern Queensland.

Migration paths are uncertain but are not thought to follow Australian coastlines (Bannister et al. 1996). There is insufficient data to prescribe migration times for fin whales. During summer and autumn this species has been recorded acoustically at the Rottnest Trench.

There are no known mating or calving areas in Australian waters (DoEE 2019a) and no BIAs for the fin whale are currently identified by the National Conservation Values Atlas (DAWE 2020b).

7.1.4. Southern Right Whale

The southern right whale is present in the southern hemisphere between approximately 30° and 60°S. The species feeds in the Southern Ocean in summer, moving close to shore in winter.

In Australian waters, southern right whales range from Perth, along the southern coastline, to Sydney. Sightings have been recorded as far north as Exmouth although these are rare (Bannister et al. 1996).

The BIs for this species within the EMBA is detailed in Table 9 and shown in Figure 9.

7.1.5. Humpback Whale

Humpback whales have a worldwide distribution, migrating along coastal waters from polar feeding grounds to subtropical breeding grounds. Geographic populations are distinct and at least six southern hemisphere populations are thought to exist based on Antarctic feeding distribution and the location of breeding grounds on either side of each continent (Bannister et al. 1996). The largest known population of humpback whales breeds along the coast of Western Australia (Branch, 2011, Salgado Kent et al., 2012, IWC, 2014) and has a recognised resting ground in

the Exmouth Gulf (Ivine & Kent 2018). The population of humpback whales migrating along the WA coastline was recently estimated to be greater than 33,000 whales and likely increasing at exceptionally high growth rates between 10–12 % (Hedley et al. 2011, Salgado Kent et al. 2012).

Humpback whale populations have increased since being placed on the threatened species list for exploitation from whaling, resulting in a higher abundance of species off our Western Australian coastline. Effective from 26/02/2022, Humpback whales are no longer classed as vulnerable under the EPBC Act, however; they remain a Matter of National Environmental Significance as a listed Migratory Species and Cetacean under EPBC Act Division 3, where it is an offence to kill, injure, take, trade, keep, move or interfere with a cetacean. Humpback whales have been able to thrive and increase in numbers despite the heavy oil and gas exploration. A study presented by Bejder et al. (2016) has prompted a review of the species being down listed under Commonwealth legislation and regulations, as they are not eligible for listing as a threatened species under all statutory criteria. The west coast Australian humpback whale population migrates from Southern Polar Ocean 'summer' feeding grounds to their northern tropical 'winter' calving/ breeding grounds in coastal waters of the Kimberley. The northern migration tends to follow deeper waters of the continental shelf, whilst the southward migration concentrates whales closer to the mainland (Jenner et al. 2001; Irvine et al., 2018). Recent satellite tagging of southbound humpback whales indicate that whales generally migrated close to the coastline, within a few tens of kilometres of shore and in a corridor frequently less than 100 km (Double et al. 2010). Aerial surveys and noise logger recordings undertaken for Chevron's Wheatstone Project indicated that the main distribution of humpback whales was sighted at an average distance of 50 km from the mainland during the northern migration and 35 km during the southbound migration (RPS 2010a). Woodside have conducted aerial surveys that have confirmed that the reported distribution of migrating humpback whales off the North West Cape is consistent with baseline surveys first conducted in 2000 to 2001 (RPS, 2010 in Woodside 2020).

The precise timing of the migration varies between years by up to six weeks, influenced by water temperature, sea ice distribution, predation risk, prey abundance and the location of feeding grounds (DEWR 2007).

Peak northward migration across the North West Shelf is identified as from late July to early August, and peak southward migration from late August to early September (DoEE 2015c). Data collected between 1995 and 1997 by the Centre for Whale Research indicates that the period for peak northern migration into the calving grounds in the Kimberley is mid to late July. The peak for southern migration is in the first half of September (Jenner et al. 2001). Actual timing of annual migration may vary by as much as three weeks from year to year due to food availability in the Antarctic (DMP 2003).

Satellite tagging data collected for migrating northbound humpback whales identified a consistent narrow inshore distribution, unlike the southward migration. There was little evidence that the whales tended to venture further from shore and into deeper water at any point on their northward migration. Whales were seen with calves off the North West Cape outside the 'calving grounds; of Lacepede Islands to Camden Sound. This indicates some potential for this area being used as a 'calving site' as well as a migratory corridor. Consequently, the region from the Lacepede Islands to Camden Sound should not be seen as the exclusive 'calving ground' for this population (Double et al. 2012b).

Details on the BIA for humpback whales within the EMBA are provided in Table 9 and depicted Figure 9.

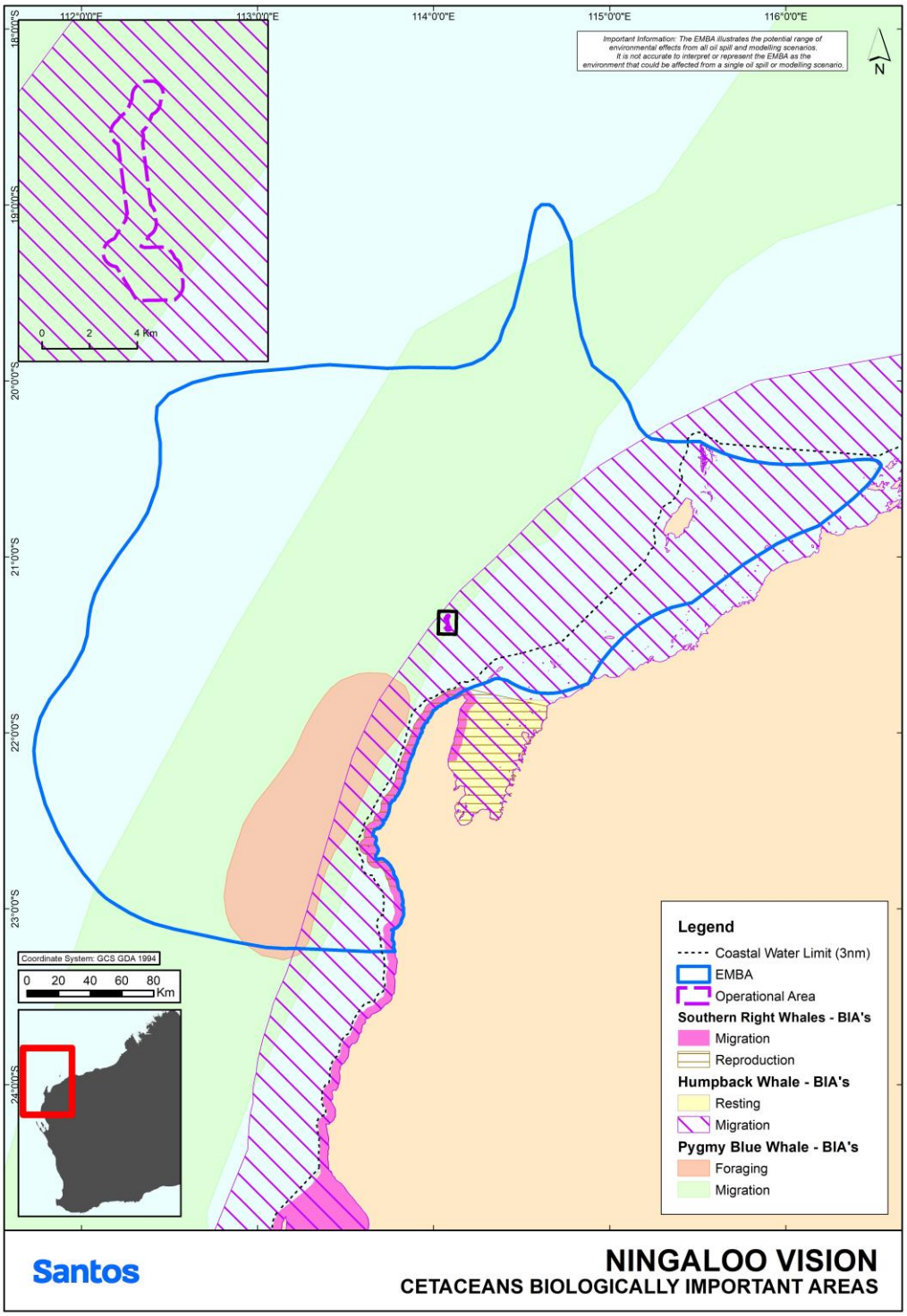


Figure 9: Biologically important areas for protected cetaceans within the vicinity of the environment that may be affected and operational area

7.1.6. Sperm Whale

Sperm whales typically occur in WA along the southern coastline between Cape Leeuwin and Esperance (Bannister et al. 1996). Sperm whales are distributed worldwide in deep waters (greater than 400 m) off continental shelves and sometimes near shelf edges, averaging 20 to 30 nautical miles offshore (Hooker et al.1999, Pirotta et al., 2011). The sperm whale is known to migrate northwards in winter and southwards in summer, however, detailed information on the distribution of sperm whales is not available for the timing of migrations. Sperm whales have been recorded in deep water off the North West Cape on the west coast of Western Australia (RPS 2010b) and appear to occasionally venture into shallower waters in other areas (RPS 2010b). No BIAs for sperm whales are recorded within the EMBA**.**

7.1.7. Antarctic Minke Whale

The Antarctic minke whale is distributed throughout the Southern Hemisphere from 55°S to the Antarctic ice edge during the austral summer and has been recorded in all Australian States (Bannister et al. 1996; Perrin & Brownell 2002). Detailed information on timing and location of migrations and breeding grounds on the west coast of Australia is largely unknown. However, it is believed that the Antarctic minke whale migrates up the WA coast to approximately 20°S during Australian winter to feed and possibly breed (Bannister et al. 1996).

7.1.8. Bryde's Whale

Bryde's whales (*Balaenoptera edeni;* Migratory) are distributed year-round across tropical and warm temperate waters with individuals recorded in all Australian states, except the NT (Ceccarelli et al., 2011; Kato 2002). The species typically moves between 40 °N and 40 °S, with these movements seeming to be primarily linked to prey availability (DoE, 2023k). Two forms are recognised: inshore and offshore Bryde's whales. It appears that the inshore form is restricted to the 200 m depth isobar whilst the offshore form is found in deeper waters of 500-1,000 m (DoEE 2019c). Both forms are expected to be found in zones of upwelling where they feed on shrimp like crustaceans (Bannister et al. 1996). Little is known about the population abundance of Bryde's whale, the location of exact breeding and calving grounds and large-scale migration patterns (DoEE 2019c). It is however, suggested that the offshore form migrates seasonally, heading towards warmer tropical waters during the winter.

7.1.9. Killer Whale

The killer whale has a widespread global distribution and has been recorded in waters of all Australian states/territories (Bannister et al. 1996). Whilst more commonly found in cold, deeper waters, killer whales have been observed along the continental slope, shelf and shallower coastal areas. Killer whales are known to make seasonal movements and are most likely to follow the migratory routes of their prey, however, little is known about these movements (DoEE, 2019).

7.1.10. Indo-Pacific Humpback Dolphin

The Indo-pacific humpback dolphin is typically found in water less than 20 m deep but has been recorded in waters up to 40 m deep. This species is generally found in association with river mouths, mangroves, tidal channels and inshore reefs (DoEE 2016a). This species of dolphin is known to have resident groups that forage, feed, breed and calve in the state waters of Roebuck Bay, Dampier Peninsula, King Sound north, Talbot Bay, Anjo Peninsula, Vansittart Bay, Napier Broome Bay and Deception Bay (DoEE 2016a).

No BIAs for the Indo-Pacific humpback dolphin are recorded in the EMBA.

7.1.11. Spotted Bottlenose Dolphin (Indo-Pacific bottlenose dolphin)

The spotted bottlenose dolphin (*Tursiops aduncus*) (Arafura/ Timor Sea populations) is generally considered to be a warm water subspecies of the spotted bottlenose dolphin, occurring in shallow (often <10 m deep) inshore waters (Bannister et al., 1996; Hale et al., 2000). The known distribution of the spotted bottlenose dolphin extends from Shark Bay north to the western edge of the Gulf of Carpentaria in Australia (DoEE 2016b). No BIAs for the spotted bottlenose dolphin are recorded in the EMBA.

7.1.12. Irrawaddy Dolphin (Australian Snubfin Dolphin)

The Irrawaddy dolphin, also known as the snubfin dolphin (*Orcaella heinsohni*) is known to occur within the waters off northern Australia, extending north from Broome in Western Australia to the Brisbane River in Queensland (DoEE 2016c). Surveys have indicated that the species is typically found in protected shallow nearshore waters, generally less than 20 m deep, adjacent to river and creek mouths close to seagrass beds (DoEE 2016c). The snubfin dolphin was not recorded during any of the aerial surveys undertaken along the Dampier Peninsula coastline

in the vicinity of James Price Point but were observed in Roebuck Bay from vessels on several occasions (RPS, 2010b). Based on the extensive survey effort and amenable conditions within the James Price Point coastal area during the survey, it is concluded that this species is seldom found outside of shallow and sheltered bays and inlets (DSD 2010). The population in Australian waters is thought to be continuous with the Papua New Guinea species but separate from populations in Asia. Breeding is thought to occur throughout the year for this species.

No BIAs for the Irrawaddy dolphin are recorded in the EMBA.

7.1.13. Dugong

The dugong (*Dugong dugon*) is a large herbivorous marine mammal (up to 3 m) that feeds off seagrass and generally inhabits coastal areas. Key populations along the WA coast are principally located at: Shark Bay (the largest resident population in Australia), Ningaloo Marine Park and Exmouth Gulf, the Pilbara coast and offshore areas including Montebello/ Barrow/ Lowendal Islands, and further north at Eighty Mile Beach and off the Kimberley Coast, particularly Roebuck Bay and Dampier Peninsula (Marsh et al. 2002; DSEWPaC 2012).

Dugong distribution and movement is based on the abundance, size and species of seagrass meadow. Dugongs can migrate hundreds of kilometres between seagrass habitats. Dugongs have been tracked moving long distances of up to 300 km between the Australia mainland and the Tiwi Islands (Whiting et al., 2009).

The dugong BIAs in the EMBA are detailed in Table 9 and shown in Figure 10.

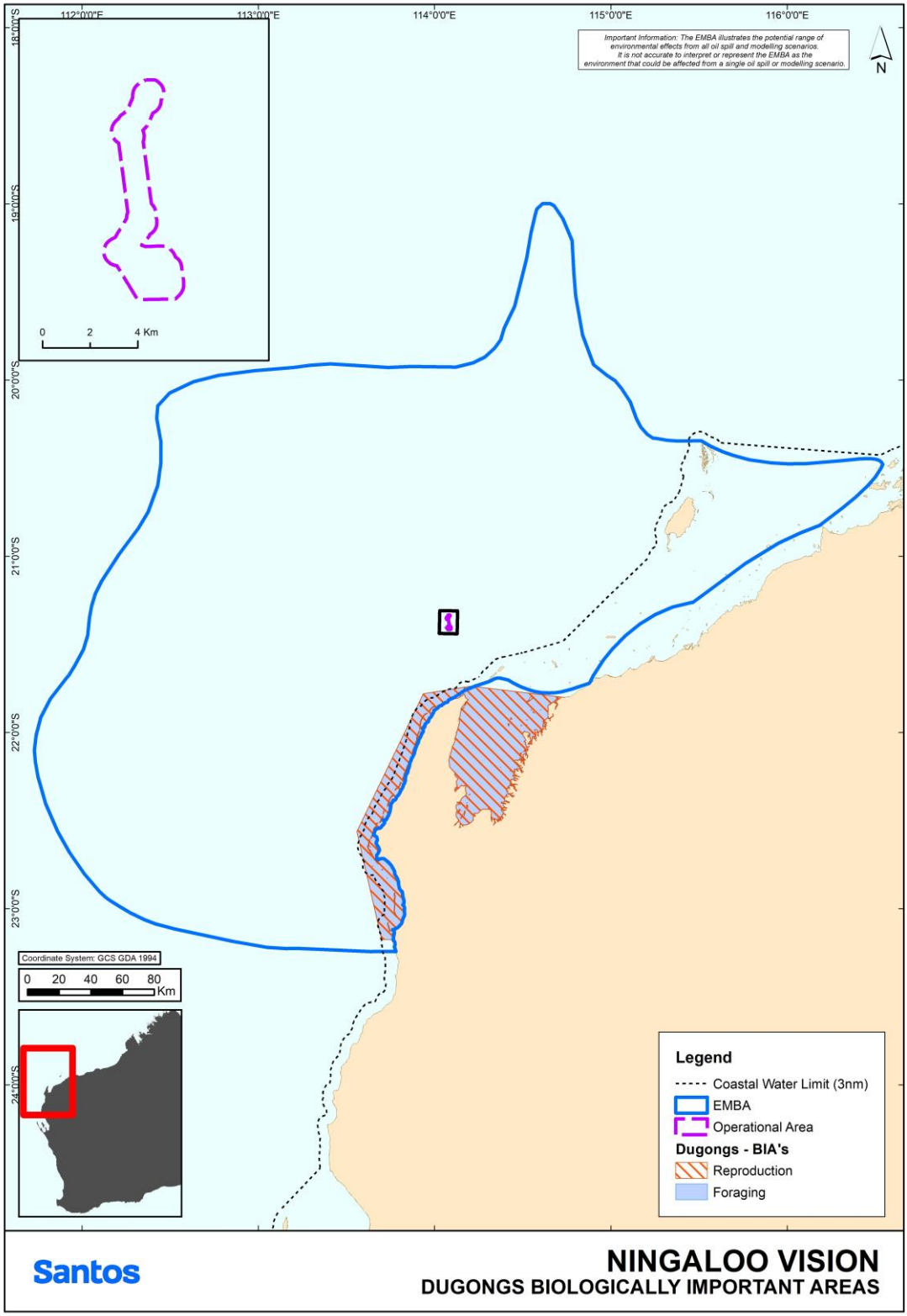


Figure 10: Biologically important areas for dugong within the vicinity of the environment that may be affected and operational area

Table 8: Summary of information for marine mammals listed as threatened under the EPBC Act

Aspect	Sei whale	Blue and pygmy blue whales	Fin whale	Southern right whale
Species expected in area	Unknown	Yes	Unknown	No, southern distribution
Migration depth (m)	Unknown, prefers offshore waters	500-1,000	Unknown	n/a
Migration seasonality	Unknown	Apr to Aug (north), Oct to Jan (south)	Unknown	Apr to Oct

7.2. Biologically Important Areas / Critical Habitat – Marine Mammals

Table 9 below provides an overview of BIAs in the EMBA for marine mammals.

The DCCEEW may also make recovery plans for threated fauna listed under the EPBC Act. The EPBC Act requires that 'habitat critical to the survival of the listed threatened species' is identified in recovery plans, relevant recovery plans are listed in Section 13.2.

In addition, both the EPBC Act and WA BC Act and associated regulations (2018) provide for the listing of critical habitat - habitat 'critical to the survival of the threatened species. To date no critical habitat in WA has been listed under either Act. No provision is made under the TPWC Act for listing critical habitat.

Table 9: Biologically Important Areas – marine mammals

Species	Scientific name	Aggregation area and use	BIAs within EMBA
Blue and pygmy blue whales	Balaenoptera musculus	Migration – along the continental shelf edge off the WA coastline, extending offshore near Scott Reef and into Indonesian waters Foraging – along Ningaloo reef, around Scott Reef, around the Perth canyon	Pygmy blue whale – Migration Augusta to Derby. Tend to pass along the shelf edge at depths of 500 m to 1000 m; appear close to coast in the Exmouth-Montebello Islands area on southern migration. Ningaloo.
Humpback whale	Megaptera novaeangliae	Reproduction/resting – Kimberley/Coastal North Lacepede Island, Campden Sound, Exmouth Gulf, Shark Bay Migration - northern migration deeper waters of the continental shelf, southward migration – along the WA mainland	Exmouth Gulf The migration corridor extends from the coast to out to approximately 100 km offshore in the Kimberley region extending south to North West Cape. From North West Cape to south of Shark Bay the migration corridor is reduced to approximately 50 km.
Dugong	Dugong dugon	Foraging - Exmouth and Ningaloo coastline Reproduction – Exmouth and the Ningaloo coastline	Exmouth gulf

8. Birds

Marine waters and coastal habitats in the EMBA contain key habitats that are important to birds, including offshore islands, sandy beaches, tidal flats, mangroves, and coastal and pelagic waters. These habitats support a variety of birds which utilise the area in different ways and at different times of the year (DSEWPaC 2012a). Birds can be broadly grouped according to their preferred foraging habitat as coastal/ terrestrial birds, seabirds, and shorebirds.

Coastal or terrestrial species inhabit the offshore islands and coastal areas of the mainland throughout the year. These species are either primarily terrestrial, or they may forage in coastal waters. Resident coastal and terrestrial species include osprey (*Pandion cristatus*), white-bellied sea eagle (*Haliaeetus leucogaster*), silver gull (*Larus novaehollandiae*) and eastern reef egret (*Egreta sacra*) (DEWHA 2008a).

Seabirds include those species whose primary habitat and food source is derived from pelagic waters. These species spend the majority of their lives at sea, ranging over large distances to forage over the open ocean. Seabirds present in the area include terns, noddies, petrels, shearwaters, tropicbirds, frigatebirds boobies and albatrosses (DEWHA 2008a).

Shorebirds, including waders, inhabit the intertidal zone and adjacent areas. Some shorebird species, including oystercatchers are resident (Surman & Nicholson 2013). Other shorebirds are migratory and include species that utilise the East Asian–Australasian Flyway, a migratory pathway for millions of migratory shorebirds that travel from Northern Hemisphere breeding grounds to Southern Hemisphere resting and foraging areas. Shorebirds that regularly migrate through the area include the Scolopacidae (curlews, sandpipers etc.) and Charadriidae (plovers and lapwings) families.

Surveys in the area by Santos and other agencies have built a picture of diverse avifauna. A summary of research is discussed below, followed by information on threatened and migratory birds. Wetlands of international importance are discussed in Section 9.2.

8.1. Regional Surveys

8.1.1. North West Cape

Avifauna surveys of the North West Cape have recorded 144 bird species, one third of which are seabirds and shorebirds (resident and migratory) (May et al. 1983). Approximately 33 species of seabirds and shorebirds are found in the Ningaloo Marine Park with the main breeding areas at Mangrove Bay, Mangrove Point, Point Maud, the Mildura wreck site and Fraser Island (CALM & MPRA 2005a).

8.1.2. Muiron Islands and Exmouth Gulf Islands

Muiron Islands and Exmouth Gulf Islands are generally lacking in published bird observations data. Early indications from surveys commissioned by Santos in 2013/14 indicate that South and North Muiron Islands are regionally significant in terms of wedge-tailed shearwater (*Ardenna pacifica*) nesting, whilst Bessiers and Fly islands are also significant (Surman pers comm. 2013). Nine coastal/terrestrial species and 21 shorebirds were identified on the Muiron and Exmouth Gulf Islands during the first of these surveys and seven bird species were recorded nesting (Surman 2013).

8.1.3. Barrow Island Group

Barrow Island and surrounding islands have a diverse avifauna comprising at least 119 species (Chevron 2010), including 11 resident land birds, eight resident seabirds, 17 seabirds, 22 species of migratory waders, six resident shorebirds and 43 irregular visitors (Surman 2003). The avifauna of Barrow Island is thus poor in terms of land birds and waterfowl compared to mainland areas of the Pilbara, but rich in migratory waders and seabirds. Compared to other nearby offshore islands, Barrow Island has substantially more migratory waders but fewer breeding seabirds (Surman 2003).

8.1.4. Lowendal Island Group and Airlie and Serrurier Islands

The Lowendal Island Group has a diverse avifauna comprising 89 recorded species (Dinara Pty Ltd. 1991, Burbidge et al. 2000). Six species of resident land birds and six species of raptors have been recorded at the Lowendal Islands (Surman & Nicholson 2012). Up to fourteen seabird species have been observed at any one time during annual surveys of the Lowendal Islands between 2004 and 2012. Surveys at the Montebello Islands have recorded

70 bird species. This includes 12 species of seabirds and 14 species of migratory shorebirds (Burbidge et al. 2000). Wedge-tailed shearwaters have been identified to nest on Varanus, Airlie, Serrurier and Bridled Islands (Astron 2017a). Breeding participation on the islands appears to be largely influenced by pre-breeding oceanographic conditions (Astron 2017a). Monitoring in 2016/17 was undertaken by Santos and demonstrated the colony sizes for wedge-tailed shearwaters to be within or above previously reported ranges (Astron 2017a). This is informed though monitoring that has been undertaken under the Integrated Shearwater Monitoring Program (ISMP), established in 1994.

In 2016/17, areas of potential wedge-tailed shearwater nesting habitat were recorded on Varanus Island (5.53 ha) and Airlie Island (12.47 ha) and surrounding islands of Bridled (2.94 ha), Serrurier (130.89 ha), Abutilon (2.02 ha) and Parakeelya (1.66 ha) (Astron 2017a). The number of wedge-tailed shearwater breeding pairs was also estimated for each of Varanus (1,492 +/- 702), Airlie (600 +/- 124), Bridled (1,039 +/- 342), Serrurier (23,240 +/- 4,341), Abutilon (317 +/- 210) and Parakeelya (172 +/- 138) islands (Astron 2017a).

Other seabird species utilising Abutilon, Beacon, Bridled and Parakeelya islands for nesting include bridled terns, silver gulls, crested terns and lesser crested terns. Monitoring for these seabirds in 2016/17 was also completed by Santos, with monitoring results concluded to support previous trends for all species. Bridled terns mainly utilise Abutilon, Bridled and Parakeelya islands for breeding, with smaller numbers noted on Beacon and Varanus Islands. The bridled terns have not been recorded on Airlie Island and only in very small numbers on Varanus Island (Astron 2017b).

Silver gull numbers appear to be growing across the region (2010/2011). However, reasons for this are unknown but considered possibly to be due to greater prey availability or immigration from the mainland (Astron 2017b). Silver gulls have been found to utilise Bridled, Parakeelya, Abutilon and Beacon islands longer term for breeding. Silver gulls have not been identified to nest on Varanus island and were only recorded nesting on Airlie island for the first time in 2016/17 since monitoring commencement in 2004/05 (Astron 2017b).

The crested tern and lesser crested tern are noted as nomadic breeders that appear to use a consistent subset of islands for breeding. In 2016/17, Beacon Island was the favourable nesting site for the crested tern and lesser crested tern (Astron 2017b). Surveys in the vicinity of Port Hedland (Bennelongia 2011) recorded 23 species of migratory shorebird between 2002 and 2011. Terrestrial/coastal and seabird species were not targeted. A total of 4,248 migratory shorebirds of 18 species were observed during the field survey in April 2011.

8.2. Threatened Species

A Protected Matters search of the EMBA identified 21 bird species (Appendix D of the Ningaloo Vision CoPFAR EP) listed as threatened under the EPBC Act.

An examination of the Species Profile and Threats database (DAWE 2020a) and The Action Plan for Australian Birds (Garnet 2011) showed that some listed bird species are not expected to occur in significant numbers in the marine and coastal environments in the EMBA due to their terrestrial or southern distributions. Hence, these species are not discussed further.

EPBC Act threatened species expected to occur in the area are listed in Table 10 along with their WA conservation status (as applicable) and discussed below. There are an additional 22 migratory species listed under the EPBC Act, with these detailed in Section 8.2 (Table 12). BIAs for birds are detailed in Table 16 and depicted in Figure 11.

Table 10: Birds listed as threatened under the EPBC Act

Species	Conservation Status			Likelihood of occurrence in EMBA	BIAs in EMBA
	EPBC Act 1999	BC Act 2016	Other WA Conservation Code		
Shorebirds					
Red knot[8] (*Calidris canutus*)	Endangered, Migratory	Endangered	-	Species or species habitat known to occur within area	None - No BIA defined
Christmas Island Goshawk (*Accipiter fasciatus natalis*)	Endangered		-	Species or species habitat known to occur within area	None - No BIA defined
Curlew sandpiper[8] (*Calidris ferruginea*)	Critically endangered, Migratory	Critically endangered	-	Species or species habitat known to occur within area	None - No BIA defined
Greater sand plover (*Charadrius leschenaultii*)	Vulnerable, Migratory	Vulnerable	-	Species or species habitat known to occur within area	None - No BIA defined
Northern Siberian bar-tailed godwit (*Limosa lapponica menzbieri*)	Critically endangered, Migratory[6]	Critically endangered, Specially protected (migratory)[6]	-	Species or species habitat known to occur within area	None - No BIA defined
Eastern curlew[8] (*Numenius madagascariensis*)	Critically endangered, Migratory	Critically endangered	-	Species or species habitat known to occur within area	None - No BIA defined
Australasian bittern (*Botaurus poiciloptilus*)	Endangered	Endangered	-	Species or species habitat known to occur within area	None - No BIA defined
Australian painted snipe (*Rostratula australis*)	Endangered	Endangered	-	Species or species habitat known to occur within area	None - No BIA defined
Seabirds					
Australian lesser noddy (*Anous tenuirostris melanops*)	Vulnerable	Endangered	-	Species or species habitat may occur within area	None - BIA not found in EMBA
Southern giant petrel (*Macronectes giganteus*)	Endangered, Migratory	Specially protected (migratory)	-	Species or species habitat may occur within area	None - BIA not found in EMBA
Abbott's booby (*Papasula abbotti*)	Endangered	-	-	Species or species habitat may occur within area	None - No BIA defined
Soft-plumaged petrel (*Pterodroma mollis*)	Vulnerable	-	-	Foraging, feeding or related behaviour likely to occur within area	Yes – refer to Table 16
Australian fairy tern (*Sternula nereis nereis*)	Vulnerable	Vulnerable	-	Breeding known to occur within area. Overlaps with BIA for reproduction	Yes – refer to Table 16
Indian yellow-nosed albatross (*Thalassarche carteri*)	Vulnerable, Migratory	Endangered	-	Species or species habitat may occur within area	Yes – refer to Table 16
Black-browed albatross (*Thalassarche melanophris*)	Vulnerable, Migratory	Endangered	-	Species or species habitat may occur within area	None - BIA not found in EMBA
Campbell albatross (*Thalassarche impavida*)	Vulnerable, Migratory	Vulnerable	-	Species or species habitat may occur within area	None - BIA not found in EMBA
Christmas Island white-tailed tropicbird (*Phaethon lepturus fulvus*)	Endangered	-	-	Species or species habitat may occur within area	None - No BIA defined

8.2.1. Shorebirds

1.1.1.1 Red Knot (New Siberian Islands and north-eastern Siberia)

The red knot is a migratory shorebird, and the species includes five subspecies, including two found in Australia, *Calidris canutus piersmai* and *Calidris canutus rogersi*. The red knot breeds in Siberia and spends the non-breeding season in Australia and New Zealand. During the non-breeding season, the species spends the majority of its time on tidal mudflats or sandflats where they feed on intertidal invertebrates, especially shellfish (Garnet et al. 2011).

1.1.1.2 Curlew Sandpiper

This species is a migratory shorebird that breeds in north Siberia and spends the non-breeding season from western Africa to Australia (Bamford et al. 2008). The curlew sandpiper occurs around coastal Australia and preferred habitats include coastal brackish lagoons, tidal mud and sand flats, estuaries, saltmarshes and less often inland. Their diet is mainly comprised of polychaete worms, molluscs and crustaceans (Higgins & Davies 1996 in Garnet et al. 2011).

1.1.1.3 Great Knot

The great knot is a migratory shorebird with a global distribution, breeding in north-east Siberia and spending the non-breeding season along coasts from Arabia to Australia. Non-breeding birds migrate to inlets, bays, harbours, estuaries and lagoons with large intertidal mud and sand flats where they feed on bivalves, gastropods, crustaceans and other invertebrates (Higgins & Davies 1996 in Garnet et al. 2011).

1.1.1.4 Greater Sand Plover

The greater sand plover are congeners that breed in China, Mongolia and Russia. The greater sand plover spends the non-breeding season along coasts from Japan through southeast Asia to Australasia (Banford et al. 2008). Non-breeding birds occur along all Australian coasts, especially in the north for the greater sand plover and in the east for the lesser sand plover (DAWE 2020a).

Non-breeding birds forage on beaches, saltmarshes, coastal bays and estuaries, and feed on marine invertebrates including molluscs, worms, crustaceans and insects (Marchant & Higgins 1993 in Garnet et al. 2011).

1.1.1.5 Bar-tailed Godwit (Western Alaskan and Northern Siberian Subspecies)

Two subspecies of the bar-tailed godwit exist, as determined by their breeding locations in Siberia and Alaska (Bamford et al. 2008). Non-breeding birds migrate to the coasts of Australia. The western Alaskan subspecies occurs especially on the north and east coasts of Australia whilst the northern Siberian subspecies occurs especially along the coasts of north Western Australia (DAWE 2020a).

Non-breeding birds are found on muddy coastlines, estuaries, inlets, mangrove-fringed lagoons and sheltered bays, feeding on annelids, bivalves and crustaceans (Higgins and Davies 1996 in Garnet et al. 2011).

1.1.1.6 Eastern Curlew

The eastern curlew is a migratory shorebird that breeds in Siberia, Kamchatka and Mongolia and migrates to coastal East Asia and Australia. The South Korean Yellow Sea is an important staging post for this species. Non-breeding birds occur around coastal Australia, are more common in the north and have disappeared or become much rarer at many sites along the south coast (Garnet 2011).

Non-breeding birds are present at estuaries, mangroves, saltmarshes and intertidal flats, particularly those with extensive seagrass (Zosteraceae), where they feed on marine invertebrates, especially crabs and small molluscs (Higgins & Davies 1996 in Garnet 2011).

1.1.1.7 Australian Painted Snipe

The Australian painted snipe has been recorded at wetlands in all states of Australia (DoE 2014g). The Australian painted snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum Muehlenbeckia or canegrass or sometimes tea-tree (*Melaleuca*). The Australian painted snipe sometimes utilises areas that are lined with trees, or that have some scattered fallen or washed-up timber (DoE 2014g).

8.2.2. Seabirds

1.1.1.8 Australian Lesser Noddy

This species is usually found only around its breeding islands in the Houtman Abrolhos Islands in Western Australia (Storr et al. 1986). The Australian lesser noddy occupies coral-limestone islands that are densely fringed with white mangrove *Avicennia marina*, and it occasionally occurs on shingle or sandy beaches (Higgins & Davies 1996 in DAWE 2020a). This species is thought to be sedentary or resident, staying near to its breeding islands in the non-breeding season. It may leave nesting islands for short periods during the non-breeding season, and probably forages widely (Higgins & Davies 1996 in DAWE 2020a).

Breeding apparently occurs only on Morley, Wooded and Pelsaert Islands at the Houtman Abrolhos Islands (Higgins and Davies 1996 in DoE 2014b). Mangrove stands support approximately 68,000 breeding pairs spread over the three islands (Surman & Nicholson 2006). Breeding may also occur on Ashmore Reef (Stokes & Hinchey 1990). The breeding season extends from mid-August to early April (Higgins & Davies 1996 in DoE 2014b).

The National Conservation Values Atlas identifies BIAs for this species in the area of the Houtman Abrolhos islands (Table 16). The Species Group Report Card – Seabirds (DSEWPaC 2012b) states that the entire Australian population of this species breeds in the South-west Marine Region, south of Busselton.

1.1.1.9 Albatrosses

A Protected Matters search of the waters in the EMBA (Appendix D of the Ningaloo Vision CoPFAR EP) identified several albatross species that may occur in the area, comprising of the southern royal albatross, northern royal albatross, Amsterdam albatross, Antipodean albatross, Tristan albatross, sooty albatross, wandering albatross, Indian yellow-nosed albatross, shy albatross, white-capped albatross, black-browed albatross and Campbell albatross. All these species predominantly occur in subantarctic to subtropical waters and breed on islands in the southern oceans (DAWE 2020a).

The National Conservation Values Atlas (DAWE 2020b) and the National Recovery Plan for Threatened Albatrosses and Giant Petrels 2011-2016 (DSEWPaC 2011) do not identify any BIAs for these species in the area from Busselton to the NT border. However, a BIA for the Indian yellow-nosed albatross is identified for foraging north to Shark bay and extending east into Bass Strait.

1.1.1.10 Southern Giant Petrel

The southern giant petrel is a highly migratory bird with a large natural range. This species occurs from Antarctic to subtropical waters and breeds on the Antarctic continent, peninsular and islands and on subantarctic islands and South America. Breeding occurs annually between August and March (DAWE 2020a).

The National Conservation Values Atlas (DAWE 2020b) and the National Recovery Plan for Threatened Albatrosses and Giant Petrels 2011-2016 (DSEWPaC 2011) do not identify any BIAs for this species in the EMBA.

1.1.1.11 Soft-Plumaged Petrel

The soft-plumaged petrel is generally found over temperate and subantarctic waters in the South Atlantic, Southern Indian and western South Pacific Oceans. The species breeds colonially on islands in the southern oceans. Breeding occurs from August to May (Marchant & Higgins 1990 in DAWE 2020a).

No BIAs for this species have been identified in the EMBA.

1.1.1.12 Abbott's Booby

Currently, Abbott's booby is only known to breed on Christmas Island and to forage in the waters surrounding the island and south-east Asia (TSSC 2020b). Within Christmas Island, most nests are found in the tall plateau forest on the central and western areas of the island, and in the upper terrace forest of the northern coast.

The National Conservation Values Atlas (DoEE 2019b) does not identify any BIAs for this species in the area spanning SW WA to the NT border. Critical habitat is considered all known nesting trees and all forest vegetation within a 200m radius of known nesting trees on Christmas Island (TSSC 2020).

1.1.1.13 Australian Fairy Tern

The Australian fairy tern is distributed in a large geographic range between Australia, New Zealand and New Caledonia. Three subspecies have been identified, one of which is found in Australia. The Australian fairy tern occurs along the coasts of Victoria, Tasmania, South Australia and WA; occurring as far north as the Dampier Archipelago (DAWE 2020a). The subspecies has been found in embayments of a variety of habitats including offshore, estuarine or lacustrine islands, wetlands and mainland coastline (Higgins & Davies 1996 in DoE 2014b, Lindsey 1986).

Australian fairy terns nest on sheltered sandy beaches, spits and banks above the high tide line and below vegetation. The Australian fairy tern breeds from August to February depending on the location of the breeding colony (Higgins & Davies 1996 in DAWE 2020a). They generally nest in small colonies of up to 100 birds, although larger colonies of more than 1400 pairs have been reported in Western Australia (Hill et al. 1988).

A BIA for this species occurs within the EMBA (Figure 11).

1.1.1.14 Christmas Island White-tailed Tropicbird

The Christmas Island white-tailed tropicbird is endemic to Christmas Island and leaves the island to forage in the warm waters of the Indian Ocean (Garnett 2011). The white-tailed tropicbird roots at sea; only incubating or brooding adults remain on nests on the island at night (Stokes 1988).

The National Conservation Values Atlas (DAWE 2020b) does not identify any BIAs for this species within the EMBA.

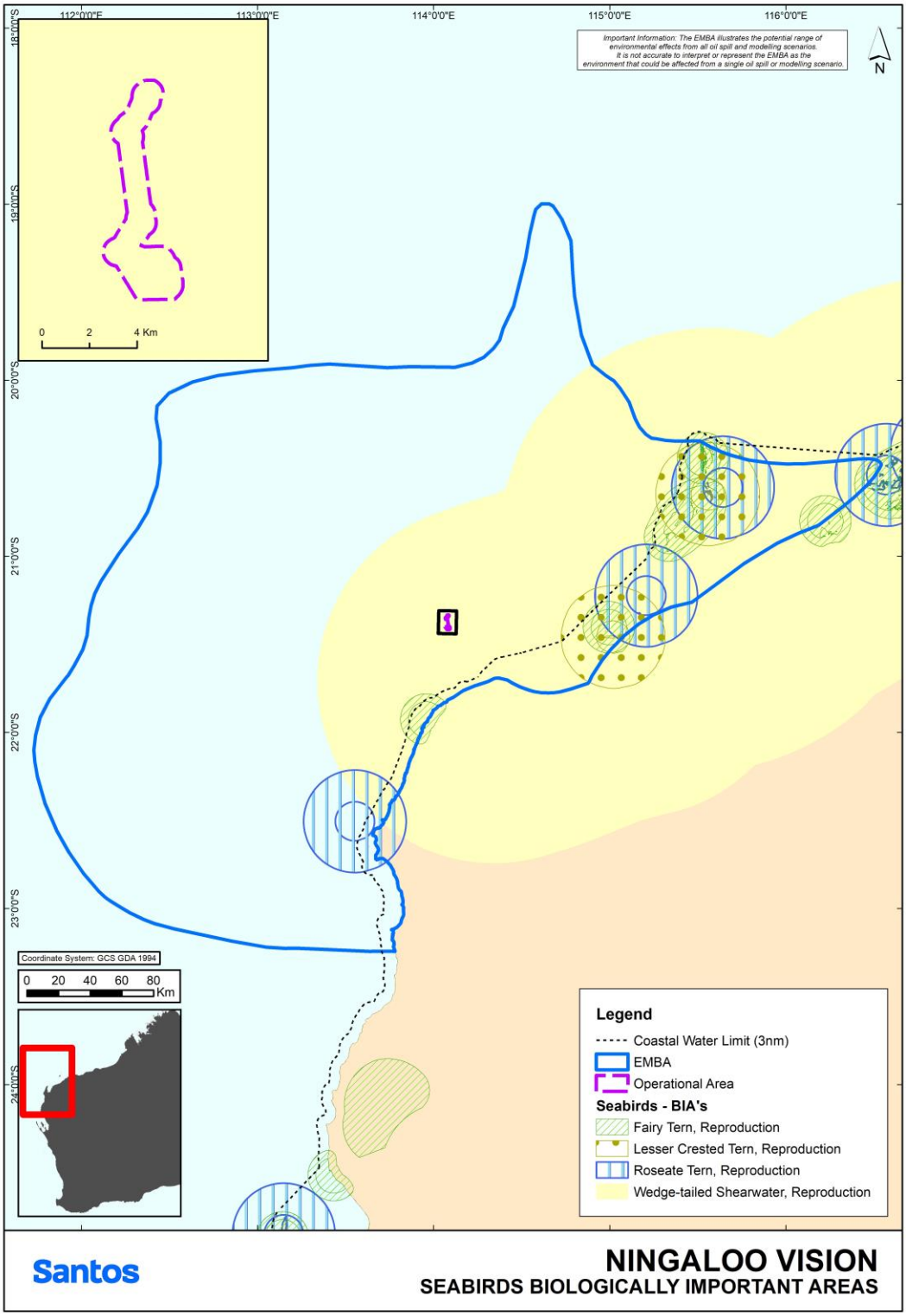


Figure 11: Biologically important areas for seabirds within the vicinity of the environment that may be affected and operational area

Table 11: Summary of information for birds listed as threatened under the EPBC Act that may be in the EMBA

Species	Species Expected in EMBA	Breeding in the Area/ Seasonality	Foraging
Shorebirds			
Red knot[8]	Yes	No	Intertidal invertebrates
Curlew sandpiper[8]	Yes	No	Polychaete worms, molluscs and crustaceans taken from shorelines
Greater sand plover/lesser sand plover	Yes	No	Marine invertebrates taken from shorelines
Bar-tailed godwit	Yes	No	Annelids, bivalves and crustaceans taken from shorelines
Eastern curlew[8]	Yes	No	Marine invertebrates associated with seagrass
Australian painted snipe	Yes	No	Seeds and small invertebrates
Seabirds			
Australian lesser noddy	May forage from Kalbarri to Shark Bay	No	Small fish taken from marine and coastal waters (DoE 2014b)
Black-browed albatross	Low densities	No	Cephalopods, fish and crustaceans taken from marine and coastal waters.
Campbell albatross	Low densities	No	Cephalopods, fish, salps, jellyfish and crustaceans taken from marine and coastal waters.
Indian yellow-nosed albatross	Low densities	No	Cephalopods, and fish taken from marine and coastal waters.
Southern giant petrel	Low densities	No	Scavenges penguin, seal and whale carcasses. Hunts live birds, penguin chicks' cephalopods and krill. Marine and coastal waters (DoE 2014b)
Soft-plumaged petrel	Low densities	No	Cephalopods, fish and crustaceans taken from marine and coastal waters (DoE 2014b)
Australian fairy tern	Yes	Yes Aug to Feb	Bait fish taken from coastal waters
Christmas Island frigatebird	Low densities	No	Planktonic crustaceans, fish and squid
Abbott's booby	Low densities	No	Fish and squid
Christmas Island white-tailed tropicbird	Very low densities	No	Squid and flying fish

[8] Species listed under the East Asian-Australasian Flyway Partnership

8.3. Migratory Species

The EPBC PMST search identified an additional 22 species listed as migratory under the EPBC Act that may occur within the EMBA. These species are listed in Table 12. All of these species are also listed as migratory under the BC Act, with the exceptions of:

- the flesh-footed shearwater, which is listed as vulnerable under the BC Act.

- the red-tailed tropicbird which are listed as migratory under the EPBC Act and migratory and a Priority 4 under the BC Act.

Those species that are listed as both migratory and threatened under either the EPBC Act and/or BC Act are outlined in Table 10 and are not repeated within Table 12.

Table 12: Summary of migratory birds that may occur within the EMBA

Species	Common Name	Likelihood of occurrence in EMBA
Limnodromus semipalmatus	Asian dowitcher[8]	Species or species habitat may occur within area
Limosa lapponica	Bar-tailed godwit	Species or species habitat known to occur within area
Onychoprion anaethetus	Bridled tern	Breeding known to occur within area
Hydroprogne caspia	Caspian tern	Breeding known to occur within area
Tringa nebularia	Common greenshank	Species or species habitat likely to occur within area
Anous stolidus	Common noddy	Species or species habitat likely to occur within area
Actitis hypoleucos	Common sandpiper	Species or species habitat known to occur within area
Ardenna carneipes	Flesh-footed shearwater	Species or species habitat likely to occur within area
Apus pacificus	Fork-tailed swift	Species or species habitat likely to occur within area
Thalasseus bergii	Greater crested tern	Breeding known to occur within area
Fregata minor	Greater frigatebird	Species or species habitat may occur within area
Sternula albifrons	Little tern	Breeding known to occur within area
Charadrius veredus	Oriental plover	Species or species habitat may occur within area
Glareola maldivarum	Oriental pratincole	Species or species habitat may occur within area
Pandion haliaetus	Osprey	Breeding known to occur within area
Calidris melanotos	Pectoral sandpiper	Species or species habitat likely to occur within area
Sula sula	Red-footed booby	Breeding known to occur within area
Sterna dougallii	Roseate tern	Breeding known to occur within area. Overlaps with BIA for reproduction
Calidris acuminata	Sharp-tailed sandpiper	Species or species habitat known to occur within area
Calonectris leucomelas	Streaked shearwater	Species or species habitat likely to occur within area
Ardenna pacifica	Wedge-tailed shearwater	Breeding known to occur within area. Overlaps with BIA for reproduction
Phaethon lepturus	White-tailed tropicbird	Species or species habitat known to occur within area

[8] Listed under the East Asian- Australasian Flyway Partnership

Australia is signatory to three international treaties with China, Japan and the Republic of Korea to safeguard migratory bird species, predominantly shorebirds. To facilitate observance of the three agreements, 36 species of migratory shorebirds have been listed as specially protected under both the Commonwealth EPBC Act and the WA BC Act.

Eleven internationally recognised areas that can support shorebird migrations are protected as wetlands of international importance. These wetlands are discussed further in Section 9.2.

The EPBC Act Policy Statement 3.21 sets out criteria for determining the significance of sites to migratory shorebirds based on the number of migratory species and the proportion of a species population that is supported by the site

(Commonwealth of Australia 2017b). Site significance can be difficult to assess, particularly for ephemeral inland wetlands. These areas may be used rarely, depending on weather conditions, but still provide important habitat for migratory shorebird species.

Migratory shorebirds require a particular conservation approach due to their migration patterns that take them across international boundaries (Bamford et al. 2008). These species and their habitats are sensitive to threats due to their high site fidelity, tendency to aggregate, high energy demands and the need for habitat networks containing both roosting and foraging sites (Commonwealth of Australia 2017b). Migratory shorebirds are known to use networks of connected sites (also known as site complexes). They move within these networks depending on the time of day, availability of resources and environmental conditions at the site (Commonwealth of Australia 2017b).

The types of habitat used by migratory shorebirds in Australia vary across the species identified in the PMST search. Migratory shorebirds use both coastal and inland habitats that most commonly include:

- Coastal habitats: coastal wetlands, estuaries, mudflats, rocky inlets, reefs and sandy beaches, sometimes supporting mangroves.
- Inland habitats: inland wetlands, floodplains and grassland areas, often with ephemeral water sources (Commonwealth of Australia 2017b).

Feeding guilds provide an explanation for much of the shorebird distribution pattern in the north Western Australia. For example, Rogers (1999) classified shorebirds (and others) in Roebuck Bay as belonging to seven guilds on the basis of prey choice and foraging method. In order of abundance, these are summarised in Table 13.

Table 13: Feeding guilds based on prey choice and foraging method (Rogers 1999) adapted from DEC (2003) and Bennelongia (2008)

Feeding habitat	Feeding guild	Species
Sea edge	Tactile hunters of macrobenthos	Great knot, red knot, bar-tailed godwit, black-tailed godwit, Asian dowitcher
Along sandy sea edges or near tidal creeks	Tactile hunters of microbenthos	Curlew sandpiper, red-necked stint, broad-billed sandpiper, marsh sandpiper, sharp-tailed sandpiper
Reefs or mangrove fringes	Visual hunters of slow surface-dwelling prey	Common sandpiper, sooty oystercatcher, pied oystercatcher, silver gull, ruddy turnstone
Sandier western parts of Roebuck Bay, often near-shore	Visual hunters of small fast prey	Grey plover, red-capped plover, greater sand plover, lesser sand plover, grey-tailed tattler, terek sandpiper
Soft mudflats in north-east Roebuck Bay	Visual hunters of fast large prey	Eastern curlew, whimbrel, greenshank, striated heron and black-necked stork
Soft mudflats in north-east Roebuck Bay	Kleptoparasites	Gull-billed tern (robs large crabs from whimbrels)
Creek-lines in eastern Roebuck Bay	Pelagic hunters of nekton (animals of the pelagic zone) and neuston (animals that live on the surface film)	Black-winged stilt, red-necked avocet, reef egret, little egret, great white egret, white-faced heron, royal spoonbill

The Wildlife Conservation Plan for Migratory Shorebirds (DoE 2015) provides a framework to guide the conservation of migratory shorebirds and their habitat in Australia and, in recognition of their migratory habits, outlines national activities to support their appreciation and conservation throughout the East Asian-Australasian Flyway.

The following migratory shorebird species are subject to the Wildlife Conservation Plan for Migratory Shorebirds 2015 (DoE 2015).

Table 14: Birds subject to the Wildlife Conservation Plan for Migratory Shorebirds 2015

Migratory species	DCCEEW SPRAT information on distribution
Asian dowitcher[8]	The Asian dowitcher is a regular visitor to the north-west between Port Hedland and Broome. Elsewhere they are sporadic and rare. Within WA, the species has been recorded at Albany, Lake McLarty, Lake McLeod, north-east Pilbara and the south-west Kimberley division. It has also been recorded at the Port Hedland Saltworks, Roebuck Bay, Ashmore Reed and Eighty Mile Beach. The Australian population is approximately 500 (Bamford et al. 2008).
Bar-tailed godwit	The bar-tailed godwit has been recorded in the coastal areas of all Australian states. In WA, it is widespread around the coast, from Eyre to Derby, with a few scattered records elsewhere in the Kimberley. Sites of international importance from WA include (all located outside of the EMBA): • Eighty Mile Beach, WA (110,290 individuals) • Roebuck Bay, WA (65,000 individuals) • Milingimbi coast, NT (7,000 individuals) • Elcho Island, NT (5,000 individuals).
Common greenshank	The common greenshank occurs around most of the coast from Cape Arid in the south to Carnarvon in the north-west. WA has three sites of international importance for the common greenshank which include (all outside of the EMBA): • Eighty Mile Beach (2,240 individuals) • Wilson Inlet (568 individuals) • Roebuck Bay (560 individuals).
Common sandpiper	WA distribution includes (outside of the EMBA): • Roebuck Bay • Nuytsland Nature Reserve
Greater sand plover	In Australia, the greater sand plover occurs in coastal areas in all states, though the greatest numbers occur in northern Australia, especially the north-west. In northern Australia, the species is especially widespread between North West Cape and Roebuck Bay in Western Australia and are sparsely scattered records from the largely inaccessible area between Roebuck Bay and Darwin. Internationally important sites within Western Australia include (all outside of the EMBA): • Eighty Mile Beach (64,548 individuals) • Roebuck Bay (26,900 individuals) • Ashmore Reef (1,196 individuals).
Oriental plover	Internationally important marine sites (all outside of the EMBA): • Eighty Mile Beach, WA (approximately 57 619 individuals) • Roebuck Bay, WA (Approximately 8 750 individuals).
Oriental pratincole	Internationally important site (located outside of the EMBA): • Eighty Mile Beach, WA (2.88 million birds). The species occurs at numerous and widespread sites in northern Australia, especially near the Pilbara and Kimberley coasts of northern WA, and throughout the entire coastline of the NT.
Pectoral sandpiper	In Australasia, the pectoral sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire.
Red knot[8]	The red knot large numbers are regularly recorded in north-west Australia, with 80 Mile Beach and Roebuck Bay being particular strongholds (both located outside of the EMBA). The Australian population during the non-breeding period is estimated to be 135 000 (Hansen et al. 2016).
Sharp-tailed sandpiper	They are widespread from Cape Arid to Carnarvon, around coastal and subcoastal plains of Pilbara Region to south-west and east Kimberley Division (Higgins & Davies 1996). Internationally important sites include (all outside of the EMBA): • Eighty Mile Beach (25 000 individuals) • Port Hedland Saltworks (20 000 individuals) • Lake Gregory (10 000 individuals) • Peel-Harvey system (4 030 individuals).

[8] Listed under the East Asian-Australasian Flyway Partnership (EAAFP)
NB Fork tailed swift and Streaked shearwater were not on the list of migratory bird subject to the Wildlife Conservation Plan for Migratory birds 2015 so were removed in Rev11 2023
Latham's Snipe was not included in this list as it does not occur within the EMBA

Shorebird migration patterns are seasonal and vary according to species (DSEWPaC 2012). Generally, shorebirds migrate to northern Australia in August to November. Many birds remain in northern Australia but others disperse southwards (Bennelongia 2011). Migratory shorebird numbers on northern beaches peak in November then again in March as the majority of birds begin their return to the northern hemisphere between March and May. Most migratory shorebirds do not breed in Australia and juvenile birds may spend several years in Australia before reaching maturity and returning north to breed (DEWHA 2009).

The Wildlife Conservation Plan for Migratory Seabirds (DoE 2020) seeks to facilitate a nationally coordinated effort to protect and conserve EPBC Act listed seabirds and provides an over-arching framework for their research and management, while encouraging an effort to address threats to seabirds and their habitats.

The following seabird species found within the EMBA are subject to the Wildlife Conservation Plan for Migratory Shorebirds 2020 (DoE 2020).

Table 15: Birds (migratory) subject to the Wildlife Conservation Plan for Seabirds 2020

Migratory species	DCCEEW SPRAT information on distribution
Red-tailed tropicbird	The Australian population is poorly known owing to the numerous breeding sites and protracted and asynchronous breeding season making an accurate census difficult. The largest population breeds on Christmas Island (>2,000 pairs) with additional key breeding locations on Cocos (Keeling) Group, islands of Ashmore Reef Marine Park, Lord Howe Island, Norfolk Island, Coral Sea Marine Park and two known islands and cays in the Great Barrier Reef Marine Park, all located outside the EMBA.
White-tailed tropicbird	In Australia, the white-tailed tropicbird (Indian Ocean) breeds in the Cocos-Keeling Islands, at Ashmore Reef and Rowley Shoals off the northern coast of Western Australia. Over the past few years, birds have been sighted with increased frequency on West Island and Home Island (also in the main atoll) in the Cocos-Keeling Islands. The White-tailed Tropicbird (Indian Ocean) ranges widely over the oceans surrounding its breeding locations (Marchant & Higgins 1990). The breeding population of the white-tailed tropicbird (Indian Ocean) in Australia is estimated at 120 birds.
Wedge-tailed shearwater	The wedge-tailed shearwater breeds on the east and west coasts of Australia and on off-shore islands. The species is common in the Indian Ocean, the Coral Sea and the Tasman Sea (Lindsey 1986). In Western Australia breeding occurs on islands off the west coast of WA including the Cocos-Keeling Island. At WA breeding sites there are at least one million breeding pairs.
Flesh-footed shearwater	The flesh-footed shearwater is a locally common visitor to waters of the continental shelf and continental slope off south-western Western Australia to south-eastern Queensland and around Lord Howe Island. Pairs breed on 41 islands off the coast of south-western Western Australia and Lord Howe Island in south-western Western Australia. Flesh-footed Shearwaters have been recorded as vagrants at Norfolk Island and are possibly regular visitors to Norfolk from breeding colonies on Lord Howe Island and around New Zealand (Moore 1985).
Streaked shearwater	The streaked shearwater undergoes trans-equatorial migration traveling south during winter, to the coasts of Vietnam, New Guinea, the Philippines, Australia, southern India and Sri Lanka. The global population has been estimated to number 3 million individuals.
Lesser frigatebird	It has been suggested that lesser frigatebird roost at Weipa and survey data suggests Ashmore Reef Marine Park comprises significant numbers and is believed to account for ≥1% of the global population.
Great frigatebird	Important populations in Western Australian seas include those at North Keeling Island,the islands of Ashmore Reef Marine Park and Adele Island.
Red-footed booby	This red-footed booby is found in tropical islands in most oceans, excluding the eastern Atlantic. It winters at sea in the same area, ranging north of the Tropic of Cancer and south of the Tropic of Capricorn. This species is largely pelagic occurring farther from land than other booby species. The most important breeding population in Australia occurs in Pulu Keeling National Park in the Indian Ocean, which regularly supports more than 30,000 pairs.
Common noddy	In Australia, the common noddy occurs mainly in ocean off the Queensland coast, but the species also occurs off the north-west and central Western Australia coast. The species is also rarely encountered off the coast of the Northern Territory, where only one breeding location with about 100-130 birds is known.

Migratory species	DCCEEW SPRAT information on distribution
	In 1996, the total Australian population of the Common Noddy was estimated to be between 174 480 and 214 130 breeding pairs.
Bridled tern	In Western Australia, bridled terns are breeding at Cape Leeuwin (extending round the southern coast to Seal Rocks) north to Shark Bay and in Pilbara region and Kimberley Division. At sea, distribution extends from Cape Leeuwin north to Dirk Hartog Island, with isolated mainland coastal records at Point Maud and Ningaloo, and from Barrow Island to the Dampier Archipelago, and at sea off the Kimberley coast from waters west of the Dampier Peninsula to Ashmore Reef and Joseph Bonaparte Gulf. The total population in Western Australia is estimated to be at least 30 000–40 000 pairs and apparently increasing.
Little tern	The Australian breeding population can be divided into two major subpopulations (northern and eastern) with the northern subpopulation that breeds across northern Australia, from about Broome in north-western Western Australia through coastal Northern Territory to the Gulf of Carpentaria and eastern Cape York Peninsula.
Caspian tern	Within Western Australia, the Caspian tern is widespread in coastal regions, from the Great Australian Bight to the Dampier Peninsula. There are sparse records on the coasts east of King Sound and in eastern regions. Breeding occurs from the Recherche Archipelago to Dirk Hartog Island and Faure Island in Shark Bay, and also in the Pilbara region from around Point Cloates to North Turtle Island, and more rarely, in the Kimberley.
Roseate tern	In Western Australia, the subspecies is regularly recorded north from Mandurah to around Eighty Mile Beach, in the Pilbara Region. Around the Kimberley coastline, the subspecies occurs at scattered sites, north to the Bonaparte Archipelago and possibly further. Records in south-west Western Australia indicate that the subspecies used to be a sporadic visitor to the region, but occurs regularly at present. In addition, breeding colonies have been established on Lancelin Island and Second Rock, off Western Australia (Higgins & Davies 1996). In the Northern Territory, the subspecies has a scattered occurrence along the north coast, mainly from Darwin to Gove Peninsula, though birds have been recorded west to North Peron Island and east to the Sir Edward Pellow Islands (Chatto 2001). The subspecies is more widespread in the west and south-west of the Gulf of Carpentaria (Higgins & Davies 1996).I
Osprey	The breeding range of the eastern osprey around the northern coast of Australia (including many offshore islands) extends from Albany in Western Australia to Lake Macquarie in NSW; with a second isolated breeding population on the coast of South Australia. The species is most abundant in northern Australia, where high population densities occur in remote areas. A population on Barrow Island was estimated at 20 pairs in 1978.

8.4. Biologically Important Areas / Critical Habitat– Birds

Table 16 below provides an overview of BIAs in the EMBA for birds. The DCCEEW may make recovery plans for threated fauna listed under the EPBC Act. The EPBC Act requires that 'habitat critical to the survival of the listed threatened species' is identified in recovery plans, relevant recovery plans are listed in Section 13.2[4].

In addition, both the EPBC Act and WA BC Act and associated regulations (2018) provide for the listing of critical habitat - habitat 'critical to the survival of the threatened species. No provision is made under the TPWC Act for listing critical habitat.

[4] Further background information on BIA and identification of critical habitat in recovery plans is provided in Section 5.4.

Table 16: Critical habitat/ biologically important areas - birds

Species	Scientific name	Aggregation area and use	Specific geographic locations for species
Australian fairy tern	*Sternula nereis*	Foraging – lower north-west coast Reproduction – Pilbara and Gascoyne coasts and islands	Pilbara and Gascoyne coasts and islands
Lesser crested tern	*Sterna bengalensis*	Reproduction, foraging – Pilbara and Gascoyne coasts and islands	Pilbara and Gascoyne coasts
Roseate tern	*Sterna dougallii*	Reproduction, foraging – Islands and coastline in the Pilbara and Gascoyne regions	Pilbara and Gascoyne coasts and islands
Wedge-tailed shearwater	*Ardenna pacifica*	Reproduction, foraging –Pilbara and Gascoyne coasts,	Pilbara and Gascoyne coasts and islands

9. Protected Areas

A number of areas in the EMBA are protected under state and federal legislation. Protected areas include World Heritage Areas, Wetlands of International Importance (Ramsar), Wetlands of National Importance, National and Commonwealth Heritage Places, and terrestrial conservation reserves (National Parks, Nature Reserves and Conservation Parks) that bound marine waters. These areas are listed in Table 17, and shown in Figure 12 and Figure 13 discussed below. Other protected areas include Key Ecological Features (discussed in Section 10) and State and Commonwealth Marine Parks/Reserves (discussed in Section 11 and Section 12).

Table 17: Summary of protected areas in waters within the EMBA

Area type	Title
World Heritage Area	The Ningaloo Coast
Wetlands of National Importance	Cape Range Subterranean Waterways
National Heritage Place	The Ningaloo Coast (Natural)
Commonwealth Heritage Place	Ningaloo Marine Area - Commonwealth Waters
	Learmonth Air Weapons Range Facility

9.1. World Heritage Areas

There are two World Heritage Areas (WHA) located in marine waters off WA, both of which occur in the waters from the South Australian border to the NT border: the Ningaloo Coast and Shark Bay (DEC 2012). One WHA is within the EMBA adjacent to NT, although most of the area is terrestrial: Kakadu National Park.

9.1.1. The Ningaloo Coast

The Ningaloo Coast was included on the World Heritage List in 2011 and was inscribed for outstanding natural universal values as follows:

- An example of superlative natural phenomena and areas of exceptional natural beauty and aesthetic importance
- outstanding examples representing major stages of Earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features.
- the most important and significant natural habitats for in situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

The Ningaloo Coast WHA includes (DEWHA 2010b):

- Ningaloo Marine Park (Commonwealth waters)
- Ningaloo Marine Park (Western Australia state waters)
- Muiron Island Marine Management Area (including the Muiron Islands)
- Jurabi Coastal Park
- Bundegi Coastal Park
- Cape Range National Park
- Learmonth Air Weapons Range.

The Ningaloo Coast World Heritage Area (including the Muiron Islands) is managed under a plan that is consistent with the World Heritage Convention and Australia's World Heritage management principles. World Heritage

Management principles are set out in regulations and cover matters relevant to the preparation of management plans, the environmental assessment of actions that may affect the property and community consultation processes.

The Australian World Heritage management principles are outlined under Schedule 5 of the EPBC regulations (2000). The objective is to ensure that any likely impact of an action on the World Heritage values of the property should be considered. Any action should be consistent with the protection, conservation, presentation or transmission to future generations of the World Heritage values of the property.

The marine environment of the Ningaloo Coast World Heritage Area is protected as a State Marine Park, a Commonwealth Marine Park, and is discussed further in Section 11.1.1 and Section 12.2.2, respectively.

9.2. Wetlands of National Importance

9.2.1. Cape Range Subterranean Waterways

The Cape Range Subterranean Waterways wetland site comprises of the subterranean waterways, sinkholes, general groundwater and artificial wells of the coastal plain and foothills of Cape Range north of a line between Norwegian Bay, at the foot of the peninsula on the west coast, and the Bay of Rest in Exmouth Gulf (DAWE 2020l).

The site is one of the only examples of subterranean karst wetland system (apart from Barrow Island) in arid north-western Australia. Two threatened species have been identified within the wetland and include the blind cave eel and the blind gudgeon (DAWE 2020l).

9.3. National Heritage Places

Natural, historic and indigenous places that are of outstanding heritage value to the Australian nation are recorded as National Heritage Places. Eleven National Heritage Places are found in waters from the South Australian border to the NT, with ten of these occurring within the EMBA. Kakadu National Park, Shark Bay and The Ningaloo Coast are listed as both World Heritage Areas and National Heritage Places and are discussed in Section 9.1.

9.3.1. The Ningaloo Coast

See the Ningaloo Coast World Heritage Area (Section 9.1.1).

9.4. Commonwealth Heritage Places

The Commonwealth Heritage Places 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. Two Commonwealth Heritage Places are found in or adjacent to the EMBA. One of these places (Ningaloo Marine Area – Commonwealth Waters) are found in Marine Parks and are discussed further in Section 12.

9.4.1. Ningaloo Marine Area – Commonwealth Waters

See the Ningaloo Coast World Heritage Area (Section 9.1.1).

9.4.2. Learmonth Air Weapons Range Facility

The Learmonth Air Weapons Range Facility is located 30 km south west of Learmonth within Cape Range and Adjacent Coastal Plain, which is listed on the Register of the National Estate. As the Learmonth Air Weapons Range Facility is located within Cape Range it is of considerable importance of showing the sea level and landform changes for the past 1.8 million years (DoEE 2019h).

The area is important to a number of cave fauna of Cape Range and is considered of exceptional biogeographical importance. It hosts a high number of endemic aquatic stygofauna with ecosystems found within this area are considered rare within Western Australia and are considered to be of considerable scientific interest. The area also supports several species of terrestrial fauna that are isolated populations, populations at the extent of their range and a number of fauna and flora species that are endemic to southern WA and restricted to sandy coastal habitats along the western coast (DoEE 2019h)

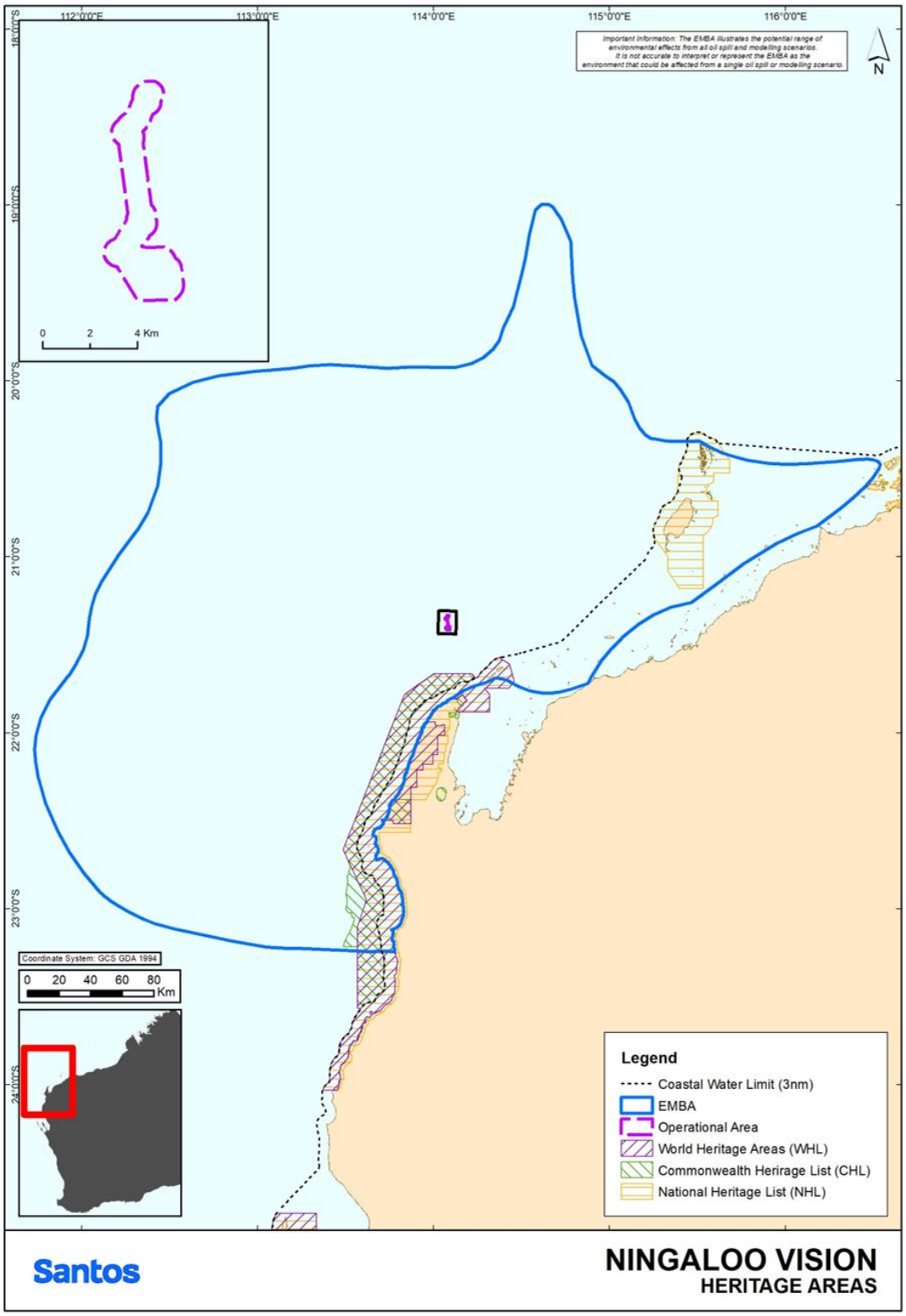


Figure 12: Heritage areas in the vicinity of the operational area and within the environment that may be affected.

10. Key Ecological Features

10.1. Introduction

Key ecological features (KEFs) are elements of the Commonwealth marine environment that are considered to be of regional importance for either a region's biodiversity or its ecosystem function and integrity. KEFs meet one or more of the following criteria (DSEWPaC 2012a):

- A species, group of species or a community with a regionally important ecological role
- A species, group of species or a community that is nationally or regionally important for biodiversity.
- An area or habitat that is nationally or regionally important for:
  - Enhanced or high biological productivity
  - Aggregations of marine life; or
  - Biodiversity and/or endemism
- A unique sea floor feature with ecological properties of regional significance.

Five ecological features of the Commonwealth waters in the EMBA have been identified in the protected matters search (Figure 13) and are discussed in this section. Sections 1 and 2 provide an overview of the geomorphology and oceanography of the Indian Ocean. Individual EPs will describe specific ecological features outside of the Commonwealth waters that are within that activity's EMBA.

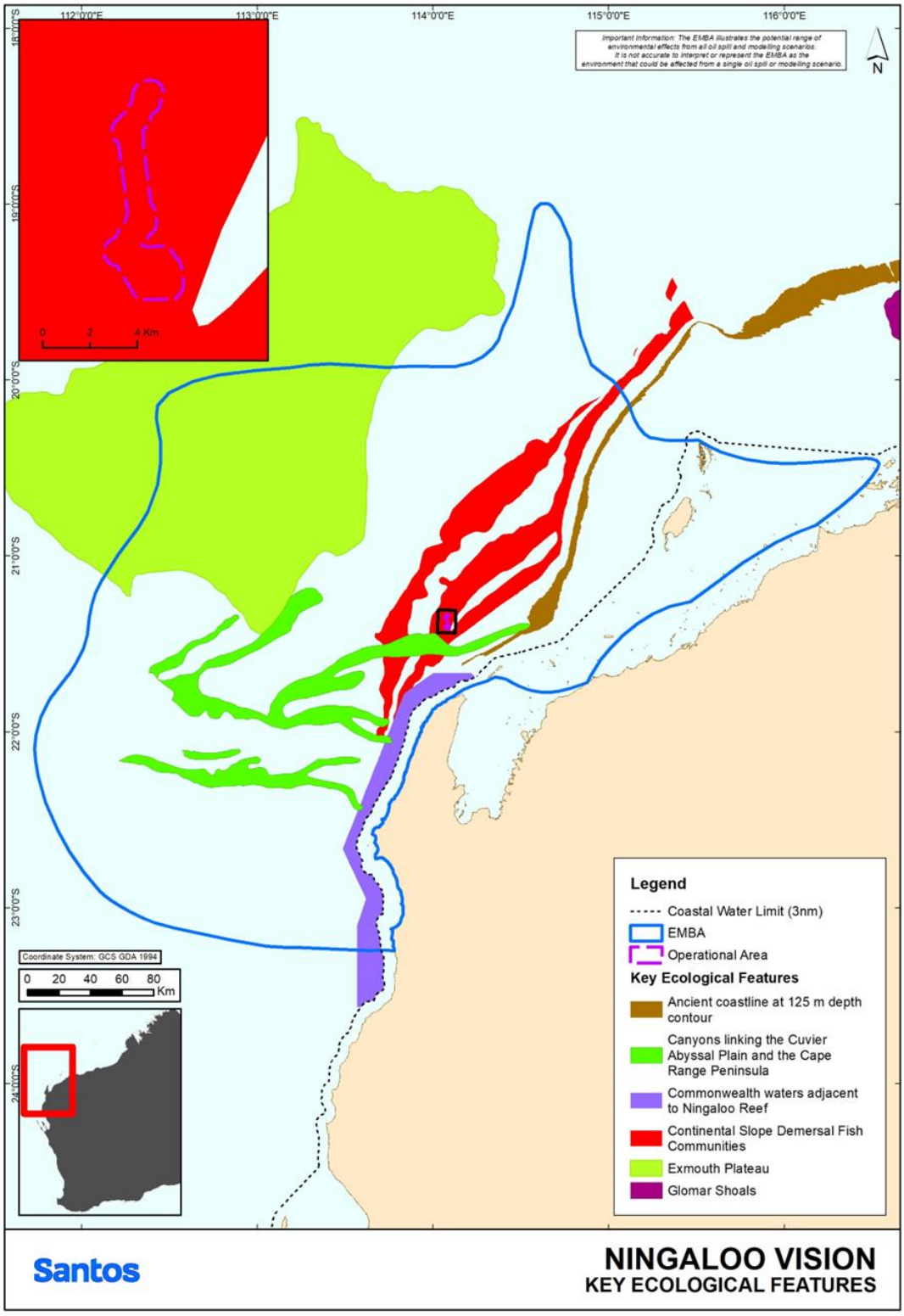


Figure 13: Key ecological features within and near the environment that may be affected and operational area.

10.1.1. Commonwealth Waters Adjacent to Ningaloo Reef

The Commonwealth Waters adjacent to Ningaloo Reef KEF is defined for high productivity and aggregations of marine life. The Ningaloo Reef extends almost 300 km along the Cape Range Peninsula to the Red Bluff and is globally significant as the only extensive coral reef in the world that fringes the west coast of a continent. Commonwealth waters adjacent to the reef are thought to support the rich aggregations of marine species at Ningaloo Reef through upwellings associated with canyons on the adjacent continental slope and interactions between the Ningaloo and Leeuwin currents (Brewer et al. 2007, DEWHA 2008d, DSEWPaC 2012a). The narrow continental shelf (10 km at its narrowest) means that the nutrients channelled to the surface via canyons are immediately available to reef species. Terrestrial nutrient input is low; hence this deep-water source is a major source of nutrients for Ningaloo Reef and therefore very important in maintaining this system (DEWHA 2008c).

The reef is known to support an extremely abundant array of marine species including over 200 species of coral and more than 460 species of reef fish, as well as molluscs, crustaceans and other reef plants and animals (DEWHA 2008c). Marine turtles, dugongs and dolphins frequently visit the reef lagoon. The Commonwealth waters around Ningaloo include areas of potentially high and unique sponge biodiversity (DEWHA 2008c). Upwellings on the seaward side support aggregations such as whale sharks and manta rays (these waters are the main known aggregation area for whale sharks in Australian waters). Humpback whales are seasonal visitors to the outer reef edge and sea snakes, sharks, large predatory fish and seabirds also utilise the reef and surrounding waters.

The Ningaloo Marine Park includes this Key Ecological Feature and is discussed in Section 12.2.2.

10.1.2. Canyons Linking the Cuvier Abyssal Plain with the Cape Range Peninsula

The Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula are defined as a KEF as they are unique sea floor features with ecological properties of regional significance.

Cape Range Peninsula and the Cuvier Abyssal Plain are linked by canyons, the largest of which are the Cape Range Canyon and Cloates Canyon. These two canyons are located along the southerly edge of Exmouth Plateau adjacent to Ningaloo Reef and are unique due to their close proximity to the North West Cape (DSEWPaC 2012a). The Leeuwin Current interacts with the heads of the canyons to produce eddies resulting in delivery of higher nutrient, cool waters from the Antarctic intermediate water mass to the shelf (Brewer et al. 2007). Strong internal tides also create upwelling at the canyon heads (Brewer et al. 2007). Thus, the canyons, the Exmouth Plateau and the Commonwealth waters adjacent to Ningaloo Reef interact to create the conditions for enhanced productivity seen in this region (Sleeman et al. 2007 in DSEWPaC 2012a). The canyons are also repositories for particulate matter deposited from the shelf and sides of the canyons and serve as conduits for organic matter between the surface, shelf and abyssal plains (DSEWPaC 2012a).

The soft bottom habitats within the canyons themselves are likely to support important assemblages of epibenthic species. Biological productivity at the head of Cape Range Canyon in particular, is known to support species aggregations, including whale sharks, manta rays, humpback whales, sea snakes, sharks, large predatory fish and seabirds. The canyons are thought to be significant contributors to the biodiversity of the adjacent Ningaloo Reef, as they channel deep water nutrients up to the reef, stimulating primary productivity (DEWHA 2008c).

10.1.3. Exmouth Plateau

The Exmouth Plateau is defined as a KEF as it is a unique sea floor feature with ecological properties of regional significance. The Exmouth Plateau covers an area of 49,310 km^2 and is located approximately 150 km northwest of Exmouth. The plateau ranges in water depths from 800 to 4,000 m (Heap & Harris 2008 in DSEWPaC 2012a). The plateau's surface is rough and undulating at 800–1,000 m depth. The northern margin is steep and intersected by large canyons (e.g. Montebello and Swan canyons) with relief greater than 50 m. The western margin is moderately steep and smooth, and the southern margin is gently sloping and virtually free of canyons (Falkner et al. 2009 in DSEWPaC 2012a).

The Exmouth Plateau is a regionally and nationally unique tropical deep-sea plateau. It that may serve an important ecological role by acting as a topographic obstacle that modifies the flow of deep waters that generate internal tides, causing upwelling of deeper water nutrients closer to the surface (Brewer et al. 2007). Sediments on the plateau suggest that biological communities include scavengers, benthic filter feeders and epifauna. Whaling records from the 19th century suggest that the Exmouth Plateau may have supported large populations of sperm whales (Bannister et al. 2007). Fauna in the pelagic waters above the plateau are likely to include small pelagic species and nekton (Brewer et al. 2007).

This KEF is located wholly within the EMBA.

10.1.4. Ancient Coastline at 125 m Depth Contour

The shelf of the North-west Marine Region 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 at a depth of 125 m as an escarpment along the North West Shelf and Sahul Shelf (DSEWPaC 2012a). Where the ancient, submerged coastline provides areas of hard substrate it may contribute to higher biological diversity in areas otherwise dominated by soft sediments. Little detailed knowledge was available at the time of its designation, but it was thought that the hard substrate of the escarpment is likely to support sponges, crinoids, molluscs, echinoderms (DSEWPaC 2012a) and that changes in topography at these depths are critical points for the generation of internal waves (Holloway et al. 2001 cited in DEWHA 2008c), playing a minor role in aiding localised upwelling or at least regional mixing associated with the seasonal changes in currents and winds. It was hypothesised that this prominent floor feature could be important as a migratory pathway for cetaceans and pelagic species such as the whale shark and humpback whale, as they move north and south between feeding and breeding grounds (DEWHA 2008c). Enhanced productivity could potentially be attracting baitfish, which in turn provide food for the migratory species. The pressures of potential concern on the biodiversity value of this feature generally include ocean acidification as a result of climate change (DoEE 2019a).

Currey-Randall et al. (2021) investigated drivers of fish species richness and assemblage composition spanning six degrees of latitude along sections of the ancient coastline, categorised as ‘on’ and ‘off’ the ancient coastline at 125m KEF (AC125) based on depth, across a range of habitats and seafloor complexity (~60–180 m depth). While some surveyed sections of the AC125 had hard bottom substrate and supported enhanced fish diversity, including over half of the total species observed, species richness and abundance overall were not greater on the AC125 than immediately adjacent to the AC125. Instead, depth, seafloor complexity and habitat type explained patterns in richness and abundance, and structured fish assemblages at both local and broad spatial scales. Fewer fishes were associated with deep sites characterized by negligible complexity and soft-bottom habitats, in contrast to shallower depths that featured benthic biota and pockets of complex substrate. Drivers of abundance of common species were species-specific and primarily related to sampling areas, depth and substrate. Fishes of the ancient coastline and adjacent habitats are representative of mesophotic fish communities of the region, included species important to fisheries and conservation, and several species were observed deeper than their currently known distribution.

Wakeford et al. (2023) investigated the bathymetry, sedimentology and benthic habitats at 5 locations across the AC125 using multibeam sonar, sediment samples and towed video imagery. Approximately 98% of the seabed surveyed was comprised of unconsolidated soft sediment habitat (mud/sand/silt) supporting negligible epibenthic biota. The prevalence of soft sediment suggests that post-glacial sediments have infilled parts of the ancient coastline), with cross-shelf, probably tidal currents in the northern section of the study area responsible for some of the sediment mobilisation and southern study areas more influenced by oceanic conditions. Within study areas, total biotic cover ranged from 0.02% to 1.07%. Of the biota encountered, most comprised filter feeder organisms (including gorgonians, sponges, and whip corals) whose distribution was associated with pockets of consolidated hard substrate. Benthic community composition varied with both study area and position in relation to the predicted AC125. In general, consolidated substrate was proportionally higher in water shallower than the AC125 compared to on the AC125 or deeper than the AC125. Spatially continuous maps of predicted benthic habitat classes (pre-determined benthic communities) in each study area were developed to characterise biodiversity. Spatial modelling corroborated depth and large-scale structural complexity of the seafloor as surrogates for predicting likely habitat class. The study provided an important assessment of the AC125 and concluded that if a distinct coastline exists in the areas surveyed, it is now largely buried and as such does not provide a unique hard substrate habitat.

10.1.5. Continental Slope Demersal Fish Communities

The Australian Continental Slope provides important habitat for demersal fish communities, characterised by high endemism and species diversity. Specifically, the continental slope between North West Cape and the Montebello Trough is the most diverse slope bioregion in Australia with more than 500 fish species, 76 of which are endemic (Last et al. 2005 in DSEWPaC 2012).

The Continental Slope consists of two distinct community types, associated with the upper and mid slope, 225 – 500 m and 750 – 1000 m respectively. The Timor Province and Northwest Transition bioregions are the second-richest areas for demersal fish across the entire continental slope (DSEWPaC 2012). The bacteria and fauna that is present in the system on the Continental Slope are the basis for the food web for demersal fish and higher order consumers in the system. Further information of this system has been poorly researched, though it has been suggested that it is a detritus-based system, where infauna and epifauna become prey for a range of teleost fish, molluscs and crustaceans (Brewer et al. 2007). The higher order consumers supported by this system are likely to

be carnivorous fish, deep water sharks, large squid and toothed whales (Brewer et al. 2007). The pelagic production is known to be phytoplankton based, with hotspots located around oceanic reefs and islands (Brewer et al. 2007).

It is believed that the loss of the benthic habitat along this continental shelf region would likely lead to a decline in the species diversity and endemism that this feature is associated with (DoEE 2019a). The endemism of the region is not supported by large data sets and is scarce. It is consequently not well understood what interactions exist between the physical processes and trophic structures that lead to this high diversity of fish and the suggested presence of endemic species in the region (DoEE 2019a).

11. State Marine Conservation Reserves

11.1. Introduction

Marine parks and reserves have been progressively established in Western Australia since 1987 and the Northern Territory since 1983. The Conservation and Parks Commission (CPC) is the vesting authority for marine parks and reserves under the provisions of the *Conservation and Land Management Act 1984*. Parks and Wildlife, within the Department of Biodiversity, Conservation and Attractions (DBCA), is responsible for day-to-day management of the parks.

There are three categories of state marine conservation reserves: marine parks; marine management areas; and marine nature reserves.

Marine parks are created to protect natural features and aesthetic values while allowing recreational and commercial uses that do not compromise conservation values. There are currently five marine parks wholly or partially within the EMBA (Figure 15)

Marine parks are multiple-use reserves that cater for a wide range of activities. Within marine parks there may be four types of management zones: recreation zones: general use zones; no-take areas known as sanctuary zones; and special purpose zones.

Each marine park has a ‘management plan’ that contains strategies to protect the high value assets in the park, as well as permitted activities tables. These tables provide explicit regulatory management.

Sanctuary zones are ‘no-take' areas created primarily for conservation and scientific research and are designed to protect a particular significant ecosystem or habitat. Low-impact tourism may be permitted, but no recreational or commercial fishing, aquaculture, pearling, petroleum drilling or production is allowed.

Marine management areas provide an integrated management structure over areas that have high conservation value and intensive multiple-use. There are two marine management areas within the EMBA (described below).

11.1.1. Ningaloo Marine Park

The Ningaloo Marine Park was declared in May 1987 under the National Parks and Wildlife Conservation Act 1975 (Commonwealth). The Ningaloo Coast, incorporating both key marine and terrestrial values was later granted World Heritage Status in June 2011. In November 2012, the Ningaloo Marine Park (Commonwealth Waters) was renamed to be incorporated in the North-west Commonwealth Marine Reserves Network. The park covers an area of 263,343 km^2, including both State and Commonwealth waters, extending 25 km offshore.

The park protects a large portion of Ningaloo Reef, which stretches over 300 km from North West Cape south to Red Bluff. It is the largest fringing coral reef in Australia, forming a discontinuous barrier that encloses a lagoon that varies in width from 200 m to 7 km. Gaps that regularly intercept the main reef line provide channels for water exchange with deeper, cooler waters (CALM 2005). The Ningaloo Marine Park forms the backbone of the nature-based tourism industry, and recreational activities in the Exmouth region. Seasonal aggregations of whale sharks, manta rays, sea turtles and whales, as well as the annual mass spawning of coral attract large numbers of visitors to Ningaloo each year (CALM 2005).

The reef is composed of partially dissected basement platform of Pleistocene marine or Aeolian sediments or tertiary limestone, covered by a thin layer of living or dead coral or macroalgae. Key features that characterise the Ningaloo Reef include (CALM 2005):

- Over 217 species of coral (representing 54 genera)
- Over 600 species of mollusc (clams, oysters, octopus, cuttlefish, snails)
- Over 460 species of fish
- Ninety-seven species of echinoderms (sea stars, sea urchins, sea cucumbers)
- Habitat for numerous threatened species, including whales, dugong, whale sharks and turtles
- Habitat for over 25 species of migratory wading birds listed in CAMBA and JAMBA.

11.1.2. Muiron Islands Marine Management Area

The Ningaloo Marine Park Management Plan (CALM 2005) created a marine management area (MMA) for the Muiron Islands, immediately adjacent to the northern end of the Park. This is managed as an integrated area together with the Ningaloo Marine Park, but its status as an MMA means that some activities, including oil and gas exploration, are still permitted under a strict environmental assessment process involving DMIRS.

The Muiron Islands located 15 km north-east of the North West Cape, comprise the North and South Muiron Islands and cover an area of 1,400 ha (AHC 2006). They are low limestone islands (maximum height of 18 m above sea level (ASL)) with some areas of sandy beaches, macroalgae and seagrass beds in the shallow waters (particularly on the eastern sides) and coral reef up to depths of 5 m, which surrounds both sides of South Muiron Island and the eastern side of North Muiron Island. The Muiron Islands MMA was WA's first MMA, gazetted in November 2004. It covers an area of 28,616 ha and occurs entirely within state waters (CALM 2005).

11.1.3. Barrow Island Marine Park

The Barrow Island Marine Park covers 4,169 ha, all of which is zoned as sanctuary zone (the Western Barrow Island Sanctuary Zone) (DEC 2007). It includes Biggada Reef, an ecologically significant fringing reef, and Turtle Bay, an important turtle aggregation and breeding area (DEC 2007). Representative areas of seagrass, macroalgal and deep-water habitat are also represented within the marine park (DEC 2007). Passive recreational activities (such as snorkelling, diving and boating) are permitted but extractive activities such as fishing and hunting are not.

Barrow Island marine park is located wholly within the EMBA.

11.1.4. Barrow Island Marine Management Area

The Barrow Island MMAis the largest reserve within the Montebello/ Barrow Islands marine conservation reserves, covering 114,693 ha (DEC 2007). The MMA includes most of the waters around Barrow Island, the Lowendal Islands and the Barrow Island Marine Park, with the exclusion of the port areas of Barrow Island and Varanus Island.

The MMA is not zoned apart from one specific management zone: the Bandicoot Bay Conservation Area. This conservation area is on the southern coast of Barrow Island and has been created to protect benthic fauna and seabirds. It includes the largest intertidal sand/mudflat community in the reserves, is known to be high in invertebrate diversity and is an important feeding area for migratory birds.

As for the other reserves in the Montebello/Barrow Islands marine conservation reserves, the Barrow Island MMA includes significant breeding and nesting areas for marine turtles and the waters support a diversity of tropical marine fauna, important coral reefs and unique mangrove communities (DEC 2007). Green, hawksbill and flatback turtles regularly use the island's beaches for breeding, and loggerhead turtles are also occasionally sighted.

Barrow Island MMA is located wholly within the EMBA.

11.1.5. Montebello Islands Marine Park

Montebello/ Barrow/ Lowendal Islands are part of a shallow submarine ridge, which extends north from the mainland near Onslow. The ridge contains extensive areas of intertidal and shallow subtidal limestone pavement surrounding the numerous, mostly small islands which are found in the region. The seabed is generally less than 5 m deep and consists of sand veneered limestone pavement with patches of fringing coral reef (DEC 2007).

The island chain lies entirely within WA State waters, with the State-Commonwealth boundary extending out to encompass the islands and waters 3 nm west of Barrow Island and north of the Montebello Islands. These islands are protected within as marine conservation reserves: Montebello Islands Marine Park, Barrow Islands Marine Park and Barrow Island Marine Management Area.

The Montebello Islands Marine Park (58,331 ha) consists of two sanctuary zones, two recreation zones, one special purpose zone for benthic protection, 11 special purpose zones for pearling and general use zones.

The Montebello Islands comprise over 100 islands, the majority of which are rocky outcrops; rocky shore accounts for 81 % of shoreline habitat (DEC 2007a).

The ecological and conservation values of the Montebello and Barrow Islands Marine Conservation Reserve (MCR) include important habitats including corals reefs and bommies, mangroves, seagrass and macroalgae meadows, rocky shorelines and hard substrate, intertidal sand and mudflat communities. These habitats provide protection, food and habitat for a large diversity of species, including dugongs, turtles, whales, other protected cetaceans and birds as well as sea snakes and fish. The area is considered to have a high biodiversity. The islands also provide feeding and resting areas for migrating shorebirds and seabird nesting areas.

Socio-economic values of the Montebello and Barrow Islands MCR include hydrocarbon exploration and production, pearling, nature-based tourism, commercial and recreational fishing, water sports, European history and maritime heritage and scientific research (DEC 2007)

Special purpose zones for pearling are established for the existing leaseholder to allow pearling to be the priority use of these areas (DEC 2007a). Commercial fishing includes a trap fishery for reef fishes, mainly in water depths of 30–100 m, and wet lining for reef fish and mackerel. Fish trawling also occurs in the waters near to the Montebello Islands. A tourist houseboat operates out of Claret Bay, at the southern end of Hermite Island, during the winter months. The Montebello Islands are becoming more frequently used by recreational boaters for camping, fishing and diving activities.

12. Australian Marine Parks

12.1. Introduction

In agreement with the states and NT governments, the Australian Commonwealth government committed to establish Commonwealth marine parks as a component of the National Representative System of Marine Protected Areas (DoE 2014) (Figure 14). In November 2012, the Commonwealth Marine Reserves Network was proclaimed with the purpose of protecting the biological diversity and sustainable use of the marine environment (Director of National Parks 2012a). Commonwealth Marine Reserves were renamed as Australian Marine Parks in October 2017. Seven marine regions are included in the Australian Marine Parks Network, including the Coral Sea, the South-west, the Temperate East, the South-east, the North, the North-west and Indian Ocean Marine Territories. The South-east network 10-year Management Plan came into effect on 1 July 2013. The remaining networks 10-year Management Plans were approved and came into effect on 1 July 2018. The Indian Ocean Marine Territories draft management plans were open for public consultation from 6 July to 17 August 2023 after Christmas Island Marine Park and Cocos (Keeling) Islands Marine Park were declared in March 2022.The new management plans establish the management and zoning of the designated marine parks. The marine park networks pertinent (i.e. marine parks wholly or partially within the EMBA) to the EMBA include the:

The North-West Marine Parks Network comprises 3 marine parks which occur within the EMBA:

- Gascoyne Marine Park
- Ningaloo Marine Park
- Montebello Marine Park

The EPBC Act requires that each management plan assign an International Union for the Conservation of Nature (IUCN) category to each marine park. Additionally, the Act also allows for the management plan to divide a marine park into zones and to assign a category to each zone, which may differ from the overall category of the marine park. Zoning considers the purposes for which the marine parks were declared, the objectives of the relevant management plans, the values of the marine park and requirements of the EPBC Act and EPBC Regulations.

The North-West Marine Parks Network includes six different types of zoning:

- Sanctuary Zone (IUCN Category Ia)
- National Park Zone (IUCN Category II)
- Recreational Use Zone (IUCN Category IV)
- Habitat Protection Zone (IUCN Category IV)
- Multiple Use Zone (IUCN Category VI)
- Special Purpose Zone (Trawl) (VI).

A summary of the AMPs within the EMBA is provided below.

12.2. North-West Marine Park Network

The North-West Marine Parks Network is aligned to the North-west Marine Region. The network covers 335, 341 km^2 and includes 13 marine parks (Director of National Parks, 2018b). Broad values of the North-west Commonwealth Marine Reserves Network include:

- Natural values
- Cultural values
- Heritage values
- Socio-economic values.

Further detail on each of the relevant marine parks within the EMBA is provided below. See Section 12.1 for extent of marine parks within the EMBA.

12.2.1. Gascoyne Marine Park

The Gascoyne Marine Park (Multiple Use Zone – IUCN Category VI-33,652 km^2; Habitat Protection Zone – IUCN Category IV-38,982 km^2; Marine National Park Zone – IUCN Category II-9,132 km^2) covers an area of approximately 81,766 km^2 and protects the following conservation values (Director of National Parks 2018a):

- Important foraging areas for: migratory seabirds threatened and migratory hawksbills and flatback turtles; and vulnerable and migratory whale shark.
- A continuous connectivity corridor from shallow depths around 15 m out to deep offshore waters on the abyssal plain at over 5,000 m in depth
- Sea floor features including canyon, terrace, ridge, knolls, deep hole/valley and continental rise. It also provides protection for sponge gardens in the south of the reserve adjacent to Western Australian coastal waters.
- Ecosystems examples from the Central Western Shelf Transition, the Central Western Transition and the Northwest province provincial bioregions as well as the Ningaloo meso-scale bioregion
- Four KEFs for the region:
  - Canyons on the slope between the Cuvier Abyssal Plain and the Cape Range Peninsula (enhanced productivity, aggregations of marine life and unique sea-floor feature)
  - Exmouth Plateau (unique sea-floor feature associated with internal wave generation)
  - Continental slope demersal fish communities (high species diversity and endemism – the most diverse slope bioregion in Australia with over 500 species found with over 64 of those species occurring nowhere else)
  - Commonwealth waters adjacent to Ningaloo Reef.
- The canyons in this reserve are believed to be associated with the movement of nutrients from deep water over the Cuvier Abyssal Plain onto the slope where mixing with overlying water layers occurs at the canyon heads. These canyon heads, including that of Cloates Canyon, are sites of species aggregation and are thought to play a significant role in maintaining the ecosystems and biodiversity associated with the adjacent Ningaloo Reef
- The reserve therefore provides connectivity between the inshore waters of the existing Ningaloo Commonwealth marine park and the deeper waters of the area.

The park is also adjacent to World Heritage listings associated with the Ningaloo Coast. Commercial tourism, commercial fishing, mining and recreation are important socio-economic values of the park (Director of National Parks 2018b).

12.2.2. Ningaloo Marine Park

Ningaloo Marine Park stretches approximately 300 km along the west coast of the Cape Range Peninsula and is adjacent to the Western Australian Ningaloo Marine Park and Gascoyne Marine Park (Director of National Parks, 2018b). Ningaloo Reef is the longest fringing barrier reef in Australia forming a discontinuous barrier that encloses a lagoon that varies in width from 200 m to 7 km. Gaps that regularly intercept the main reef line provide channels for water exchange with deeper, cooler waters (CALM 2005). It is the only example in the world of extensive fringing coral reef on the west coast of a continent.

The Ningaloo Marine Park (Recreational Use Zone – IUCN Category II) covers an area of approximately 2,435 km^2 and protects the following conservation values (Director of National Parks 2018a):

- Important habitat (foraging areas) for vulnerable and migratory whale sharks
- Areas used for foraging by marine turtles adjacent to important internesting sites
- Part of the migratory pathway of the protected humpback whale
- Foraging and migratory pathway for pygmy blue whales

- Breeding, calving, foraging and nursing habitat for dugong
- Shallow shelf environments which provides protection for shelf and slope habitats, as well as pinnacle and terrace sea floor features
- Sea floor habitats and communities of the Central Western Shelf Transition
- Three KEFs
- The Ningaloo Coast World Heritage Property, the Ningaloo Coast National Heritage listing and Ningaloo Marine Area Commonwealth Heritage Listing.

Commercial tourism and recreation (e.g. fishing) are important socio-economic values of the marine park (Director of National Parks 2018b).

12.2.3. Montebello Marine Park

The Montebello Marine Park is located offshore of Barrow Island and 80 km west of Dampier extending from the Western Australian state water boundary and is adjacent to the Western Australian Barrow Island and Montebello Islands Marine Parks. The Montebello Marine Park (Multiple Use Zone – IUCN Category VI) covers an area of approximately 3,413 km^2 and protects the following conservation values (Director of National Parks 2018b):

- Foraging areas for migratory seabirds that are adjacent to important breeding areas
- Areas used by vulnerable and migratory whale sharks for foraging
- Foraging areas marine turtles which are adjacent to important nesting sites
- Section of the north and south bound migratory pathway of the humpback whale
- Shallow shelf environments with depths ranging from 15–150 m which provides protection for shelf and slope habitats, as well as pinnacle and terrace sea floor features
- Sea floor habitats and communities of the Northwest Shelf Province provincial bioregions as well as the Pilbara (offshore) meso-scale bioregion
- One KEF for the region is the ancient Coastline (a unique sea floor feature that provides areas of enhanced biological productivity).

Commercial tourism, commercial fishing, mining and recreation are important socio-economic values for the park.

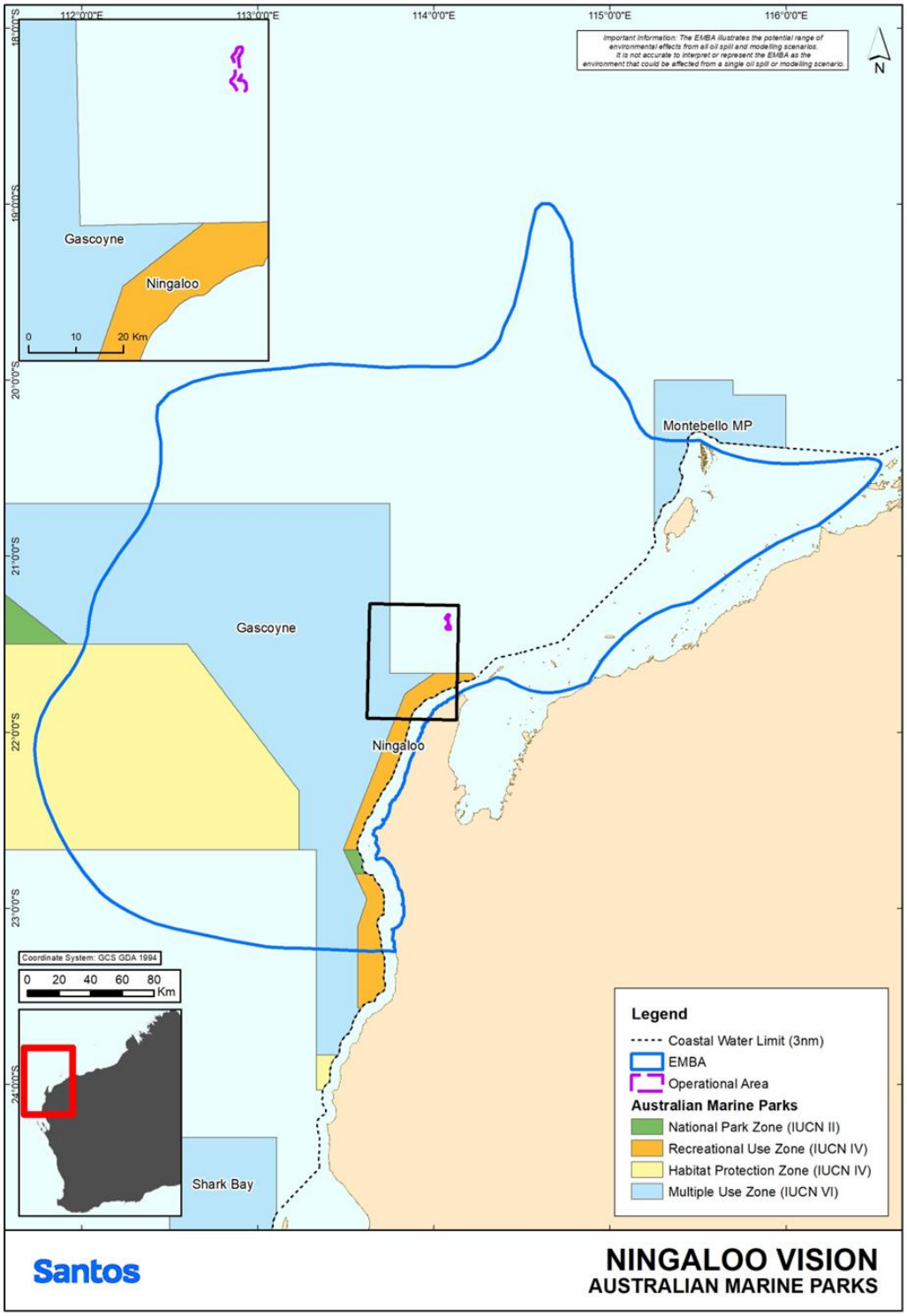


Figure 14: Australian marine parks within the environment that may be affected and operational area

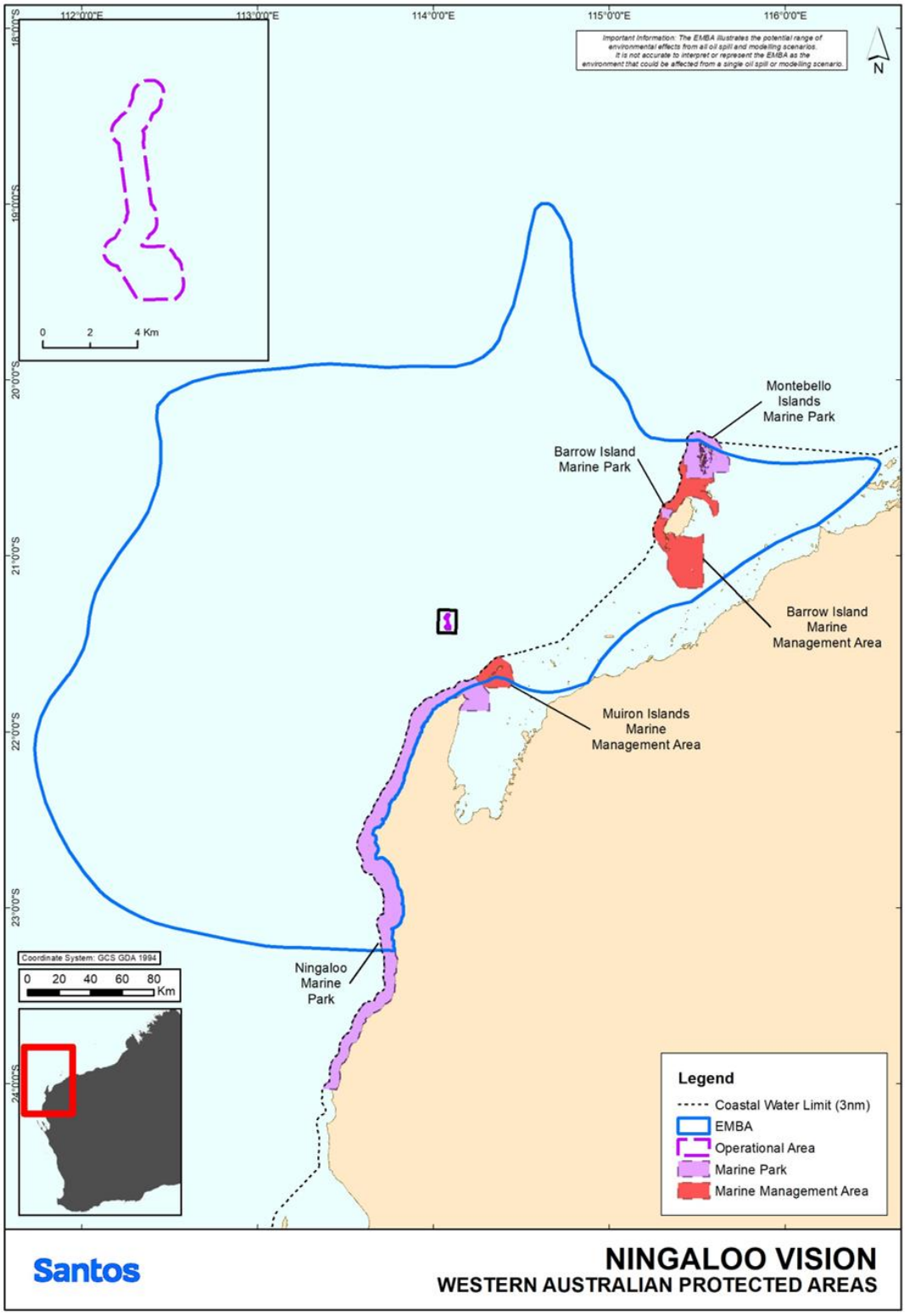


Figure 15: State marine protected areas within the environment that may be affected and operational area.

Table 18 Summary of marine network values, pressures, management programs and actions applicable to the EMBA

Marine network	Values	Pressures	Management programs and actions
North-west	• Eight bioregions • Key ecological features • EPBC listed species • Biologically important areas • Sea country indigenous values • Native title determinations • Traditional Indonesian fishers • World Heritage Properties (Ningaloo Coast, Shark Bay) • Ashmore Reef Marine Park and Eighty-Mile Beach Ramsar sites • Shipping and port activities • Commercial fishing, pearling, aquaculture • Marine tourism • Scientific research	• Climate change • Hydrological changes from coastal development and agriculture (increase sediment loads and pollutants) • Illegal/unregulated/ unreported fishing • Bycatch of non-target species • Habitat modification from mining • Human presence • Invasive species • Marine pollution	• Communication, education, and awareness programs • Promote suitable tourism experience • Facilitate partnerships between tourism operators and Indigenous operators • Indigenous engagement program • Marine monitoring programs • Park management via assessments / authorisation program for marine park activities • Marine Park management and development of suitable infrastructure • Compliance planning and surveillance

13. Conservation Management Plans

In order to protect, maintain and enhance recovery of certain threatened species and ecological communities the DCCEEW may prepare conservation management plans in the form of Conservation Advice or Recovery Plans.

13.1. Conservation Advice

When a native species or ecological community is listed as threatened under the EPBC Act, conservation advice is developed to assist its recovery. Conservation advice provides guidance on immediate recovery and threat abatement activities that can be undertaken to ensure the conservation of a newly listed species or ecological community.

13.2. Recovery Plans

The Australian Government Minister for the Environment may make or adopt and implement recovery plans for threatened fauna, threatened flora (other than conservation dependent species) and threatened ecological communities listed under the Commonwealth EPBC Act. Recovery plans set out the research and management actions necessary to stop the decline of, and support the recovery of, listed threatened species or threatened ecological communities. The aim of a recovery plan is to maximise the long-term survival in the wild of a threatened species or ecological community (DCCEEW, 2024).

14. Social and Economic Features

14.1. Industry

In 2020/21, Western Australia's petroleum industry was worth $23 billion. The petroleum sector accounted for 10.4 % of the total value of WA's mineral and petroleum sales in 2020/21, with 7.5 % of all mineral and petroleum sales coming from Liquefied Natural Gas (LNG). This is a 37 % decrease in prices compared to 2018/19. The decrease was accounted for by a drop in oil prices due to excess supply from the COVID-19 pandemic and related economic shutdowns, operation issues at Gorgon, Prelude remaining offline until January 2021 along with maintenance shutdowns at the North West Shelf and Wheatstone. Currently Western Australia has five operating LNG projects; the North West Shelf, Gorgon, Pluto, Wheatstone and Prelude. The operational area and surrounding waters are predominantly used for petroleum exploration and development as shown in Figure 16. The nearest petroleum activities are two Woodside operated FPSOs:

- • Ngujima-Yin FPSO – Enfield Development in WA-28-L, approximately 4 km south of the operational area currently in the decommissioning phase
- • Pyrenees Venture FPSO - Pyrenees Development in WA-42-L, approximately 13 km south east of the operational area.

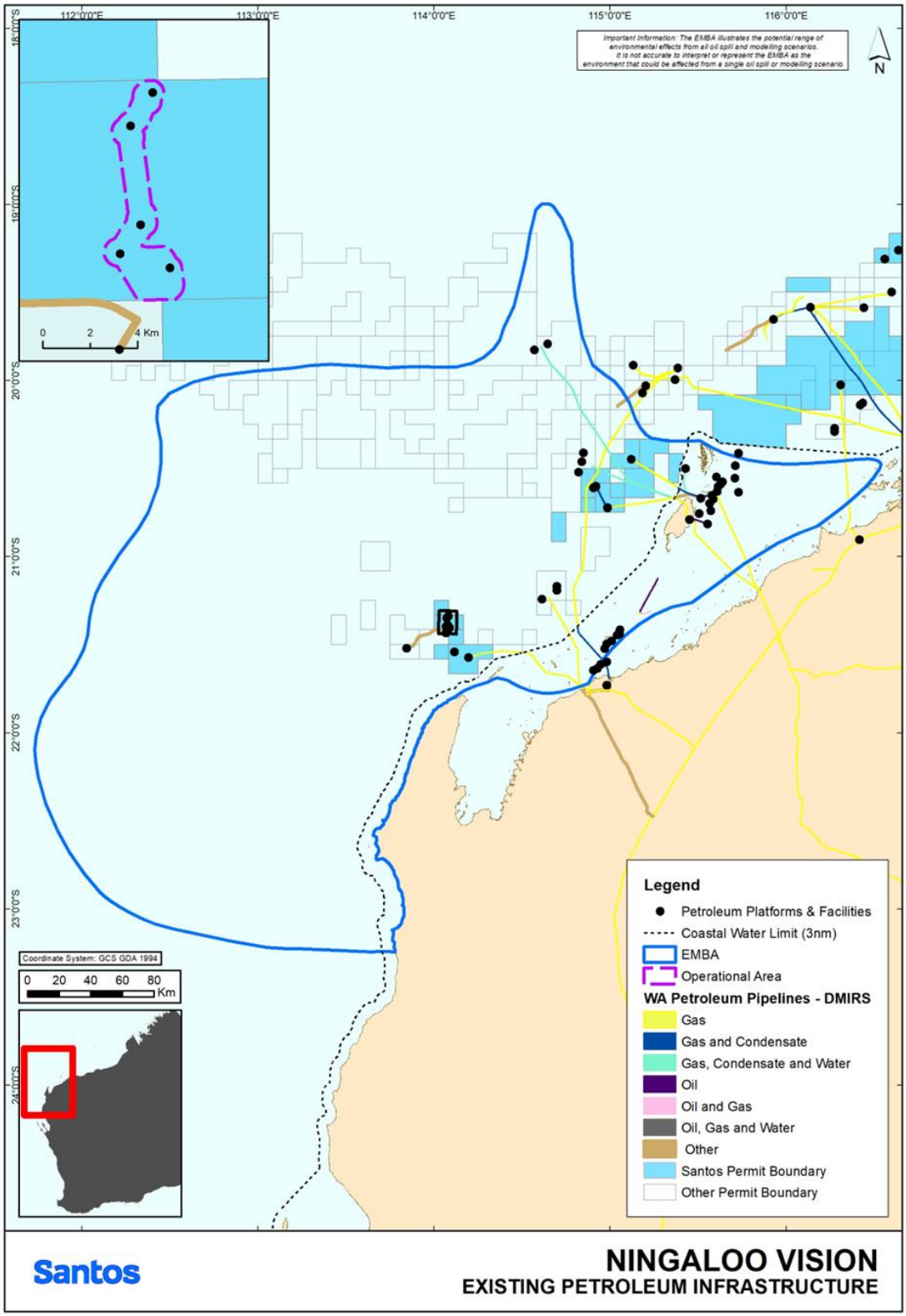


Figure 16: Existing oil and gas equipment within the environment that may be affected.

14.2. Shipping

The Western Australian coastline supports twelve ports including the major ports of Dampier, Port Hedland and Broome which are operated by their respective port authorities. Large cargo vessels move through the region to and from Fremantle, transiting along coastline. Commercial shipping also moves to and from marine terminals associated with the oil and gas industry (see Section 14.1). Closer proximity shipping also includes construction vessels/barges/dredges, domestic support vessels, and offshore survey vessels.

The Australian Maritime Safety Authority (AMSA) has established a network of shipping fairways off the north-west coast of Australia to manage traffic patterns (AMSA 2013). The Shipping Fairways are designed to keep shipping traffic away from offshore infrastructure and aims to reduce the risk of collision (AMSA 2013).

Use of the fairways is strongly recommended but not mandatory. The International Regulations for *Preventing Collisions at Sea 1972* apply to all vessels navigating within or outside the shipping fairways. The use of these fairways does not give vessels any special right of way (AMSA 2012).

Under the *Commonwealth Navigation Act 2012*, certain vessels operating in Australian waters are required to report their location on a daily basis to the Rescue Coordination Centre (RCC) in Canberra. This Australian Ship Reporting System (AUSREP) is an integral part of the Australian Maritime Search and Rescue system and is operated by AMSA through the RCC. Vessels recorded in waters in the EMBA through the AUSREP system in 2023 are shown in Figure 17**.**

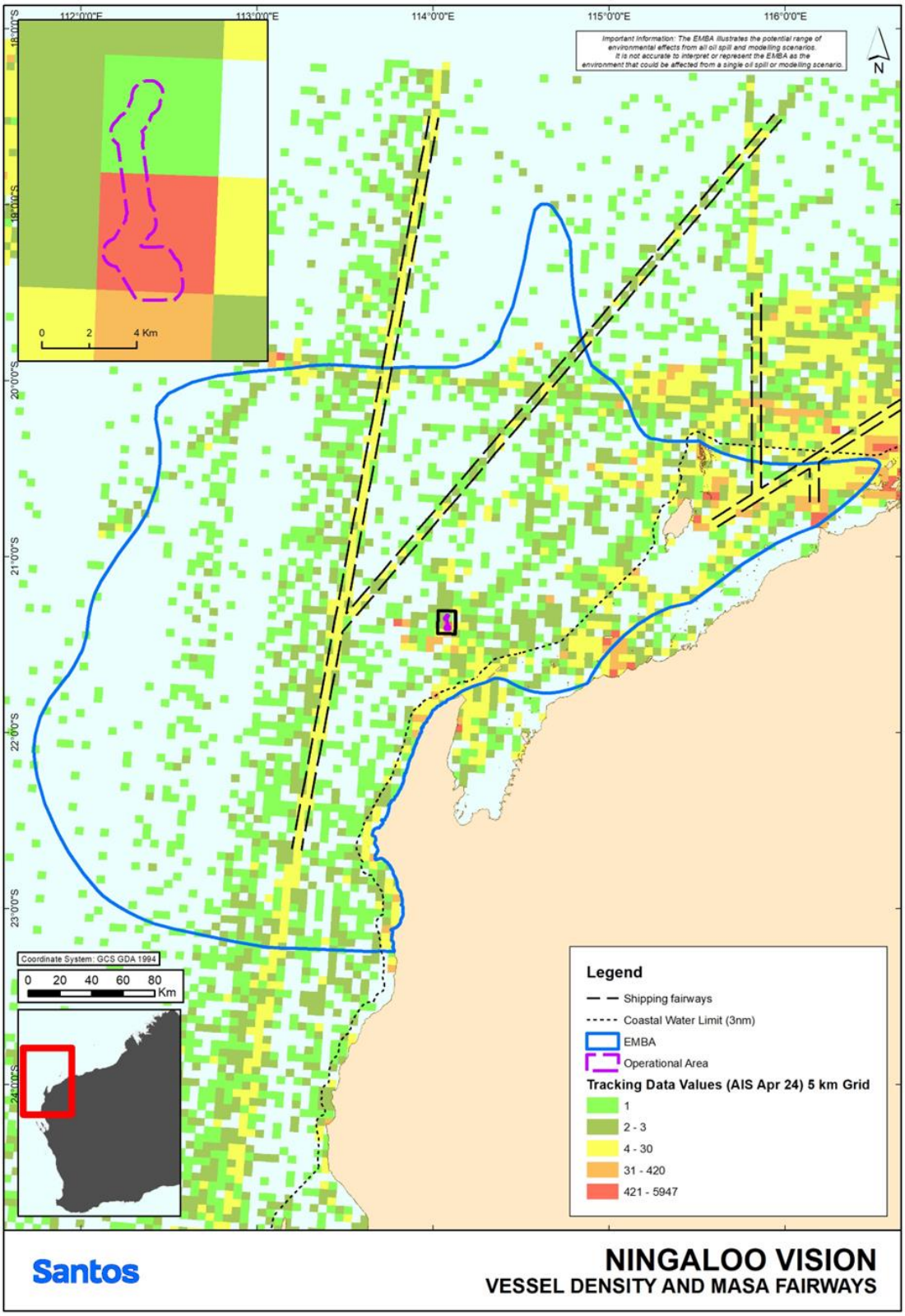


Figure 17: Vessel density and shipping fairways within the environment that may be affected

14.3. Defence Activities

Key defence bases and facilities are illustrated in Figure 18.

The Naval Communication Station Harold E. Holt is located on the northwest coast of Australia, 6 km north of Exmouth. The town of Exmouth was built at the same time as the communications station to provide support to the base and to house dependent families of US Navy personnel (Shire of Exmouth 2018, DoE 2014).

The station provides very low frequency radio transmission to US Navy and Royal Australian Navy ships and submarines in the western Pacific Ocean and eastern Indian Ocean. With a transmission power of 1 megawatt, it is the most powerful transmission station in the southern hemisphere (Shire of Exmouth 2018, DoE 2014).

Two Royal Australian Airforce (RAAF) bases are located in the northwest of WA; Learmonth RAAF Base, near Exmouth and Curtin RAAF Base near Derby (RAAF 2014).

Designated military exercise areas occur over waters and airspace of the north west of WA and may be activated following the required notifications.

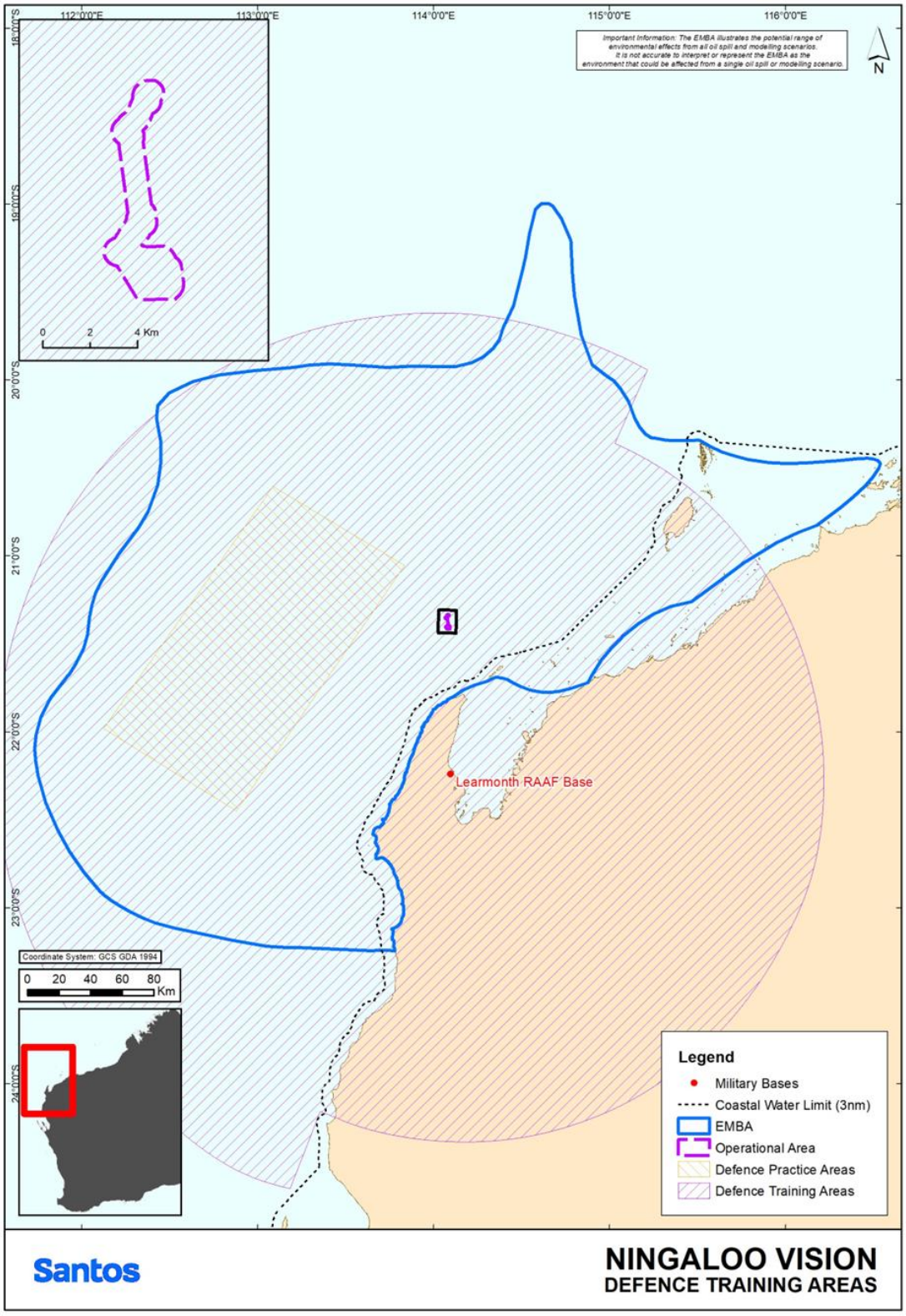


Figure 18: Existing defence equipment within the environment that may be affected

14.4. Tourism

The Pilbara and Gascoyne regions are popular visitor destination for Australian and international tourists. Tourism is concentrated in the vicinity of population centres including Exmouth and Coral Bay.

Marine tourism to offshore Islands includes various Pilbara nearshore Islands (Muiron, Serrurier, Sholl and Montebello). The Montebello Islands are ranked among the world's most bio-diverse marine environments (DBCA) and are attracting a growing number of nature-based tourism operators, with people participating in activities such as fishing, diving, wildlife viewing, island exploration and surfing (DEC 2007).

Tourism contributes to local economies in terms of both income and employment and tourists include local, interstate and international visitors. Popular water-based activities include fishing, swimming, snorkelling/ diving, surfing/windsurfing/kiting and boating, while popular land-based activities include bushwalking, camping, bird watching and four-wheel driving.

Seasonal nature-based tourism such as humpback whale watching, whale shark encounters and tours of turtle hatching mainly occurring around Ningaloo Reef and Cape Range National Park. Seasonal aggregations of whale sharks, manta rays, sea turtles and whales, as well as the annual mass spawning of coral attract large numbers of visitors to Ningaloo each year (CALM 2005).

14.5. Maritime Heritage

Details of recorded shipwreck sites are available on the Australian National Shipwreck Database are managed by the DCCEEW although precise locations of the wrecks are sometimes unknown. There are no listed World Heritage areas, Aboriginal heritage, cultural heritage places or records of shipwrecks within or in the vicinity of the operational area. The closest known shipwreck to the operational area is the Gem shipwreck which was wrecked in 1893 approximately 10 km southeast of the operational area.

Based on the predictions from the spill modelling, the Ningaloo Coast is the only World Heritage Area within the EMBA in the event of a worst-case spill.

Under the Commonwealth *Underwater Culture Heritage Act 2018* all shipwrecks older than 75 years are protected, while those dated pre-1900 are protected by WA law under the Maritime Archaeology Act 1973.

14.6. Commercial Fisheries

A valuable and diverse commercial fishing industry is supported by both the offshore and coastal waters in the North Coast, Gascoyne, West Coast and South Coast Bioregions between the WA and NT and South Australian borders. The major fisheries in this area target tropical finfish, large pelagic fish species, crustaceans (prawns and scampi), Western Rock Lobster and pearl oysters (Fletcher and Santoro 2013). A number of smaller fisheries also exist in this area including the octopus and beche-de-mer fisheries.

14.6.1. State Fisheries

State fisheries are managed by the WA Department of Primary Industries and Regional Development (DPIRD) (formerly Department of Fisheries (DoF)) with specific management plans, regulations and a variety of subsidiary regulatory instruments under the *Fish Resources Management Act 1994* (WA). The information on State managed fisheries has been derived from '*The State of the Fisheries'* Report 20 (Newman et al. 2023) and direct consultation with DPIRD. Santos consults regularly with State fisheries relevant to activity operational areas, mainly by distribution of an Annual Consultation Update by post (as well as conducting further consultation in preparing an EP under s 25 of the Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023.

State commercial fisheries that overlap the EMBA are shown in Figure 20 and Figure 21. A summary of all commercial fisheries wholly or partially operating in the EMBA is also provided in Table 19.

14.6.2. Commonwealth Fisheries

Commonwealth fisheries are those within the 200 nautical mile Australian Fishing Zone (AFZ) managed by Australian Fisheries Management Authority (AFMA) and are, on the high seas, and, in some cases, by agreement with the States and Territory, to the low water mark. Information on Commonwealth managed fisheries has been derived from '*Fishery Status'* Report 2019 (Department of Agriculture 2019)

Commonwealth fisheries who have permits to operate in the EMBA include as shown in Figure 19

- North West Slope Trawl (NWST)
- Southern Bluefin Tuna Fishery (SBFTF)
- Western Tuna and Billfish Fishery (WTBF) (including Southern Tuna and Billfish Fishery)
- Skipjack Tuna Fishery (STF) (referred to as Western Skipjack Tuna Fishery in Figure 19)

Commonwealth commercial fisheries overlapping the EMBA are shown in Figure 19 and summarised in Table 19.

Table 19: Commercial fisheries with permits to operate within the EMBA

Fishery	Target Species	Catch[1]	Fishing Method	Area Description
State Managed Fisheries				
Exmouth Gulf Prawn Managed Fishery	Western king prawns (*Penaeus latisulcatus*), brown tiger prawns (*Penaeus esculentus*), endeavour prawns (*Metapenaeus* spp.) and banana prawns (*Penaeus merguiensis*).	2017/2018: 713 tonnes 2022/2023: Commercial: 898t	Low opening otter trawls.	Sheltered waters of Exmouth Gulf Essentially the western half of the Exmouth Gulf (eastern part is a nursery ground). The Muiron Islands and Point Murat provide the western boundary; Serrurier Island provides the northern limit Wholly within the EMBA
Gascoyne Demersal Scalefish Managed Fishery (GDSMF)	Targets pink snapper (*Pagrus auratus*) and goldband snapper (*Pristipomoides multidens*). Other demersal species caught include the rosy snapper (*P. filamentosus*), ruby snapper *(Etelis carbunculus*), red emperor (*Lutjanus sebae*), emperors (*Lethrinidae*, including spangled emperor, *Lethrinus nebulosus*, and redthroat emperor, *L. miniatus*), cods (*Epinephelidae*, including Rankin cod, *Epinephelus multinotatus* and goldspotted rockcod, *E. coioides*), pearl perch (*Glaucosoma burgeri)*, mulloway (*Argyrosomus japonicas*), amberjack (*Seriola dumerili)* and trevallies (*Carangidae*).	2017/2018: Snapper: 133 tonnes Other demersals: 144 tonnes 2022/2023: Commercial: 166.3t Recreational: 79-117t	Mechanised handlines	The GDSF operates in the waters of the Indian Ocean and Shark Bay between latitudes 23°07’30”S and 26°30’S. Vessels are not permitted to fish in inner Shark Bay. Wholly within the EMBA
Abalone Managed Fishery	Greenlip abalone (*Haliotis laevigata*) Brownlip abalone (*H. conicopora*)	2017/2018: 98 tonnes 2022/2023: Commercial: 40.1t Recreational: 11.6-17.2t	Dive fishery The principal harvest method is a diver working off ‘hookah’ (surface supplied breathing apparatus) or SCUBA using an abalone ‘iron’ to prise the shellfish	Shallow coastal waters off the south-west and south coasts of Western Australia Covers all Western Australian coastal waters, which are divided into eight management areas. Commercial fishing for greenlip/brownlip abalone is managed in three separate areas. Partially within the EMBA

Fishery	Target Species	Catch[1]	Fishing Method	Area Description
			off rocks – both commercial and recreational divers employ this method.	
Marine Aquarium Fish Managed Fishery (MAFMF)	Over 250 target species of finfish. (228 species caught in 2012). Fishers can also take coral, live rock, algae, seagrass and invertebrates. The main fish species landed in 2012 were scribbled angelfish (*Chaetodontoplus duboulayi*) and green chromis (*Chromis cinerascens*) The main coral species landed in 2012 were the coral like anemones of the *Corallimorpharia*.	2017/2018: Total catch of 150,544 fishes, 21.9 t of coral, live rock & living sand and 322 L of marine plants. 2022: Commercial: total catch 19,710 individuals (fish) 77,287 invertebrates	Hand harvest while diving or wading. Hand held nets	Dive based fishery operating all year throughout WA waters but restricted by diving depths. The MAFMF is able to operate in all State waters (between the Northern Territory border and South Australian border). The fishery is typically more active in waters south of Broome with higher levels of effort around the Capes region, Perth, Geraldton, Exmouth and Dampier. Operators in the MAFMF are also permitted to take coral, live rock, algae, seagrass and invertebrates under the Prohibition on Fishing (Coral, 'Live Rock' and Algae) Order 2007 and by way of Ministerial Exemption (Gaughan & Santoro, 2018). Partially within the EMBA
Northern Demersal Scalefish Managed Fishery (NDSF)	Red emperor (*Lutjanus sebae*) Goldband snapper (*Pristipomoides* multidens)	2017/2018:1317 t (total) Goldband snapper (not including other jobfish): 473 tonnes. Red emperor: 34 – 47 t 2022/2023: Commercial: 1458 t Recreational:41-63 t	The permitted means of operation within the fishery include handline, dropline and fish traps, but since 2002 it has essentially been a trap-based fishery which uses gear time access and spatial zones as the primary management measures (State of the Fisheries 2014-15).	The Northern Demersal Scalefish Managed Fishery (NDSF) operates off the northwest coast of Western Australia in the waters east of 120° E longitude. These waters extend out to the edge of the Australian Fishing Zone (200 nautical miles). The Fishery consists of three zones; Zone A is an inshore area; Zone B comprises the area with most historical fishing activity and Zone C is an offshore deep slope developmental area. The fishery is further divided into two fishing areas: an inshore sector and an offshore sector. The inshore waters in the vicinity of Broome are closed to commercial fishing. Wholly within the EMBA
Onslow Prawn Managed Fishery (OPMF)	Western king prawns (*Penaeus latisulcatus*), brown tiger prawns (*Penaeus esculentus*), endeavour prawns (*Metapenaeus* spp.)	2017/2018: Negligible (Minimal fishing occurred in 2017) 2022/2023: Commercial: <60 t	Otter trawl	Operates along the western part of the North-West Shelf with most prawning activities concentrated in the shallower water off the mainland. The boundaries of the OPMF are 'all the Western Australian waters between the Exmouth Prawn

Fishery	Target Species	Catch[1]	Fishing Method	Area Description
				Fishery and the Nickol Bay prawn fishery east of 114º39.9' on the landward side of the 200 m depth isobath'. Wholly within the EMBA
Pilbara Developmental Crab Fishery	Blue Swimmer (Portunus armatus) Mud Crab (*Scylla* spp)	2017/2018: 60 t (total number includes Kimberley Developing Mud Crab Fishery) 2022/2023: unspecified	Variety of gear but mostly commercial crab pots (Hourglass traps used in inshore waters from Onslow through to Port Hedland with most commercial and activity occurring in and around Nickol Bay) Recreational fishers use drop nets or scoop nets, with diving for crabs becoming increasingly popular	The majority of the commercially and recreationally-fished stocks are concentrated in the coastal embayments and estuaries between Geographe Bay in the south west and Nickol Bay in the north. Crabbing activity along the Pilbara coast is centred largely on the inshore waters from Onslow through to Port Hedland, with most commercial and recreational activity occurring in and around Nickol Bay. Wholly within the EMBA
Specimen Shell Managed Fishery (SSF)	Shells (cowries, cones) The Specimen Shell Managed Fishery (SSF) is based on the collection of individual shells for the purposes of display, collection, cataloguing, classification and sale. Just under 200 (196) different Specimen Shell species were collected in 2012, using a variety of methods.	2017/2018: 7,806 shells 2022/2023: 5,074 shells	Hand harvest while diving or wading along coastal beaches below the high-water mark An exemption method being employed by the fishery is using a remote-controlled underwater vehicle at depths between 60 and 300 m.	Dive based fishery operating all year throughout WA waters but restricted by diving depths. The fishing area includes all Western Australian waters between the high-water mark and the 200 m isobath. While the fishery covers the entire WA coastline, there is some concentration of effort in areas adjacent to population centres such as Broome, Karratha, Exmouth, Shark Bay, metropolitan Perth, Mandurah, the Capes area and Albany. Partially within the EMBA
South West Coast Salmon Managed Fishery	WA salmon (Arripis truttaceus)	Insufficient information	Insufficient information	Insufficient information Various beaches south of the metropolitan area. Wholly within the EMBA

Fishery	Target Species	Catch[1]	Fishing Method	Area Description
Spanish Mackerel Fishery	Narrow-barred Spanish mackerel	In 2012, there were 16 fishery licences of which 12 were actively operating (DPIF 2014). The 2012 fishing effort was 719 boat-days; a decrease from 813 boat-days in 2011 but an increase from the 672 boat-days in 2010.	Near-surface trolling gear from vessels or handline.	The fishery extends from the NT waters seaward off the coast and river mouths to the outer limit of the AFZ. The majority of the fishing effort occurs coastal areas around reefs, shoals and headlands. The majority of the catch is taken in the Kimberley Area and north of Port Hedland. Wholly within the EMBA
Pilbara Fish Trawl (Interim) Managed Fishery (PFTIMF)	Variety of demersal scalefish including goldband snapper (Pristipomoides multidens), red emperor (Lutjanus sebae), bluespotted emperor (Lethrinus punctulatus), crimson snapper (Lutjanus erythropterus), saddletail snapper (Lutjanus malabaricus), Rankin cod (Epinephelus multinotatus), brownstripe snapper (Lutjanus vitta), rosy threadfin bream (Nemipterus furcosus), spangled emperor (Lethrinus nebulosus) and frypan Moses' snapper (Argyrops lutjanusspinifer russelli).	2017/2018: 1,780 t 2022/2023: Commercial: 1784 t	Demersal trawl	The Pilbara Fish Trawl (Interim) Managed Fishery is situated in the Pilbara region in the north west of Australia. It occupies the waters north of latitude 21°35'S and between longitudes 14°9'36"E and 120°E. The Fishery is seaward of the 50 m isobath and landward of the 200 m isobath. The Fishery consists of two zones; Zone 1 in the south west of the Fishery (which is closed to trawling) and Zone 2 in the North, which consists of six management areas. Wholly within the combined EMBA
West Coast Rock Lobster Managed Fishery (WCRLMF)	Western rock lobster (Panulirus cygnus	2016: 272 – 400 tonnes (346-481 t based on updated average weight) 2022/2023: Commercial: 862 t (12 month) Recreational: 401-476 t Charter: 17	Baited traps (pots). Pots and diving (recreational catch)	The fishery is situated along the west coast of Australia between Latitudes 21°44´ to 34°24´ S. The fishery is managed in three zones: Zone A – Abrolhos Islands, north of latitude 30° S excluding the Abrolhos Islands (Zone B) and south of latitude 30° S (Zone C). Wholly within the combined EMB
Mackerel Fishery	Spanish mackerel (*Scomberomorus commerson*), grey mackerel (*S. semifasciatus*), with other	2016: Commercial: The commercial catch	Trolling or handline	The Fishery extends from the West Coast Bioregion to the WA/NT border, to the 200 nautical mile AFZ with most effort and catches

Fishery	Target Species	Catch[1]	Fishing Method	Area Description
	species from the genera Scomberomorus, Grammatorcynus and Acanthocybium also contributing to commercial catches.	of Spanish mackerel was 276 t in 2016 (Gaughan & Santoro, 2018) 2022/2023: Commercial:197 t Recreational: 89-138 t	Near-surface trolling gear from vessels in coastal areas around reefs, shoals and headlands. Jig fishing is also used to capture grey mackerel (S.semifasciatus)	recorded north of Geraldton, especially from the Kimberley and Pilbara coasts of the Northern Bioregion. Restricted to coastal and shallower waters. Catches are reported separately for three Areas: Area 1 – Kimberley (121º E to WA/NT border) Area 2 -Pilbara (114º E to 121º E) Area 3 – Gascoyne (27º S to 114º E) and West Coast (Cape Leeuwin to 27º S). Wholly within the EMBA
Commonwealth Managed Fisheries				
North West Slope Trawl	Scampi (crayfish): velvet scampi (*Metanephrops velutinus*) and boschmai scampi *(Metanephrops boschmai)*. Deepwater prawns (penaeid and carid): pink prawn (*Parapenaeus longirostris)*, red prawn (*Aristaeomorpha foliacea*), striped prawn (*Aristeus virilis)*, giant scarlet prawn (*Aristaeopsis edwardsiana*), red carid prawn (*Heterocarpus woodmasoni*) and white carid prawn (*Heterocarpus sibogae*). Snapper.	2017-18: 79.7 t (total) 2021/2022: 85.8 t	Demersal crustacean trawl seaward of the 200 m isobath.	Extends from 114° E to approximately 125° E off the WA coast between the 200 m isobath and the outer limit of the Australian Fishing Zone (AFZ). Wholly within the EMBA
Western Skipjack Tuna Fishery	Skipjack tuna (Katsuwonus pelamis)	2017-18: None in either zone No catch since 2008/09 fishing season 9 permits awarded 2021/2022	Purse seine	The Skipjack Tuna Fishery is split into two sectors; east and west. The Western Skipjack Tuna Fishery is located in all Australia waters west of 142° 30’ 00°E, out to 200 nm from the coast. There has been no fishing effort in the Skipjack Tuna Fishery since the 2008-09 season, and in that season activity concentrated off South Australia (Department of Agriculture 2019). Partially within the EMBA
Southern Bluefin Tuna Fishery	Southern bluefin tuna (*Thunnus maccoyii*).	2017-18: 6,159 t 2022: 5,972 t	Purse seine vessels primarily in Great Australian Bight all year round and longline off southern NSW in winter.	Fishery includes all waters of Australia, out to 200 nm from the coast. No current effort on the North West Shelf, fishing activity is concentrated in the Great Australian Bight and off South-east Australia (Department of Agriculture 2019). Partially within the EMBA

Fishery	Target Species	Catch[1]	Fishing Method	Area Description
			Around 98% of Australia's SBT quota is taken by 5–10 purse seine vessels fishing for 13–25 kg southern bluefin tuna.	
Western Deepwater Trawl Fishery	A diverse range of species are caught, ranging from tropical and ruby snappers on the shelf edge to orange roughy *(Hoplostethus atlanticus*), oreo dories and bugs (*Ibacus* spp.) in the deeper temperate waters.	2017-18: 101.9 t 2021/2022: 12 t	Demersal fish trawl seaward of the 200 m isobath.	Its northernmost point is from the boundary of the AFZ to longitude 114° E, and its southernmost point is from the boundary of the AFZ to longitude 115°08' E. Deep water off WA, from the 200 m isobath to the edge of the AFZ. Wholly within the EMBA
Western Tuna and Billfish Fishery	Broadbill swordfish (*Xiphias gladius*), albacore tuna (*Thunnus alalunga)*, striped marlin (*Kajikia audax*), bigeye tuna (*T. obesus)* and yellowfin tuna (*T. albacares*).	2018: 278 t 2022: 139 t	Pelagic, longline, minor line and purse seine.	Extends westward from Cape York Peninsula (142°30' E) off Queensland to 34° S off the WA west coast. It also extends eastward from 34° S off the west coast of WA across the Great Australian Bight to 141° E at the South Australian–Victorian border. In recent years, fishing effort has concentrated off south-west Western Australia and South Australia with no current effort on the North West Shelf (Department of Agriculture 2019). Partially within the EMBA

Source: Apache (2008); Australian Fisheries Management Authority (2011); Department of Fisheries (2013), Stakeholder consultation.
[1]Sources for catch data: Department of Agriculture 2019; Gaughan et al., 2019; DPIRD 2018, DPIRD 2023, Newman et al 2023

14.7. Recreational Fisheries

14.7.1. Gascoyne Coast Bioregion

The Gascoyne Coast Bioregion extends from just north of Kalbarri to the Ashburton River, south of Onslow. The marine environment of this region represents a transition between the fully tropical waters of the north-west shelf of the north coast region and the temperate waters of the west coast region. This region has been identified as one of the 18 world 'hotspots' in terms of tropical reef endemism and the second most divers marine environment in the world in terms of tropical reef species. This region is a focal point for winter recreational fishing and is a key component of many tourist visits. Angling activities include beach and cliff fishing (e.g. Steep Point and Quobba), embayment and shallow-water boat angling (e.g. Shark Bay, Exmouth Gulf and Ningaloo lagoons), and offshore boat angling for demersal and larger pelagic species (e.g. off Ningaloo). The predominant target species include the tropical species such as emperors, tropical snappers, groupers, mackerels, trevallies, and other game fish. Temperate species at the northern end of their ranges such as pink snapper, tailor and whiting also provide significant catches, particularly in Shark Bay (WAFIC 2016).

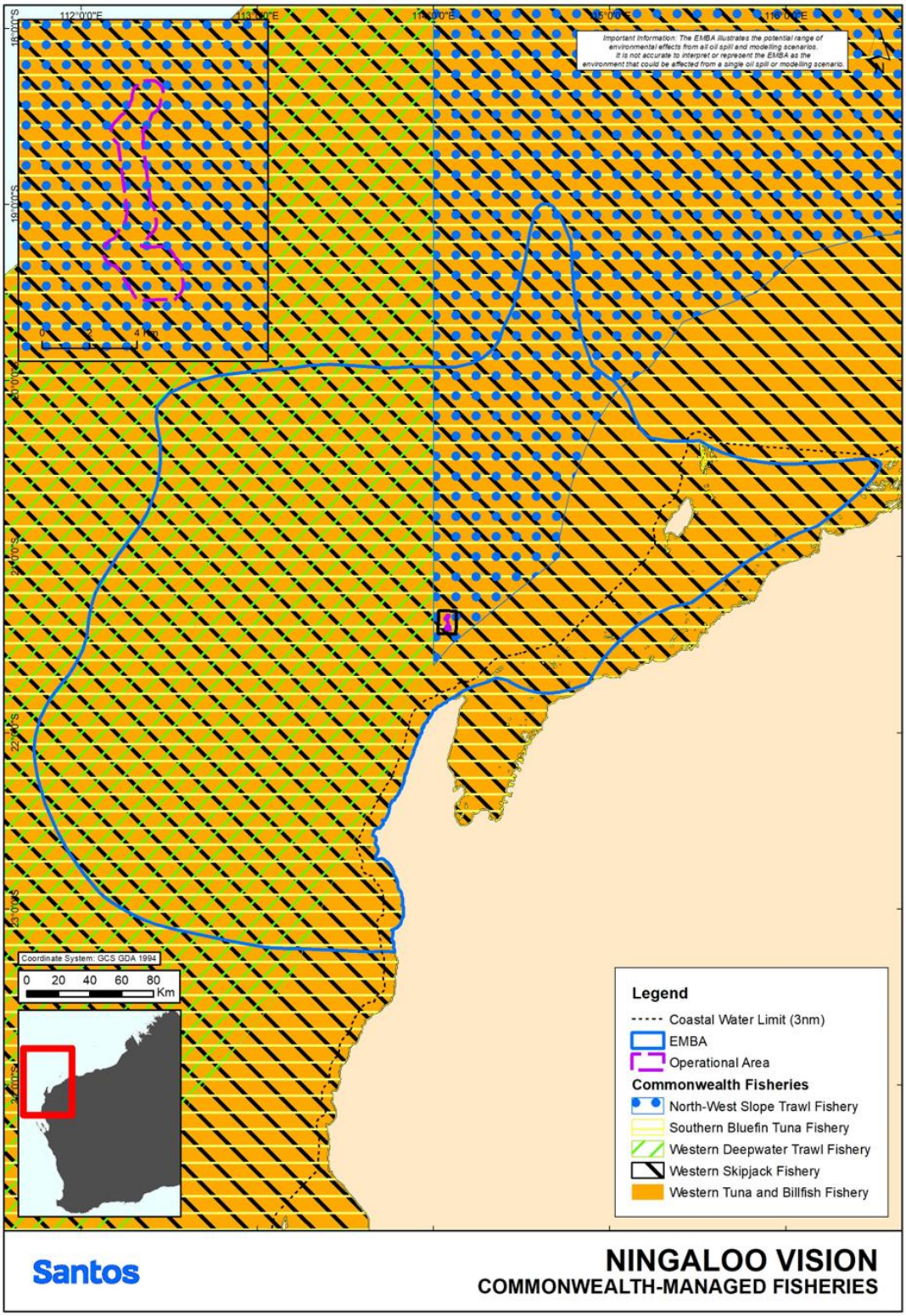


Figure 19: Commonwealth commercial fisheries within the environment that may be affected and operational area

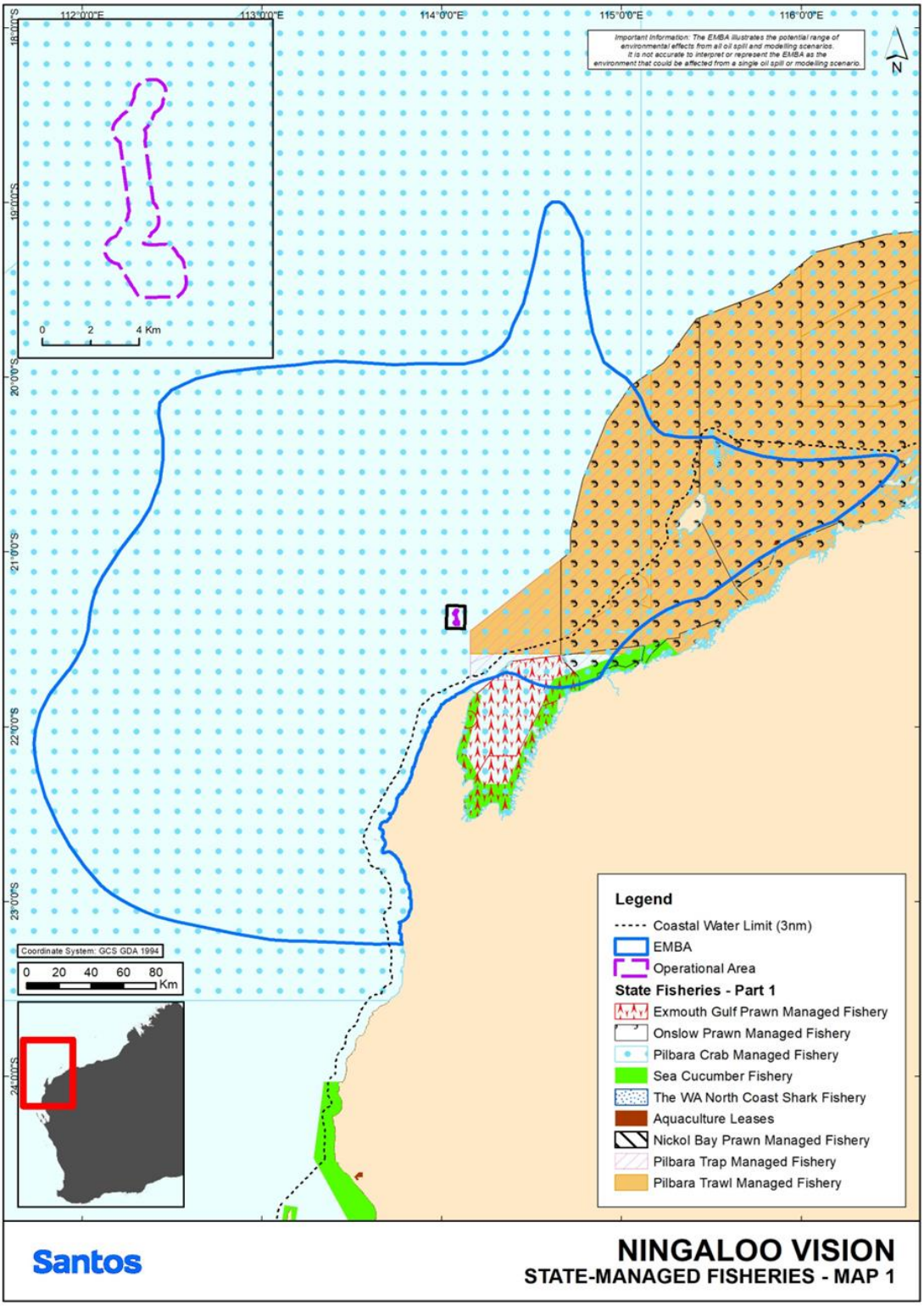


Figure 20: State commercial fisheries within the environment that may be affected and the operational area

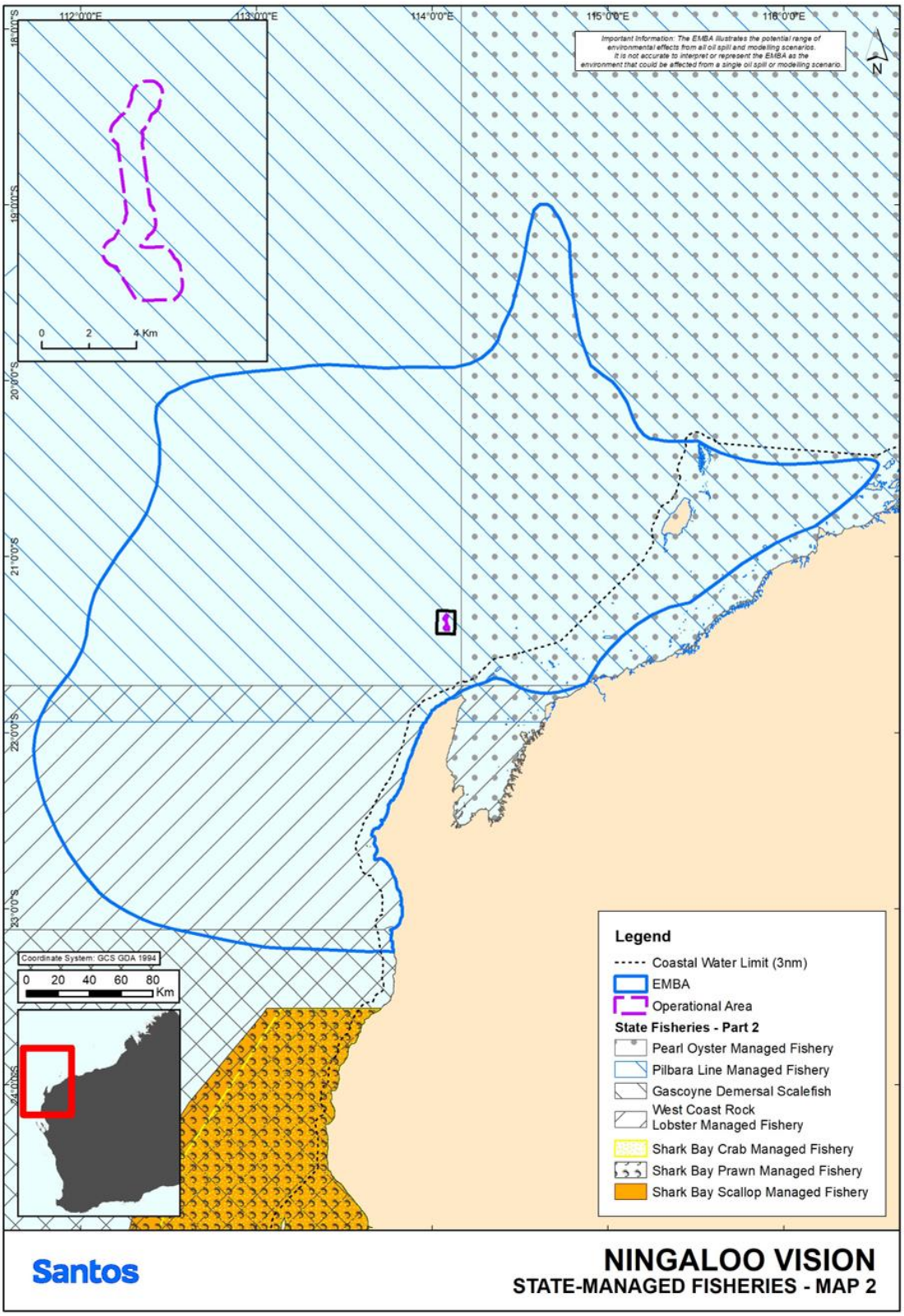


Figure 21: State commercial fisheries within the environment that may be affected and the operational area

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Appendix D Protected Matters Search Tool Reports

Note: PMST Search outputs from the DCCEEW Protected Matters Search tool are in the order of

1 – Operational Area

2 – EMBA

3 - MEVA

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: 07-Dec-2023

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:	2
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	26
Listed Migratory Species:	41

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:	64
Whales and Other Cetaceans:	30
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	1
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:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	47
Key Ecological Features (Marine):	3
Biologically Important Areas:	9
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	Buffer Status
Commonwealth Marine Areas (EPBC Act)	In buffer area only
Commonwealth Marine Areas (EPBC Act)	In feature area

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	Buffer Status
BIRD			
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Phaethon lepturus fulvus Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area	In feature area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Sternula nereis nereis			
Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche carteri			
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area	In feature area
FISH			
Thunnus maccoyii			
Southern Bluefin Tuna [69402]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area
MAMMAL			
Balaenoptera borealis			
Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Balaenoptera musculus			
Blue Whale [36]	Endangered	Migration route known to occur within area	In feature area
Balaenoptera physalus			
Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Eubalaena australis			
Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In feature area
REPTILE			
Aipysurus apraefrontalis			
Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Caretta caretta			
Loggerhead Turtle [1763]	Endangered	Congregation or aggregation known to occur within area	In feature area
Chelonia mydas			
Green Turtle [1765]	Vulnerable	Congregation or aggregation known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Congregation or aggregation known to occur within area	In feature area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area	In feature area
SHARK			
Carcharias taurus (west coast population) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat may occur within area	In feature area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area	In feature area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Sphyrna lewini Scalloped Hammerhead [85267]	Conservation Dependent	Species or species habitat likely to occur within area	In feature area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area	In feature area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat may occur within area	In feature area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat likely to occur within area	In feature area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area	In feature area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
Phaethon lepturus White-tailed Tropicbird [1014]		Species or species habitat known to occur within area	In feature area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area	In feature area
Migratory Marine Species			
Anoxypristis cuspidata Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat may occur within area	In feature area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area	In feature area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area	In feature area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area	In feature area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Congregation or aggregation known to occur within area	In feature area
Chelonia mydas Green Turtle [1765]	Vulnerable	Congregation or aggregation known to occur within area	In feature area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area	In feature area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Congregation or aggregation known to occur within area	In feature area
Eubalaena australis as Balaena glacialis australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In feature area
Isurus oxyrinchus Shortfin Mako, Mako Shark [79073]		Species or species habitat likely to occur within area	In feature area
Isurus paucus Longfin Mako [82947]		Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area	In feature area
Mobula alfredi as Manta alfredi Reef Manta Ray, Coastal Manta Ray [90033]		Species or species habitat known to occur within area	In buffer area only
Mobula birostris as Manta birostris Giant Manta Ray [90034]		Species or species habitat known to occur within area	In feature area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area	In feature area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat may occur within area	In feature area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In feature area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area	In feature area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area	In feature area
Rhincodon typus Whale Shark [66680]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Sousa sahulensis as Sousa chinensis Australian Humpback Dolphin [87942]		Species or species habitat may occur within area	In feature area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

[Resource Information]

Listed Marine Species

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Anous stolidus](#) Common Noddy [825]		Species or species habitat may occur within area	In feature area
[Ardenna carneipes as Puffinus carneipes](#) Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat may occur within area	In feature area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
[Calidris canutus](#) Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
[Calonectris leucomelas](#) Streaked Shearwater [1077]		Species or species habitat likely to occur within area	In feature area
[Fregata ariel](#) Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area	In feature area
[Macronectes giganteus](#) Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area	In feature area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
[Phaethon lepturus](#) White-tailed Tropicbird [1014]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Phaethon lepturus fulvus](#) Christmas Island White-tailed Tropicbird, Golden Bosunbird [26021]	Endangered	Species or species habitat may occur within area	In feature area
[Pterodroma mollis](#) Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area	In feature area
[Thalassarche carteri](#) Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat may occur within area	In feature area
Fish			
[Acentronura larsonae](#) Helen's Pygmy Pipehorse [66186]		Species or species habitat may occur within area	In feature area
[Bulbonaricus brauni](#) Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area	In feature area
[Campichthys tricarinatus](#) Three-keel Pipefish [66192]		Species or species habitat may occur within area	In feature area
[Choeroichthys brachysoma](#) Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area	In feature area
[Choeroichthys latispinosus](#) Muiron Island Pipefish [66196]		Species or species habitat may occur within area	In feature area
[Choeroichthys suillus](#) Pig-snouted Pipefish [66198]		Species or species habitat may occur within area	In feature area
[Doryrhamphus dactyliophorus](#) Banded Pipefish, Ringed Pipefish [66210]		Species or species habitat may occur within area	In feature area
[Doryrhamphus janssi](#) Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Doryrhamphus multiannulatus Many-banded Pipefish [66717]		Species or species habitat may occur within area	In feature area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area	In feature area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area	In feature area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area	In feature area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area	In feature area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area	In feature area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area	In feature area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area	In feature area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area	In feature area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area	In feature area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area	In feature area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area	In feature area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area	In feature area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area	In feature area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area	In feature area
Phoxocampus belcheri Black Rock Pipefish [66719]		Species or species habitat may occur within area	In feature area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area	In feature area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area	In feature area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area	In feature area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area	In feature area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Trachyrhamphus longirostris](#) Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area	In feature area
Reptile			
[Aipysurus apraefrontalis](#) Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
[Aipysurus duboisii](#) Dubois' Sea Snake, Dubois' Seasnake, Reef Shallows Sea Snake [1116]		Species or species habitat may occur within area	In feature area
[Aipysurus laevis](#) Olive Sea Snake, Olive-brown Sea Snake [1120]		Species or species habitat may occur within area	In feature area
[Aipysurus mosaicus as Aipysurus eydouxii](#) Mosaic Sea Snake [87261]		Species or species habitat may occur within area	In feature area
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Congregation or aggregation known to occur within area	In feature area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Congregation or aggregation known to occur within area	In feature area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area	In feature area
[Emydocephalus annulatus](#) Eastern Turtle-headed Sea Snake [1125]		Species or species habitat may occur within area	In buffer area only
[Ephalophis greyi](#) Mangrove Sea Snake [1127]		Species or species habitat may occur within area	In feature area
[Eretmochelys imbricata](#) Hawksbill Turtle [1766]	Vulnerable	Congregation or aggregation known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hydrophis elegans Elegant Sea Snake, Bar-bellied Sea Snake [1104]		Species or species habitat may occur within area	In feature area
Hydrophis kingii as Disteira kingii Spectacled Sea Snake [93511]		Species or species habitat may occur within area	In feature area
Hydrophis major as Disteira major Olive-headed Sea Snake [93512]		Species or species habitat may occur within area	In feature area
Hydrophis ornatus Spotted Sea Snake, Ornate Reef Sea Snake [1111]		Species or species habitat may occur within area	In feature area
Hydrophis peronii as Acalyptophis peronii Horned Sea Snake [93509]		Species or species habitat may occur within area	In feature area
Hydrophis platurus as Pelamis platurus Yellow-bellied Sea Snake [93517]		Species or species habitat may occur within area	In feature area
Hydrophis stokesii as Astrotia stokesii Stokes' Sea Snake [93510]		Species or species habitat may occur within area	In feature area
Natator depressus Flatback Turtle [59257]	Vulnerable	Congregation or aggregation known to occur within area	In feature area

Whales and Other Cetaceans [Resource Information]

Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area	In feature area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area	In feature area

Current Scientific Name	Status	Type of Presence	Buffer Status
Balaenoptera borealis Sei Whale [34]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat likely to occur within area	In feature area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area	In feature area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In feature area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area	In feature area
Feresa attenuata Pygmy Killer Whale [61]		Species or species habitat may occur within area	In feature area
Globicephala macrorhynchus Short-finned Pilot Whale [62]		Species or species habitat may occur within area	In feature area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In feature area
Kogia breviceps Pygmy Sperm Whale [57]		Species or species habitat may occur within area	In feature area
Kogia sima Dwarf Sperm Whale [85043]		Species or species habitat may occur within area	In feature area

Current Scientific Name	Status	Type of Presence	Buffer Status
Lagenodelphis hosei Fraser's Dolphin, Sarawak Dolphin [41]		Species or species habitat may occur within area	In feature area
Megaptera novaeangliae Humpback Whale [38]		Breeding known to occur within area	In feature area
Mesoplodon densirostris Blainville's Beaked Whale, Dense-beaked Whale [74]		Species or species habitat may occur within area	In feature area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat may occur within area	In feature area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area	In feature area
Peponocephala electra Melon-headed Whale [47]		Species or species habitat may occur within area	In feature area
Physeter macrocephalus Sperm Whale [59]		Species or species habitat may occur within area	In feature area
Pseudorca crassidens False Killer Whale [48]		Species or species habitat likely to occur within area	In feature area
Sousa sahulensis Australian Humpback Dolphin [87942]		Species or species habitat may occur within area	In feature area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area	In feature area
Stenella coeruleoalba Striped Dolphin, Euphrosyne Dolphin [52]		Species or species habitat may occur within area	In feature area

Current Scientific Name	Status	Type of Presence	Buffer Status
Stenella longirostris Long-snouted Spinner Dolphin [29]		Species or species habitat may occur within area	In feature area
Steno bredanensis Rough-toothed Dolphin [30]		Species or species habitat may occur within area	In feature area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat may occur within area	In buffer area only
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area	In feature area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In feature area
Ziphius cavirostris Cuvier's Beaked Whale, Goose-beaked Whale [56]		Species or species habitat may occur within area	In feature area

Australian Marine Parks [Resource Information]

Park Name	Zone & IUCN Categories	Buffer Status
Gascoyne	Multiple Use Zone (IUCN VI)	In buffer area only

Habitat Critical to the Survival of Marine Turtles			
Scientific Name	Behaviour	Presence	Buffer Status
Aug - Sep			
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur	In feature area
Dec - Jan			
Chelonia mydas Green Turtle [1765]	Nesting	Known to occur	In buffer area only
Nov-Feb			
Caretta caretta Loggerhead Turtle [1763]	Nesting	Known to occur	In buffer area only
Nov - May			

Scientific Name	Behaviour	Presence	Buffer Status
Eretmochelys imbricata Hawksbill Turtle [1766]	Nesting	Known to occur	In buffer area only

Extra Information

[Resource Information]

EPBC Act Referrals

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Action clearly unacceptable				
Highlands 3D Marine Seismic Survey	2012/6680	Action Clearly Unacceptable	Completed	In buffer area only
Controlled action				
'Van Gogh' Petroleum Field Development	2007/3213	Controlled Action	Post-Approval	In feature area
Development of Coniston/Novara fields within the Exmouth Sub-basin	2011/5995	Controlled Action	Post-Approval	In feature area
Development of Stybarrow petroleum field incl drilling and facility installation	2004/1469	Controlled Action	Post-Approval	In feature area
Enfield full field development	2001/257	Controlled Action	Post-Approval	In feature area
Greater Enfield (Vincent) Development	2005/2110	Controlled Action	Post-Approval	In feature area
Pyrenees Oil Fields Development	2005/2034	Controlled Action	Post-Approval	In feature area
Vincent Appraisal Well	2000/22	Controlled Action	Post-Approval	In feature area
Not controlled action				
'Van Gogh' Oil Appraisal Drilling Program, Exploration Permit Area WA-155-P(1)	2006/3148	Not Controlled Action	Completed	In feature area
Bultaco-2, Laverda-2, Laverda-3 and Montesa-2 Appraisal Wells	2000/103	Not Controlled Action	Completed	In buffer area only
Carnarvon 3D Marine Seismic Survey	2004/1890	Not Controlled Action	Completed	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Exploration drilling well WA-155-P(1)	2003/971	Not Controlled Action	Completed	In feature area
Exploration Well in Permit Area WA-155-P(1)	2002/759	Not Controlled Action	Completed	In feature area
Exploratory drilling in permit area WA-225-P	2001/490	Not Controlled Action	Completed	In feature area
HCA05X Macedon Experimental Survey	2004/1926	Not Controlled Action	Completed	In feature area
Montesa-1 and Bultaco-1 Exploration Wells	2000/102	Not Controlled Action	Completed	In buffer area only
Subsea Gas Pipeline From Stybarrow Field to Griffin Venture Gas Export Pipeline	2005/2033	Not Controlled Action	Completed	In feature area
Wanda Offshore Research Project, 80 km north-east of Exmouth, WA	2018/8293	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
2D and 3D seismic surveys	2005/2151	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
3D Seismic Survey, WA	2008/4428	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Apache Northwest Shelf Van Gogh Field Appraisal Drilling Program	2007/3495	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Babylon 3D Marine Seismic Survey, Commonwealth Waters, nr Exmouth WA	2013/7081	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
CVG 3D Marine Seismic Survey	2012/6654	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Deep Water Northwest Shelf 2D Seismic Survey	2007/3260	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Eendracht Multi-Client 3D Marine Seismic Survey	2009/4749	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action (particular manner)				
Enfield M3 & Vincent 4D Marine Seismic Surveys	2008/3981	Not Controlled Action (Particular Manner)	Completed	In feature area
Enfield M3 4D, Vincent 4D & 4D Line Test Marine Seismic Surveys	2008/4122	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Enfield M4 4D Marine Seismic Survey	2008/4558	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Enfield oilfield 3D Seismic Survey	2006/3132	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Gazelle 3D Marine Seismic Survey in WA-399-P and WA-42-L	2010/5570	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Huzzas MC3D Marine Seismic Survey (HZ-13) Carnarvon Basin, offshore WA	2013/7003	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Huzzas phase 2 marine seismic survey, Exmouth Plateau, Northern Carnarvon Basin, WA	2013/7093	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Laverda 3D Marine Seismic Survey and Vincent M1 4D Marine Seismic Survey	2010/5415	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Macedon Gas Field Development	2008/4605	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Ocean Bottom Cable Seismic Program, WA-264-P	2007/3844	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Ocean Bottom Cable Seismic Survey	2005/2017	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Pyrenees 4D Marine Seismic Monitor Survey, HCA12A	2012/6579	Not Controlled Action (Particular	Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action (particular manner)				
		Manner)		
Pyrenees-Macedon 3D marine seismic survey	2005/2325	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Rydal-1 Petroleum Exploration Well, WA	2012/6522	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Stybarrow 4D Marine Seismic Survey	2011/5810	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Stybarrow Baseline 4D marine seismic survey	2008/4530	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Vincent M1 and Enfield M5 4D Marine Seismic Survey	2010/5720	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Warramunga Non-Inclusive 3D Seismic Survey	2008/4553	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
Referral decision				
CVG 3D Marine Seismic Survey	2012/6270	Referral Decision	Completed	In feature area
Enfield 4D Marine Seismic Surveys, Production Permit WA-28-L	2005/2370	Referral Decision	Completed	In feature area
Stybarrow Baseline 4D Marine Seismic Survey (Permit Areas WA-255-P, WA-32-L, WA-	2008/4165	Referral Decision	Completed	In buffer area only

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	Buffer Status
Ancient coastline at 125 m depth contour	North-west	In buffer area only

Name	Region	Buffer Status
Canyons linking the Cuvier Abyssal Plain and the Cape Range Peninsula	North-west	In buffer area only
Continental Slope Demersal Fish Communities	North-west	In feature area

Biologically Important Areas

Scientific Name	Behaviour	Presence	Buffer Status
Marine Turtles			
Caretta caretta Loggerhead Turtle [1763]	Internesting buffer	Known to occur	In buffer area only
Chelonia mydas Green Turtle [1765]	Internesting buffer	Known to occur	In buffer area only
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting buffer	Known to occur	In buffer area only
Natator depressus Flatback Turtle [59257]	Internesting buffer	Known to occur	In feature area
Seabirds			
Ardenna pacifica Wedge-tailed Shearwater [84292]	Breeding	Known to occur	In feature area
Sharks			
Rhincodon typus Whale Shark [66680]	Foraging	Known to occur	In feature area
Whales			
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Distribution	Known to occur	In feature area
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Migration	Known to occur	In feature area
Megaptera novaeangliae Humpback Whale [38]	Migration (north and south)	Known to occur	In feature area

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 are 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

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

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

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
- 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: 21-May-2024

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:	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:	54
Listed Migratory Species:	62

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:	4
Commonwealth Heritage Places:	2
Listed Marine Species:	103
Whales and Other Cetaceans:	32
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:	31
Regional Forest Agreements:	None
Nationally Important Wetlands:	1
EPBC Act Referrals:	165
Key Ecological Features (Marine):	5
Biologically Important Areas:	38
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

World Heritage Properties		[Resource Information]
Name	State	Legal Status
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		
Aphelocephala leucopsis		
Southern Whiteface [529]	Vulnerable	Species or species habitat may 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

Scientific Name	Threatened Category	Presence Text
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	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
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]	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 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
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
CRUSTACEAN		
Kumonga exleyi		
Cape Range Remipede [86875]	Vulnerable	Species or species habitat likely to occur within area
FISH		
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
Thunnus maccoyii		
Southern Bluefin Tuna [69402]	Conservation Dependent	Breeding known to occur within area
MAMMAL		

Scientific Name	Threatened Category	Presence Text
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
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
Osphranter robustus isabellinus Barrow Island Wallaroo, Barrow Island Euro [89262]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Petrogale lateralis lateralis		
Black-flanked Rock-wallaby, Mororong, 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
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
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

Scientific Name	Threatened Category	Presence Text
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 Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	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
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

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 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
[Sterna dougallii](#) Roseate Tern [817]		Breeding known to occur within area
[Sternula albifrons](#) Little Tern [82849]		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 likely to occur within area

Scientific Name	Threatened Category	Presence Text
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
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
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

Scientific Name	Threatened Category	Presence Text
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
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]		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

Scientific Name	Threatened Category	Presence Text
Pristis pristis		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	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
Sousa sahulensis as Sousa chinensis		
Australian Humpback Dolphin [87942]		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 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 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

Scientific Name	Threatened Category	Presence Text
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 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
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
Defence - LEARMONTH - AIR WEAPONS RANGE [50193]	WA
Defence - LEARMONTH RADAR SITE - VLAMING HEAD EXMOUTH [50001]	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

Scientific Name	Threatened Category	Presence Text
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 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 likely 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

Scientific Name	Threatened Category	Presence Text
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 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
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

Scientific Name	Threatened Category	Presence Text
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 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
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

Scientific Name	Threatened Category	Presence Text
Sternula albifrons as Sterna albifrons Little Tern [82849]		Breeding known to occur within area
Sternula nereis as Sterna nereis Fairy Tern [82949]		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
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
Hydrophis czeblukovi Fine-spined Sea Snake [59233]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
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
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area

Current Scientific Name	Status	Type of Presence
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
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]		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]		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
Gascoyne	Habitat Protection Zone (IUCN IV)
Gascoyne	Multiple Use Zone (IUCN VI)
Montebello	Multiple Use Zone (IUCN VI)
Gascoyne	National Park Zone (IUCN II)
Ningaloo	National Park Zone (IUCN II)

Park Name	Zone & IUCN Categories
Ningaloo	Recreational Use Zone (IUCN IV)
Ningaloo	Recreational Use Zone (IUCN IV)

Habitat Critical to the Survival of Marine Turtles		[Resource Information]
Scientific Name	Behaviour	Presence
Aug - Sep		
Natator depressus		
Flatback Turtle [59257]	Nesting	Known to occur
Dec - Jan		
Chelonia mydas		
Green Turtle [1765]	Nesting	Known to occur
Nov-Feb		
Caretta caretta		
Loggerhead Turtle [1763]	Nesting	Known to occur
Nov - May		
Eretmochelys imbricata		
Hawksbill Turtle [1766]	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
Bessieres Island	Nature Reserve	WA
Boodie, Double Middle Islands	Nature Reserve	WA
Cape Range	National Park	WA
Cape Range (South)	National Park	WA
Great Sandy Island	Nature Reserve	WA
Jurabi Coastal Park	5(1)(h) Reserve	WA

Protected Area Name	Reserve Type	State
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
Ningaloo	Marine Park	WA
North Sandy Island	Nature Reserve	WA
Nyingguulu (Ningaloo) Coastal Reserve	5(1)(h) Reserve	WA
Round Island	Nature Reserve	WA
Serrurier Island	Nature Reserve	WA
Thevenard Island	Nature Reserve	WA
Unnamed WA36913	Nature Reserve	WA
Unnamed WA36915	Nature Reserve	WA
Unnamed WA37500	5(1)(g) Reserve	WA
Unnamed WA40322	5(1)(h) Reserve	WA
Unnamed WA40828	5(1)(h) Reserve	WA
Unnamed WA41080	5(1)(h) Reserve	WA
Unnamed WA44665	5(1)(h) Reserve	WA
Unnamed WA44667	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

Title of referral	Reference	Referral Outcome	Assessment Status
Gorgon Gas Development	2003/1294		Post-Approval
Ningaloo Lighthouse Development, 17km north west Exmouth, Western Australia	2020/8693		Post-Approval
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
Balmoral South Iron Ore Mine	2008/4236	Controlled Action	Post-Approval
Boating Facility	2002/830	Controlled Action	Completed
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 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
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
Eramurra Industrial Salt Project, near Karratha, WA	2019/8448	Controlled Action	Completed
Gorgon Gas Development 4th Train Proposal	2011/5942	Controlled Action	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
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
Pluto Gas Project	2005/2258	Controlled Action	Completed
Pluto Gas Project Including Site B	2006/2968	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
Vincent Appraisal Well	2000/22	Controlled Action	Post-Approval
Yardie Creek Road Realignment Project	2021/8967	Controlled Action	Assessment Approach
Not controlled action			
'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

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Barrow Island 2D Seismic survey	2006/2667	Not Controlled Action	Completed
Boating Facility	2002/832	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
Construction and operation of an unmanned sea platform and connecting pipeline to Varanus Island for	2004/1703	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
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
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 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

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
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
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
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
Project Highclere Geophysical Survey	2021/9023	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
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
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

Title of referral	Reference	Referral Outcome	Assessment Status
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
"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 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
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 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
3D seismic survey	2006/2715	Not Controlled Action (Particular Manner)	Post-Approval
3D Seismic Survey, WA	2008/4428	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
3D Seismic Survey in the Carnarvon Bsin on the North West Shelf	2002/778	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
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
Babylon 3D Marine Seismic Survey, Commonwealth Waters, nr Exmouth WA	2013/7081	Not Controlled Action (Particular Manner)	Post-Approval
Balnaves Condensate Field Development	2011/6188	Not Controlled Action (Particular Manner)	Post-Approval
Bonaventure 3D seismic survey	2006/2514	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

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular 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
CVG 3D Marine Seismic Survey	2012/6654	Not Controlled Action (Particular Manner)	Post-Approval
DAVROS MC 3D marine seismic survey northwaet of Dampier, WA	2013/7092	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Drilling Program	2010/5532	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Northwest Shelf 2D Seismic Survey	2007/3260	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
Eendracht Multi-Client 3D Marine Seismic Survey	2009/4749	Not Controlled Action (Particular Manner)	Post-Approval
Enfield M3 & Vincent 4D Marine Seismic Surveys	2008/3981	Not Controlled Action (Particular	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
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
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
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

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
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
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 Manner)	Post-Approval
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	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
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
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
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

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
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
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
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
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
Tortilla 2D Seismic Survey, WA	2011/6110	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
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
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
Referral decision			
3D Marine Seismic Survey in the offshore northwest Carnarvon Basin	2011/6175	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

Title of referral	Reference	Referral Outcome	Assessment Status
Referral decision			
Enfield 4D Marine Seismic Surveys, Production Permit WA-28-L	2005/2370	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

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]	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
Eretmochelys imbricata Hawksbill Turtle [1766]	Mating	Known to occur

Scientific Name	Behaviour	Presence
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
Sterna dougallii Roseate Tern [817]	Breeding	Known to occur
Sternula nereis Fairy Tern [82949]	Breeding	Known to occur
Thalasseus bengalensis Lesser Crested Tern [66546]	Breeding	Known to occur
Sharks		
Rhincodon typus Whale Shark [66680]	Foraging	Known to occur

Scientific Name	Behaviour	Presence
Rhincodon typus Whale Shark [66680]	Foraging (high density prey)	Known to occur
Whales		
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Distribution	Known to occur
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 are 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

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

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

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
- 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: 24-May-2024

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:	44
Listed Migratory Species:	59

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:	4
Commonwealth Heritage Places:	2
Listed Marine Species:	89
Whales and Other Cetaceans:	32
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	5
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:	7
Regional Forest Agreements:	None
Nationally Important Wetlands:	1
EPBC Act Referrals:	98
Key Ecological Features (Marine):	5
Biologically Important Areas:	22
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Legal Status
The Ningaloo Coast	WA	Declared property

National Heritage Places [Resource Information]

Name	State	Legal Status
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 likely to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	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

Scientific Name	Threatened Category	Presence Text
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely 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
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pezoporus occidentalis Night Parrot [59350]	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
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 nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
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
CRUSTACEAN		
Kumonga exleyi		
Cape Range Remipede [86875]	Vulnerable	Species or species habitat likely to occur within area
FISH		
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
Thunnus maccoyii		
Southern Bluefin Tuna [69402]	Conservation Dependent	Breeding 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

Scientific Name	Threatened Category	Presence Text
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Petrogale lateralis lateralis Black-flanked Rock-wallaby, Mororong, 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 may occur within area
REPTILE		
Aipysurus apraefrontalis Short-nosed Sea Snake, Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely 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	Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area

Scientific Name	Threatened Category	Presence Text
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		
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	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
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

Scientific Name	Threatened Category	Presence Text
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
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
Phaethon lepturus White-tailed Tropicbird [1014]		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]		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 likely to occur within area
Balaenoptera bonaerensis Antarctic Minke Whale, Dark-shoulder Minke Whale [67812]		Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
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
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
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

Scientific Name	Threatened Category	Presence Text
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
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]		Species or species habitat likely 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 Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat likely 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
Sousa sahulensis as Sousa chinensis		
Australian Humpback Dolphin [87942]		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 likely 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
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
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
Defence - LEARMONTH RADAR SITE - VLAMING HEAD EXMOUTH [50001]	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 likely 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 may 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
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to 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

Scientific Name	Threatened Category	Presence Text
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
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
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
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

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 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]		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

Scientific Name	Threatened Category	Presence Text
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
Doryrhamphus dactyliophorus Banded Pipefish, Ringed Pipefish [66210]		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 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

Scientific Name	Threatened Category	Presence Text
[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 likely 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

Scientific Name	Threatened Category	Presence Text
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
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	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
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 major as Disteira major Olive-headed Sea Snake [93512]		Species or species habitat may occur within area

Scientific Name	Threatened Category	Presence Text
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
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

Current Scientific Name	Status	Type of Presence
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
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

Current Scientific Name	Status	Type of Presence
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]		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]		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
Gascoyne	Habitat Protection Zone (IUCN IV)
Gascoyne	Multiple Use Zone (IUCN VI)
Ningaloo	National Park Zone (IUCN II)
Ningaloo	Recreational Use Zone (IUCN IV)
Ningaloo	Recreational Use Zone (IUCN IV)

Habitat Critical to the Survival of Marine Turtles		[Resource Information]
Scientific Name	Behaviour	Presence
Aug - Sep		
Natator depressus Flatback Turtle [59257]	Nesting	Known to occur
Dec - Jan		
Chelonia mydas Green Turtle [1765]	Nesting	Known to occur
Nov-Feb		

Scientific Name	Behaviour	Presence
Caretta caretta		
Loggerhead Turtle [1763]	Nesting	Known to occur
Nov - May		
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Nesting	Known to occur

Extra Information

State and Territory Reserves		[Resource Information]
Protected Area Name	Reserve Type	State
Cape Range	National Park	WA
Cape Range (South)	National Park	WA
Jurabi Coastal Park	5(1)(h) Reserve	WA
Muiron Islands	Nature Reserve	WA
Muiron Islands	Marine Management Area	WA
Ningaloo	Marine Park	WA
Nyingguulu (Ningaloo) Coastal Reserve	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
Gorgon Gas Development	2003/1294		Post-Approval
Ningaloo Lighthouse Development, 17km north west Exmouth, Western Australia	2020/8693		Post-Approval
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

Title of referral	Reference	Referral Outcome	Assessment Status
Controlled action			
Construct and operate LNG & domestic gas plant including onshore and offshore facilities - Wheatston	2008/4469	Controlled Action	Post-Approval
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 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
Enfield full field development	2001/257	Controlled Action	Post-Approval
Equus Gas Fields Development Project, Carnarvon Basin	2012/6301	Controlled Action	Completed
Gorgon Gas Development 4th Train Proposal	2011/5942	Controlled Action	Post-Approval
Greater Enfield (Vincent) Development	2005/2110	Controlled Action	Post-Approval
Light Crude Oil Production	2001/365	Controlled Action	Post-Approval
Pluto Gas Project	2005/2258	Controlled Action	Completed
Pyrenees Oil Fields Development	2005/2034	Controlled Action	Post-Approval
Vincent Appraisal Well	2000/22	Controlled Action	Post-Approval
Yardie Creek Road Realignment Project	2021/8967	Controlled Action	Assessment Approach
Not controlled action			
'Van Gogh' Oil Appraisal Drilling Program, Exploration Permit Area WA-155-P(1)	2006/3148	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	2004/1703	Not Controlled Action	Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Island for			
Development of Halyard Field off the west coast of WA	2010/5611	Not Controlled Action	Completed
Exploration drilling well WA-155-P(1)	2003/971	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
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
Infill Production Well (Griffin-9)	2001/417	Not Controlled Action	Completed
Klammer 2D Seismic Survey	2002/868	Not Controlled Action	Completed
Montesa-1 and Bultaco-1 Exploration Wells	2000/102	Not Controlled Action	Completed
Project Highclere Geophysical Survey	2021/9023	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
Wanda Offshore Research Project, 80 km north-east of Exmouth, WA	2018/8293	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
"Leanne" offshore 3D seismic exploration, WA-356-P	2005/1938	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
2D and 3D seismic surveys	2005/2151	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 Surveys - Contos CT-13 & Supertubes CT-13, offshore WA	2013/6901	Not Controlled Action (Particular Manner)	Post-Approval
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
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
Babylon 3D Marine Seismic Survey, Commonwealth Waters, nr Exmouth WA	2013/7081	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
CVG 3D Marine Seismic Survey	2012/6654	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
Deep Water Drilling Program	2010/5532	Not Controlled Action (Particular Manner)	Post-Approval
Deep Water Northwest Shelf 2D Seismic Survey	2007/3260	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
Eendracht Multi-Client 3D Marine Seismic Survey	2009/4749	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
Gazelle 3D Marine Seismic Survey in WA-399-P and WA-42-L	2010/5570	Not Controlled Action (Particular Manner)	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
Glencoe 3D Marine Seismic Survey WA-390-P	2007/3684	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
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
John Ross & Rosella Off Bottom Cable Seismic Exploration Program	2008/3966	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
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 reconnaissance survey	2008/4466	Not Controlled Action (Particular	Post-Approval

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
		Manner)	
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
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
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
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

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action (particular manner)			
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
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
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 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
Westralia SPAN Marine Seismic Survey, WA & NT	2012/6463	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
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
Stybarrow Baseline 4D Marine Seismic Survey (Permit Areas WA-255-P, WA-32-L, WA-	2008/4165	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

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		
Caretta caretta		
Loggerhead Turtle [1763]	Internesting buffer	Known to occur

Scientific Name	Behaviour	Presence
Caretta caretta Loggerhead Turtle [1763]	Nesting	Known to occur
Chelonia mydas Green Turtle [1765]	Internesting buffer	Known to occur
Chelonia mydas Green Turtle [1765]	Nesting	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Internesting buffer	Known to occur
Eretmochelys imbricata Hawksbill Turtle [1766]	Nesting	Known to occur
Natator depressus Flatback Turtle [59257]	Internesting buffer	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
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]	Distribution	Known to occur

Scientific Name	Behaviour	Presence
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 are 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

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

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

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
- 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 Report for Hydrocarbon Spill EMBA

Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Register

Search Criteria

47 Aboriginal Cultural Heritage (ACH) Register in Shapefile - NV_CoPFAR_Smoothed_EMBA_Rev1

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

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 94 Datum.

Basemap Copyright

Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Register

ID	Name	Boundary Restricted	Boundary Reliable	Culturally Sensitive	Culturally Sensitive Nature	Status	Place Type	Knowledge Holders	Legacy ID
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
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
6596	POINT ANDERSON.	Yes	Yes	Yes	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Camp; Hunting Place; Midden; Shell; Water Source	*Registered Knowledge Holder names available from DPLH	P06341
6723	MULANDA 2	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06257
6724	MULANDA 3	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06258
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
6769	MULANDA 1	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P06180

Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Register

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
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
7126	MESA CAMP	No	No	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden	*Registered Knowledge Holder names available from DPLH	P05792
7203	BAUBOODJOO POINT (Bruboodjoo Midden Site)	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Camp; Hunting Place; Midden	*Registered Knowledge Holder names available from DPLH	P05707
7205	TWIN HILL FISHING PLACE.	No	No	No	No Gender / Initiation Restrictions	Register	Hunting Place	*Registered Knowledge Holder names available from DPLH	P05709
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

Aboriginal Cultural Heritage Inquiry System

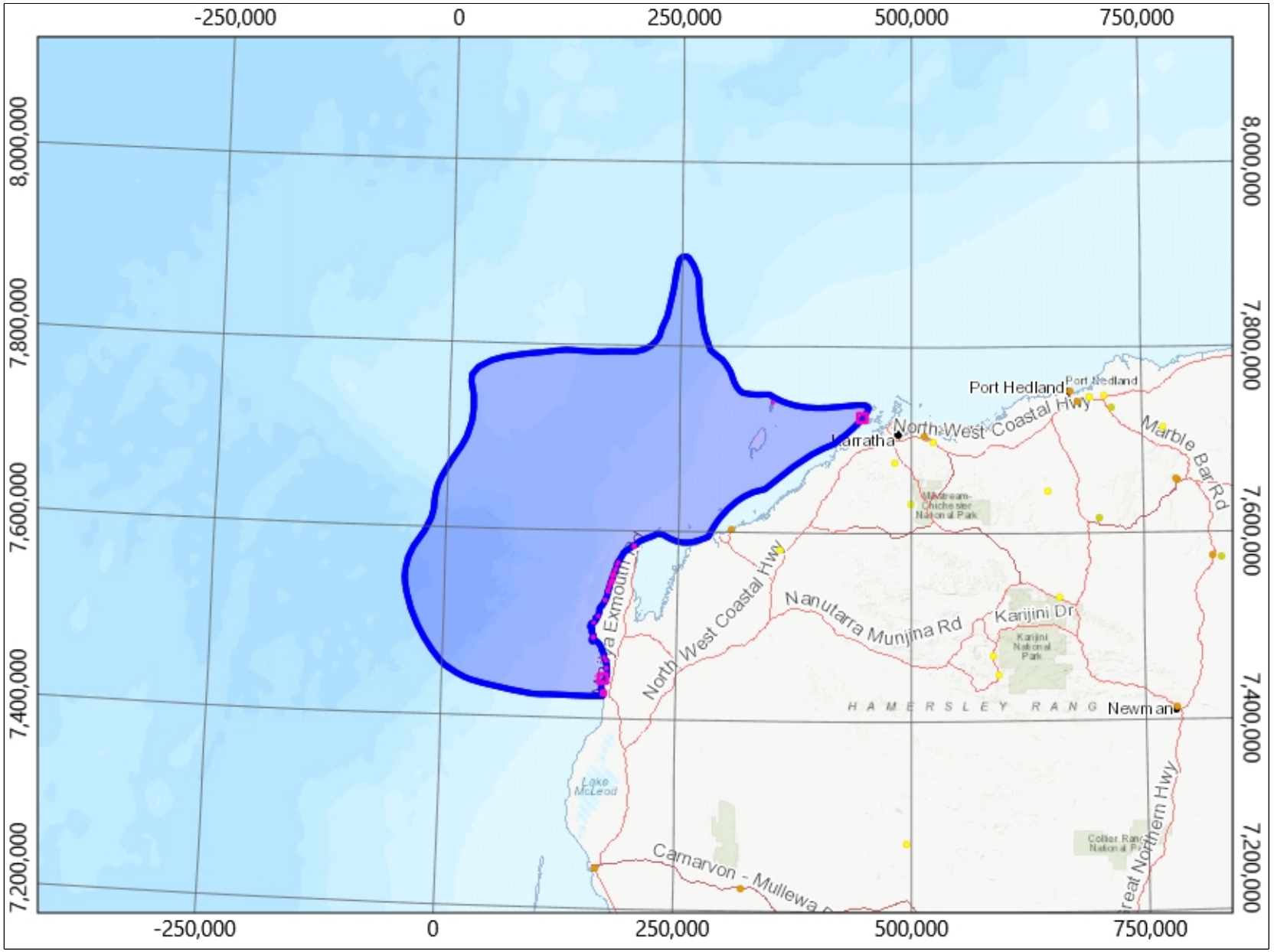
List of Aboriginal Cultural Heritage (ACH) Register

ID	Name	Boundary Restricted	Boundary Reliable	Culturally Sensitive	Culturally Sensitive Nature	Status	Place Type	Knowledge Holders	Legacy ID
7211	MAUD LANDING.	No	No	No	No Gender / Initiation Restrictions	Register	Burial; Camp; Meeting Place; Water Source	*Registered Knowledge Holder names available from DPLH	P05715
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
10381	VLAMING HEAD	Yes	No	Yes	No Gender / Initiation Restrictions	Register	Ritual / Ceremonial; Creation / Dreaming Narrative	*Registered Knowledge Holder names available from DPLH	P01799
11458	NINGALOO (near)	No	No	No	No Gender / Initiation Restrictions	Register	Painting	*Registered Knowledge Holder names available from DPLH	P00701
11820	ENDERBY ISLAND 01	No	No	No	No Gender / Initiation Restrictions	Register	Engraving	*Registered Knowledge Holder names available from DPLH	P00364
16597	Baler Bluff	No	Yes	No	No Gender / Initiation Restrictions	Register	Artefacts / Scatter; Midden; Shell	*Registered Knowledge Holder names available from DPLH	
17193	Ningaloo Station	No	No	No	No Gender / Initiation Restrictions	Register	Burial	*Registered Knowledge Holder names available from DPLH	

Department of Planning, Lands and Heritage

Aboriginal Cultural Heritage Inquiry System

Map of Aboriginal Cultural Heritage (ACH) Register



Legend

- Aboriginal Cultural Heritage (ACH) Register
- Search Area
- Aboriginal Community
  - *Permanent*
  - *Seasonal*
  - *Town Based*
- Town
- Road
- River
- Local Government Authority

220.59 kilometres

Map Scale 1 : 6,680,000

MGA Zone 50 (GDA94)

Appendix F Consultation

Fact sheets

Information for relevant persons

Santos

Ningaloo Vision Cessation of Production and Floating Asset Removal Environment Plan

Activity overview

Santos is planning for the progressive decommissioning of the Ningaloo Vision floating production, storage and offloading (FPSO) vessel and associated subsea infrastructure, the Operational Area for which is located approximately 42 km north-northwest of the Cape Range Peninsula and 57 km north-northwest of Exmouth, Western Australia.

The Ningaloo Vision FPSO currently produces oil from the Van Gogh, Coniston and Novara fields which are approaching their end of field life, at which time production will cease, and the FPSO will depart the field.

The first phase of decommissioning will commence under the Cessation of Production and Floating Asset Removal (CoPFAR) EP, subject to Regulatory approvals. Activities include the removal of floating equipment and preserving and maintaining the remaining infrastructure ahead of future decommissioning activities.

Future decommissioning activities, such as well plug & abandonment and asset removal, will be subject to separate consultation and environmental approvals.

Consultation and feedback

All petroleum activities in Commonwealth waters must have an Environment Plan (EP) accepted by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) before any activities can take place.

Under Commonwealth environment regulations, Santos is required to consult with relevant persons about proposed activities when preparing an EP. A relevant person includes authorities, persons or organisations whose functions, interests or activities may be affected by the proposed activity.

Santos meets this requirement by undertaking consultation in two phases:

- **Preliminary consultation** to understand values and sensitivities and confirm consultation expectations of relevant persons.
- **Consultation** of relevant persons on the specific activities.

This factsheet has been issued to support preliminary consultation. Activity specific consultation is planned to commence on **15 May 2024**, with the consultation period closing on **14 June 2024**. More details on consultation and providing feedback can be found on the back page of this fact sheet.

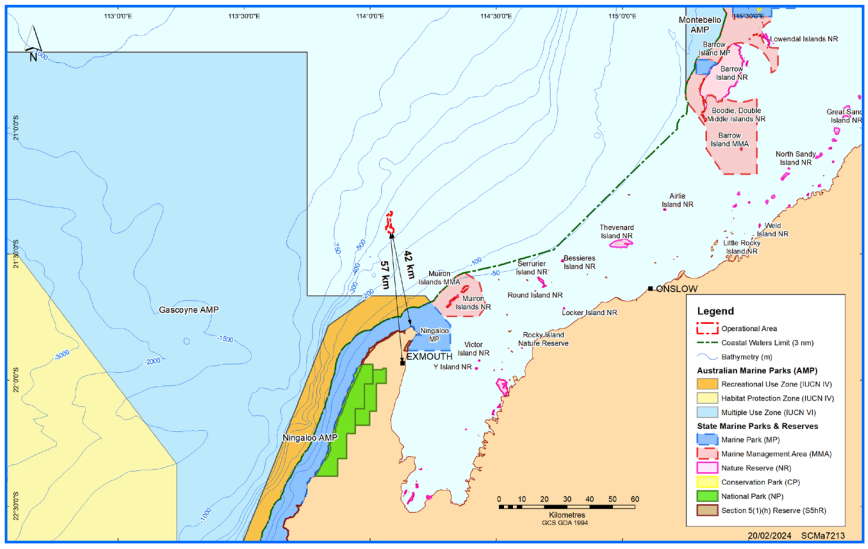


Figure 1. Ningaloo Vision FPSO location

Activity description

Activity details	
Timing	Activities associated with the removal of the floating assets will commence following the end of field life, which could occur at any time during the five-year period of the accepted EP. The floating asset removal activity is planned to take between 45 and 90 days. Individual inspection, maintenance, monitoring and repair (IMMR) campaigns will also be undertaken over the 5 year period and are expected to take approximately 30 days per campaign.
Water depth	The water depth ranges from 340 m in the east of the production licence to 400 m in the west.
Planned activities	The Ningaloo Vision FPSO will depart the Operational Area at the end of field life under the current in-force Ningaloo Vision Operations EP. The disconnectable turret mooring (DTM) system, mooring chains and subsea infrastructure will be temporarily left in place for later retrieval. General field management and IMMR activities for equipment that remains on title may include: • Inspection of the DTM buoy (around 30 m below sea level) and mooring lines (prior to removal). • IMMR of the subsea equipment, risers, flowlines and umbilicals. • Clearing debris (e.g., calcareous marine growth). • Seabed surveys using one or a combination of equipment such as multi-beam echo sounder, side scan sonar, sub bottom profiling, seabed grab sampling, autonomous underwater vehicle, remote operate vehicle or towed camera for identification of debris or raised seabed features. Activities associated with the removal of floating assets include: • Preparatory works on the DTM (e.g. reduction of DTM draft) to make the DTM of a smaller depth to allow access to a slipway, and potential in-water cleaning of the DTM. • Recovery and removal of the DTM and risers from the field and transport to designated waste recycling and disposal facility. • The DTM mooring chains and anchors will remain in the field, with chains laid down on the seabed. However, if deemed safe and practicable to do so, the chains (or partial lengths of them) may be removed as part of the activities covered by this EP.
Vessels	• IMMR activities are expected to be conducted by a single vessel. • Activities associated with the floating asset removal will be carried out by one primary vessel and up to two support vessels.
Aircraft	• Helicopters may be used to transfer crew and equipment to and from vessels and assist in emergency as required.

Description of the natural environment	• The Ningaloo Australian Marine Park (AMP) is located approximately 27 km southwest of the operational area. • The operational area does not contain any shoreline habitat. Due to water depths, there are no primary producer habitats (including coral and seagrass) within the operational area and soft sediment is the dominant habitat. • The operational area includes Biologically Important Areas (BIAs) for protected marine species that include seabirds and whales. • The operational area is located within the Continental Slope Demersal Fish Communities Key Ecological Feature.
Operational Area	The operational area is defined as: • A 500 m radius petroleum safety zone (PSZ) that extends around the DTM. • A 500 m radius around the DTM anchor spread. • A 500 m around and either side of all other subsea field infrastructure. This is consistent with the current in force Ningaloo Vision Operations EP operational area.
Petroleum production licences	Production licence WA-35-L.

Activity purpose and approvals

The Ningaloo Vision Cessation of Production and Floating Asset Removal (CoPFAR) EP is being prepared to meet the requirements of the Commonwealth *Offshore Petroleum and Greenhouse Gas Storage (Environment) Regulations 2023* (OPGGS(E)R) for acceptance by NOPSEMA and is the first step in the Santos' Ningaloo Vision decommissioning approvals pathway by providing a:

- Description of all property brought onto title, including its current status and condition.
- Description of the activities associated with the cessation of production phase of the Ningaloo Vision Development up until the field decommissioning phase.
- Detailed plan for the removal of the DTM, risers and components of the DTM mooring system (mooring chains and wires).
- Description of the planning processes and timetables of activities to support:
  - decommissioning of remaining equipment (which will be the subject of a future decommissioning EP), particularly, the provision of a schedule of activities, including submission of the permissioning documents to support decommissioning (i.e., schedule applicable to a future decommissioning EP).
  - a separate EP for the plug and abandonment of existing wells.
  - description of how Santos will maintain all property on the title, as required by s572 (2) of the *Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGS Act)* to ensure it can be removed, such that end states are not precluded.
- Description of the existing environment that may be affected by the activity.
- Implementation strategy that will be used to measure and report on environmental performance to ensure impacts and risks during planned and unplanned events are reduced to as low as reasonably practicable (ALARP) and acceptable levels.

The Commonwealth OPGGS(E)R require a titleholder to have an EP accepted by NOPSEMA before any petroleum activity can commence. An accepted Ningaloo Vision CoPFAR EP must be in place to enable the cessation phase activities to commence.

Image 1. *Installation of the DTM in 2008*

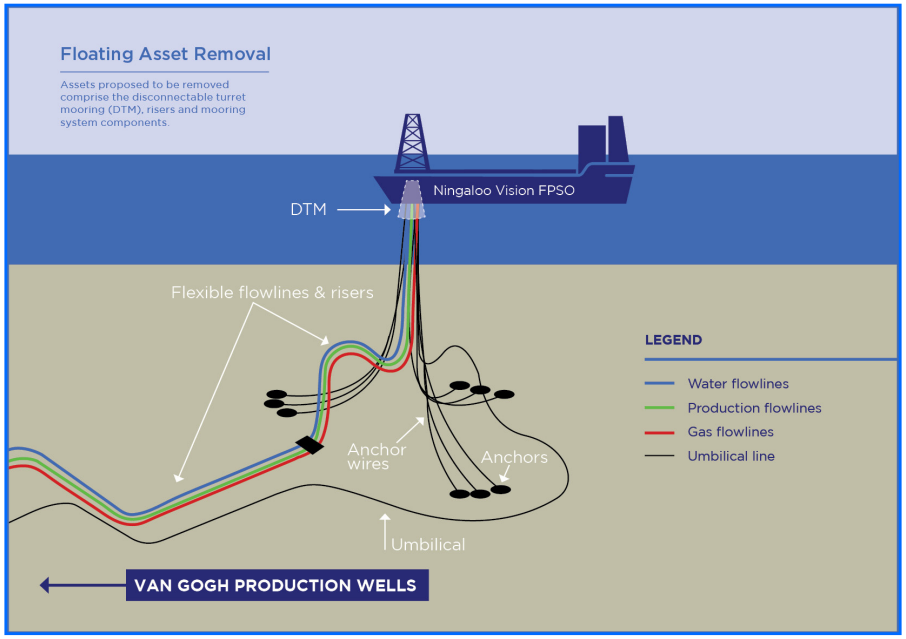


Image 2. *Floating Asset Removal from the FPSO*

Defining the environment area for proposed activities

Santos has undertaken an initial assessment to identify the environmental, social, economic, and cultural values and sensitivities that may be affected by impacts and risks of proposed activities.

To do this we have considered the totality of the areas where activity impacts and risks may occur.

These areas are summarised in **Table 1**. The widest extent of these areas is called the Environment that May Be Affected (EMBA), which for this activity is the combined EMBA for the modelled potential worst-case scenarios (discharge of crude oil at the seabed from a loss of well integrity and vessel collision releasing marine diesel oil at the sea surface). The EMBA is illustrated in **Figure 2**.

Oil spill EMBAs are defined by overlaying a great number (usually hundreds) of individual, computer simulated, hypothetical oil spill events into a single map. Each simulation run starts from the same location (release point) but each run will be subject to a different set of wind and weather conditions derived from historical data. The use of advanced and sophisticated models enables us to present all the areas that could be affected.

While the modelled EMBA represents the theoretical spatial extent that could be contacted by the worst-case spill event(s), an actual spill event is more accurately represented by a single simulation run, resulting in a much smaller spatial extent impacted by the spill.

Often, one or more simulation runs are selected to be representative of the 'worst-case' based on the nature and scale of the activity and the local environment.

Please see the **NOPSEMA Spill Modelling Video** for more information on oil spill modelling and why it is required for the preparation of Environment Plans.

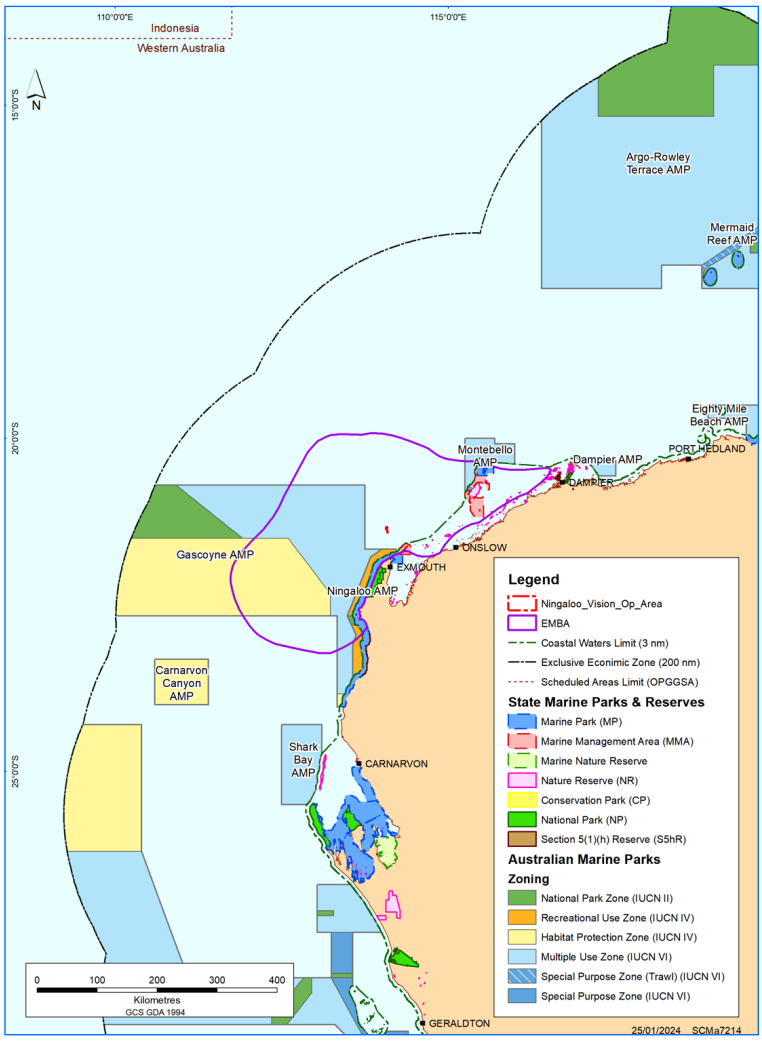


Figure 2. Operational Area and EMBA

Table 1. Environment area for proposed activities

Operational Area
Operational area for the Ningaloo Vision CoPFAR EP is defined as: • A 500 m radius petroleum safety zone (PSZ) that extends around the DTM. • A 500 m radius around the DTM anchor spread • 500 m around and either side of all other subsea field infrastructure.
Environment that May Be Affected (EMBA)
The spatial extent of the risk of a hydrocarbon spill.

Santos has undertaken a review of publicly available information to identify environmental, social, economic and cultural features and/or values that may be affected by activity impacts and risks. The outcomes of this review are summarised in **Table 2**.

Table 2. Environmental, social, economic and cultural features

Feature	Description	Within Operational Area	Within EMBA	Public information review
Aboriginal heritage	Registered Aboriginal heritage sites protected under the: • *Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth).* • *Aboriginal Heritage Act 1972 (WA).*	No	Yes	Barrow Island, Montebello Islands, Exmouth, Dampier Archipelago, Ningaloo Reef and the adjacent foreshores have a long history of occupancy by Indigenous communities. No Indigenous Protected Areas are located within the operational area or EMBA. There are no registered aboriginal heritage sites (*Aboriginal Heritage Act 1972 (WA)*) within the operational area, however numerous sites are present along the Ningaloo coastline (located within the EMBA), with the closest site being 43 km south of the operational area.
Biologically important areas	Biologically important areas (BIAs) are spatially defined areas where aggregations of individuals of a species are known to display biologically important behaviour such as breeding, foraging, resting or migration.	Yes	Yes	The operational area includes BIAs for seabirds and whales.

Table 2. Environmental, social, economic and cultural features ... continued

Feature	Description	Within Operational Area	Within EMBA	Public information review
Cultural heritage	Registered cultural sites under the: • *Underwater Cultural Heritage Act 2018 (Cth).* • *Maritime Archaeology Act 1973 (WA).*	No	Yes	There are no known sites of shipwrecks, sunken aircraft or other types of underwater cultural heritage within the operational area. The closest known historic shipwreck is the Gem which foundered during a cyclone in 1893 approximately 23 km south-southwest of the operational area (located within the EMBA).
Defence	Designated defence activity areas.	Yes	Yes	The operational area is within the North-western Exercise Area (NWXA) and military restricted airspace (R853A). Military exercise areas associated with Learmonth Air Weapons Range (AWR) and Learmonth weapons range overlap the EMBA.
Energy industry	Petroleum and Carbon Capture and Storage activities.	No	Yes	Several offshore petroleum projects and exploration activity is present within the region.
Fishing	Commercial fishing.	Yes	Yes	A number of state and commonwealth fisheries overlap the operational area and EMBA. However, none of the fisheries are active within the operational area.
	Indigenous, subsistence or customary fishing.	No	Yes	There is no indigenous or customary fishing in the operational area. Traditional Australian Indigenous fishing in WA waters predominately occurs within inshore tidal waters.
	Recreational fishing.	No	Yes	Recreational fishing does not occur within the operational area but does occur within the wider EMBA.

Table 2. Environmental, social, economic and cultural features ... continued

Feature	Description	Within Operational Area	Within EMBA	Public information review
Key ecological features	Key Ecological Features (KEFs) are elements of the Commonwealth marine environment that are considered to be of regional importance for either a region's biodiversity or its ecosystem function and integrity.	Yes	Yes	The operational area is located within the Continental Slope Demersal Fish Communities KEF.
Protected Areas (nearest Commonwealth and Territory)	Australian Marine Park (AMP).	No	Yes	No Australian Marine Parks are located within the operational area. The Ningaloo AMP is located approximated 27 km from the operational area.
	Western Australian Marine Parks and Marine Management Areas.	No	Yes	There are no Western Australian Marine Parks or Marine Management Areas located within the operational area. The Muiron Islands Marine Management Area and Ningaloo State Marine Park are located approximately 37 km and 44 km from the operational area, respectively.
Shipping	Shipping routes.	No	Yes	There are no designated shipping routes within operational area. The closest major commercial port to the EMBA is the Port of Dampier approximately 27 km to the northwest.
Tourism	Marine and coastal tourism.	No	Yes	There is no tourism in the operational area. Within wider EMBA tourism/recreational activities include whale shark tours, fishing charters and whale watching tours associated with the Ningaloo Coast.
Towns/communities	Exmouth.	No	No	Exmouth is the nearest town and is approximately 58 km south-southeast of the operational area.

We have summarised in Table 3 the potential environmental impacts and risks and associated management measures for the proposed activity. These aspects will be risk-assessed within the Environment Plan on a case-by-case basis.

Table 3. Activity impacts and risk management

Potential impacts – planned activities	
Acoustic disturbance to fauna	
Description of potential impacts Potential impacts from noise emissions may occur from the following sources: • Vessel activities. • IMMR activities (e.g. use of ROV and geophysical survey or positioning equipment). • Helicopter activities. • Marine growth removal (subsea). • Cutting of risers.	**Compliance with the following key management measures** • Santos' procedure for interacting with marine fauna. • Vessel planned maintenance system (PMS) to maintain vessel dynamic positioning (DP), engines, and machinery.
Atmospheric emissions	
Description of potential impacts • Potential impacts from atmospheric emissions may occur in the operational area due to vessel and helicopter operations.	**Compliance with the following key management measures** • Waste incineration. • Fuel oil quality meets International Convention for the Prevention of Pollution from Ships (MARPOL) requirements. • International Air Pollution Prevention Certification (IAPP). • Vessel PMS to maintain vessel DP, engines, and machinery.

Table 3. Activity impacts and risk management ... continued

Physical presence and interaction with other marine users	
Description of potential impacts Potential interactions with other marine users may occur as a result of: • Vessel operations. • Ongoing presence of infrastructure left in situ.	**Compliance with the following key management measures** • Maritime notices. • Santos' stakeholder consultation strategy. • No fishing from project vessels. • Existing (gazetted) PSZs established around the DTM location. • Safety exclusion zone established around primary vessels during floating asset removal activities to reduce potential for collision or interference with other marine user activities. • Compliant navigation lighting. • Seafarer certification. • Constant bridge watch. • Floating asset tow plan.
Light emissions	
Description of potential impacts Light emissions in the marine environment will occur as a result of: • Safety and navigational lighting. • Operational lighting. • ROV operational lights.	**Compliance with the following key management measures** • Lighting will be used as required, for safe work conditions and to meet navigational requirements. • Premobilisation review and planning of lighting on vessels prior to IMMR activities commencing.
Planned Chemical and hydrocarbon discharges	
Planned discharges include discharges due to: • Treated seawater during floating asset removal activities from cutting of the riser. • Marine and calcareous growth removal. • IMMR activities.	**Compliance with the following key management measures** • Santos chemical selection procedure. • Onshore reuse, recycling or disposal of floating assets (including risers) by contractors at a licensed waste facility.

Table 3. Activity impacts and risk management ... continued

Operational discharges	
Description of potential impacts	**Compliance with the following key management measures**
Planned discharges from vessels to the marine environment include: • Sewage and grey water. • Putrescible waste. • Desalination brine. • Cooling water. • Boiler blowdown water. • Deck drainage. • Bilge water.	• Waste (garbage) management plan. • Deck cleaning product selection procedure. • General chemical management procedure. • Chemical selection procedure. • Sewage treatment system. • Oily water treatment system. • Disposal of any hazardous waste associated with the floating assets will comply with relevant state and Commonwealth legislation.
Seabed and benthic habitat disturbance	
Description of potential impacts	**Compliance with the following key management measures**
Disturbance to the seabed and benthic habitats could potentially occur as a result of the following activities: • Temporary placement of infrastructure (production risers, mooring lines and umbilicals) on the seabed. • Placement of ROV installation aid, ROV basket or testing manifold on the seabed. • Temporary wet storage of equipment infrastructure (e.g. temporary laydown mooring lines).	• Pre and post floating asset removal seabed ROV surveys of wet storage locations. • Wet storage positioning.

Table 3. Activity impacts and risk management ... continued

Potential risks - unplanned activities	
Unplanned oil spill resulting from a vessel collision	
Description of potential risks The maximum credible spill scenario as a result of a vessel collision is the release of 325 m3 of marine diesel oil.	**Compliance with the following key management measures** • In the event of a hydrocarbon spill, an activity specific Oil Pollution Emergency Plan (OPEP) will be implemented to mitigate environmental impacts. • The OPEP sets out environmental protection priorities and appropriate response measures for a range of spill scenarios. • The OPEP is developed in in accordance with National, State and Territory marine pollution plans.
Unplanned oil spill resulting from a loss of well control	
Description of potential risks The maximum credible spill scenario as a result of a loss of well control is a release of 1,225 m3 of crude oil.	**Compliance with the following key management measures** • In the event of a hydrocarbon spill, an activity specific OPEP will be implemented to mitigate environmental impacts. • The OPEP sets out environmental protection priorities and appropriate response measures for a range of spill scenarios. • The OPEP is developed in accordance with National, State and Territory marine pollution plans.
Unplanned hazardous liquid release (non-hydrocarbon)	
Description of potential risks Sources of risk from minor hazardous liquid releases may occur as a result of: • transferring, storing or using bulk products. • mechanical failure of equipment. • hose or hose connection failure or leak. • lifting – dropped objects damaging liquid vessels (containers). • ROV operations. • Loss of umbilical contents.	**Compliance with the following key management measures** • General Chemical Management Procedure. • Hazardous Chemical Management Procedure. • Chemical selection procedure. • Vessel spill response plans (shipboard oil pollution emergency plan (SOPEP)/ shipboard marine pollution emergency plan (SMPEP). • Dropped object prevention procedure.

Table 3. Activity impacts and risk management ... continued

Minor hydrocarbon release	
Description of potential impacts	**Compliance with the following key management measures**
Sources of risk from minor hydrocarbon releases may occur as a result of: • ROV equipment failure. • Loss of primary containment. • Spills or leaking machinery. • Potential discharge fluids from a rupture or leak from a flowline, service line, or umbilical.	• General chemical management procedure. • Hazardous chemical management procedure. • Chemical selection procedure. • Hazardous chemical management procedures. • Vessel spill response plans (shipboard oil pollution emergency plan (SOPEP)/ shipboard marine pollution emergency plan (SMPEP). • ROV inspection and maintenance procedures. • OPEP.
Unplanned release of solid objects	
Description of potential risks	**Compliance with the following key management measures**
Solid objects, such as those listed below, can be accidentally released to the marine environment, and potentially impact on sensitive receptors: • Non-hazardous solid and liquid wastes such as paper, packaging, and non-hazardous liquid waste containers. • Hazardous solid and liquid wastes such as batteries, fluorescent tubes, hazardous liquid waste containers and aerosol cans. • Equipment and materials such as hard hats, tools, or infrastructure parts. • DTM and riser recovery and towing of the DTM (operational area to port).	• Dropped object prevention procedures. • Waste (garbage) management procedure. • Recovery procedures. • Floating asset tow plan.

Table 3. Activity impacts and risk management ... continued

Unplanned Introduction of invasive marine species (IMS)	
Description of potential risks Introduction of invasive marine species (IMS) may occur due to: • Biofouling on vessels and external/internal niches (such as sea chests, seawater systems). • Biofouling on equipment that is routinely submerged in water (such as ROVs). • Discharge of high-risk ballast water. • Discharge of marine growth of DTM/risers as part of the asset removal.	**Compliance with the following key management measures** • Implementation of the management controls in the Santos Invasive Marine Species Management Plan (IMSMP). • Anti-foulant system.
Unplanned interaction with marine fauna	
Description of potential risks There is the potential for vessels or equipment (for example, ROV, AUV) involved in IMMR activities to interact with marine fauna, including potential strike or collision, potentially resulting in severe injury or mortality.	**Compliance with the following key management measures** • Procedure for interacting with marine fauna. • Constant bridge watch. • Floating assets tow plan.

Consultation

Consultation provides Santos 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. Santos' objective for proposed activities is to reduce environmental impacts and risks to a level that is 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.

Providing feedback

You might be a relevant person if, for example, you have spiritual or cultural connections to land and sea country in accordance with Indigenous tradition that might be affected by our activity, if you otherwise carry out recreational or commercial fishing, tourism or other activities that might be affected by our proposed activity, or if you are part of a local community that might be affected by our proposed activity.

If you consider you may be a relevant person, please contact us by **15 May 2024** to allow Santos time to initiate consultation with you, so you can tell us how you would like to be consulted throughout this process or if you need additional information.

The merits of relevant person feedback provided through the consultation process will be considered during EP development, with a summary of responses summarised and included in the EP submitted to 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.

More information about how community members can participate in environmental approvals for activities proposed in Commonwealth waters has been published in a **brochure** by NOPSEMA.

Contact

E: offshore.consultation@santos.com
T: 1800 267 600
santos.com/offshoreconsultation

Information for commercial fishers

Santos

Ningaloo Vision Cessation of Production and Floating Asset Removal (CoPFAR) Environment Plan

Information overview

Santos provides this supplementary information for commercial fishers as part of regulatory consultation activities for the proposed progressive decommissioning of the Ningaloo Vision floating production, storage and offloading (FPSO) vessel and associated subsea infrastructure, in the Carnarvon Basin.

Santos is seeking input from commercial fishers by **26 June 2024**. Details on consultation and providing input can be found on the back page of this fact sheet. Pre and post activity notifications are also available upon request.

A general fact sheet on proposed activities, including potential environmental impacts risks and associated management measures, can be found at **santos.com/offshoreconsultation**

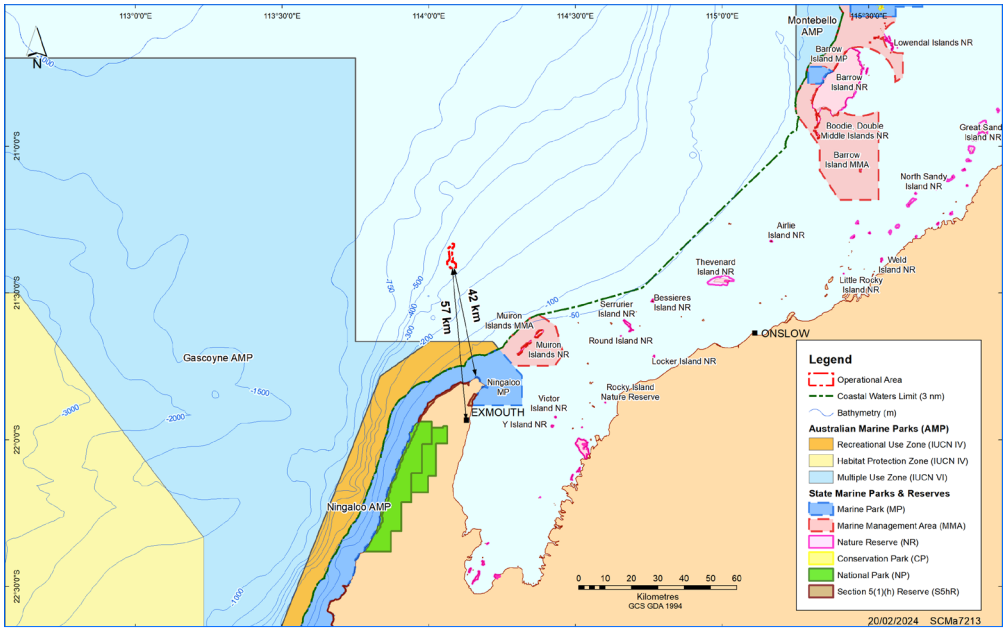


Figure 1. Ningaloo Vision FPSO location

Activity details	
Proposed activity	Santos is planning for the progressive decommissioning of the Ningaloo Vision floating production, storage and offloading (FPSO) vessel and associated subsea infrastructure. The first phase of decommissioning will commence under the Cessation of Production and Floating Asset Removal (CoPFAR) EP, subject to Regulatory approvals. Activities include the removal of floating assets and preserving the remaining infrastructure ahead of future decommissioning activities.
Activity purpose	Removal of floating assets and preparation of remaining subsea infrastructure for final decommissioning.
Operational Area location	Operational area for the Ningaloo Vision CoPFAR EP is defined as: • A 500 m radius petroleum safety zone (PSZ) that extends around the DTM. • A 500 m radius around the DTM anchor spread • 500 m around and either side of all other subsea field infrastructure.
Water depth	340 m to 400 m
Timing and duration	• Activities associated with the removal of the floating assets will commence following the end of field life, which could occur at any time during the five-year period of the accepted EP. • Is planned to take between 45 and 90 days. • Individual inspection, maintenance, monitoring and repair (IMMR) campaigns are expected to take around 30 days.
Exclusion zone	A Petroleum Safety Zone (PSZ) of 500 m radius that extends around the DTM.

Commercial fishery implications

Santos has undertaken an assessment to define the environmental, social, economic and cultural aspects that may be affected by proposed activities. To do this we have considered the totality of the area where activity impacts and risks may occur.

The widest extent of this area is called the Environment that May Be Affected (EMBA), which for this activity is the outer boundary of a worst-case marine diesel spill resulting from the unlikely event of a vessel collision.

Table 1 provides an overview of those fisheries active in the Operational Area to determine potential for interaction with proposed activities. We have also assessed those fisheries that are entitled to fish in the EMBA. Operational Area coordinates can be found in **Table 2**.

Our fisheries assessment is based on publicly available government managed catch and effort data, our ongoing discussions with commercial fisheries representative organisations, and historic engagements for previous petroleum activities.

Table 1. Commercial fishery assessment

	Potential for interaction in the Operational Area	Entitled to fish in the EMBA
Commonwealth fishery		
Western Tuna and Billfish Fishery	No	Yes
Southern Bluefin Tuna Fishery	No	Yes
Western Skipjack Tuna Fishery	No	Yes
North West Slope Trawl Fishery	No	Yes
Western Deepwater Trawl Fishery	No	Yes
Western Australian fishery		
Exmouth Gulf Prawn Managed Fishery	No	Yes
Onslow Prawn Limited Entry Fishery	No	Yes
Pilbara Demersal Scalefish Fisheries (includes trap and trawl fisheries)	No	Yes
Pilbara Developmental Crab Managed Fishery	No	Yes
Mackerel Managed Fishery	No	Yes
West Coast Rock Lobster Managed Fishery	No	Yes
Gascoyne Demersal Scalefish Managed Fishery	No	Yes
Northern Demersal Scalefish Managed Fishery	No	Yes
Marine Aquarium Fish Managed Fishery	No	Yes
Specimen Shell Managed Fishery	No	Yes
West Coast Deep Sea Crustacean Managed Fishery	No	Yes
Abalone Managed Fishery	No	Yes
South-West Coast Salmon Fishery	No	Yes

Table 2. Operational Area coordinates

Operational Area	Latitude	Longitude
Point 1	114° 04’ 59.953” E	21° 19’ 55.411” S
Point 2	114° 04’ 59.882” E	21° 23’ 10.136” S
Point 3	114° 05’ 37.292” E	21° 24’ 36.100” S
Point 4	114° 04′ 58.803″ E	21° 24’ 55.416” S
Point 5	114° 03′ 41.666″ E	21° 23’ 49.587” S
Point 6	114° 03′ 56.282″ E	21° 21’ 03.965” S

Consultation

Consultation provides Santos with an opportunity to receive input from authorities, persons and organisations whose functions, interests or activities may be affected by the proposed activities.

This input helps us to refine or change the management measures we are planning to address during potential activity impacts and risks.

Santos' objective for the proposed activities is to reduce environmental impacts and risks to a level that is As Low As Reasonably Practicable (ALARP) and acceptable over the life of the activity.

Providing input

Santos is seeking input on proposed activities by **26 June 2024**.

The merits of relevant person feedback provided through the consultation process will be considered during EP development, with responses summarised and included in the EP submitted to 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.

More information about how community members can participate in environmental approvals for activities proposed in Commonwealth waters has been published in a **brochure** by NOPSEMA.

Contact

E: offshore.consultation@santos.com
T: 1800 267 600
santos.com/offshoreconsultation

Emails

From:	Consultation, Santos
To:	[redacted]
Bcc:	
Subject:	PRELIMINARY CONSULTATION | Carnarvon Basin | Ningaloo Vision Cessation of Production and Floating Asset Removal Environment Plan
Date:	Monday, 15 April 2024 4:05:00 PM
Attachments:	image001.png image003.png image005.png image006.png

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Preliminary Consultation on Carnarvon Basin activities:

- **Ningaloo Vision Cessation of Production and Floating Asset Removal Environment Plan**

Santos is contacting you as we are proposing to undertake activities in Commonwealth waters offshore northern Western Australia.

An activity summary is provided below, as well as a link embedded in the image to a fact sheet published on our Consultation Hub at www.santos.com/offshoreconsultation.

The fact sheet includes information on proposed activities; potential impacts, risks and management measures; and the presence, based on a review of publicly available information, of environmental, social, economic and cultural features and/or values within the Environment That May Be Affected.

Ningaloo Vision Cessation of Operation and Floating Asset Removal

Santos has commenced planning for the progressive decommissioning of the Ningaloo Vision floating production, storage and offloading facility and associated production equipment.

Following the end of field life, Santos proposes to remove floating (submerged) assets and maintain the remaining equipment ahead of future decommissioning activities.

The Ningaloo Vision is approximately 53 km north-northwest of Exmouth. Activities associated with the removal of the floating assets could occur at any time during the 5-year period of the accepted environment plan.

Consultation Requirements

Under Commonwealth government Environmental Regulations, Santos is required to consult with relevant persons whose functions, interests and activities may be affected by proposed activities.

Input from relevant persons is used for the development of Environment Plans (EP) for proposed activities, which are assessed by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

Providing Input

Please contact us at the earliest opportunity if you consider you may be a relevant person and wish to participate in the consultation process. We can then discuss with you consultation methods appropriate to your information needs and interests, as well as a suitable meeting date

and location.

Consultation for these activities will commence on **15 May 2024**, with the consultation period closing on **14 June 2024.**

If you would like to provide input now, please note that a summary of your feedback will be included in the EP, including our assessment of your input and our response to you. You can provide input via return email or call us toll free on **1800 267 600**.

Also, please let us know if you would like any sensitive information to remain private. If requested, Santos will ensure your information remains confidential between us and NOPSEMA and will not be published or otherwise made publicly available. Santos will handle your information in accordance with our *Offshore Western Australia and Northern Territory Consultation Privacy Policy*.

Additional resources

NOPSEMA has published information that sets out titleholders' responsibilities for consultation, as well as opportunities for relevant persons to provide guidance for consultation expectations. Click the image to read in full.

We look forward to hearing from you soon.

Regards
Santos Consultation Team

From:	Consultation, Santos
To:	[redacted]
Subject:	CONSULTATION | Carnarvon Basin | Ningaloo Vision Cessation of Production and Floating Asset Removal Environment Plan
Date:	Wednesday, 29 May 2024 3:56:00 PM
Attachments:	image001.png image003.png image002.png image004.png

Consultation on Carnarvon Basin activities:

- **Ningaloo Vision Cessation of Production and Floating Asset Removal Environment Plan**

Santos is contacting you again as consultation on our proposed Ningaloo Vision Cessation of Production and Floating Asset Removal Environment Plan (EP) commenced on 15 May 2024. We apologise for not sending out a notification on that date. However, we have extended the consultation period by two weeks and are now asking for relevant persons to provide any input they may have in relation to this EP by **28 June 2024** (previously 14 June).

Santos has begun planning for the progressive decommissioning of the Ningaloo Vision floating production, storage and offloading facility and associated production equipment.

Following the end of field life, Santos proposes to disconnect and sail away the Floating Production, Storage and Offloading vessel (FPSO), remove floating (submerged) assets and maintain the remaining equipment on title, ahead of future decommissioning activities.

The Ningaloo Vision is approximately 53 km north-northwest of Exmouth. Activities associated with the removal of the floating assets could occur at any time during the 5-year period of the accepted environment plan.

More information on proposed activities can be found below in this email.

Please contact us at the earliest opportunity so we can assess and respond to your input during the consultation period, which closes on **28 June 2024**. You can provide input via return email or call us toll free on **1800 267 600**.

Also, please let us know if you know of authorities, organisations or individuals who should participate in the consultation process.

We look forward to hearing from you soon.

Regards
Santos Consultation Team

From: Consultation, Santos
Sent: Monday, April 15, 2024 4:06 PM
To: s[redacted]
Subject: PRELIMINARY CONSULTATION | Carnarvon Basin | Ningaloo Vision Cessation of Production and Floating Asset Removal Environment Plan

Preliminary Consultation on Carnarvon Basin activities:

- **Ningaloo Vision Cessation of Production and Floating Asset Removal Environment Plan**

Santos is contacting you as we are proposing to undertake activities in Commonwealth waters offshore northern Western Australia.

An activity summary is provided below, as well as a link embedded in the image to a fact sheet published on our Consultation Hub at www.santos.com/offshoreconsultation.

The fact sheet includes information on proposed activities; potential impacts, risks and management measures; and the presence, based on a review of publicly available information, of environmental, social, economic and cultural features and/or values within the Environment That May Be Affected.

Ningaloo Vision Cessation of Operation and Floating Asset Removal

Santos has commenced planning for the progressive decommissioning of the Ningaloo Vision floating production, storage and offloading facility and associated production equipment.

Following the end of field life, Santos proposes to remove floating (submerged) assets and maintain the remaining equipment ahead of future decommissioning activities.

The Ningaloo Vision is approximately 53 km north-northwest of Exmouth. Activities associated with the removal of the floating assets could occur at any time during the 5-year period of the accepted environment plan.

Consultation Requirements

Under Commonwealth government Environmental Regulations, Santos is required to consult with relevant persons whose functions, interests and activities may be affected by proposed activities.

Input from relevant persons is used for the development of Environment Plans (EP) for proposed activities, which are assessed by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

Providing Input

Please contact us at the earliest opportunity if you consider you may be a relevant person and wish to participate in the consultation process. We can then discuss with you consultation methods appropriate to your information needs and interests, as well as a suitable meeting date and location.

Consultation for these activities will commence on **15 May 2024**, with the consultation period closing on **14 June 2024.**

If you would like to provide input now, please note that a summary of your feedback will be included in the EP, including our assessment of your input and our response to you. You can

provide input via return email or call us toll free on **1800 267 600**.

Also, please let us know if you would like any sensitive information to remain private. If requested, Santos will ensure your information remains confidential between us and NOPSEMA and will not be published or otherwise made publicly available. Santos will handle your information in accordance with our *Offshore Western Australia and Northern Territory Consultation Privacy Policy*.

Additional resources

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We look forward to hearing from you soon.

Regards
Santos Consultation Team

From: Consultation, Santos
To: [redacted]
Subject: Reminder: CONSULTATION | Carnarvon Basin | Ningaloo Vision Cessation of Production and Floating Asset Removal Environment Plan
Date: Friday, 21 June 2024 10:52:00 AM
Attachments: image001.png
image003.png
image005.png
image006.png

Dear [redacted]

Consultation on Carnarvon Basin activities:

- **Ningaloo Vision Cessation of Production and Floating Asset Removal Environment Plan**

Santos is contacting you by way of reminder as consultation for our proposed Ningaloo Vision Cessation of Production and Floating Asset Removal Environment Plan closes on **28 June 2024**. Santos provided information on 29 May 2024, and this is included below.

You can provide input via return email or call us toll free on **1800 267 600**.

Please get back to us at the earliest opportunity should you wish to provide input, noting that if we don't hear from you by **28 June 2024,** we will consider consultation with you closed for this Environment Plan.

Regards
Santos Consultation Team

From: Consultation, Santos
Sent: Wednesday, May 29, 2024 3:56 PM
To: s[redacted]
Subject: CONSULTATION | Carnarvon Basin | Ningaloo Vision Cessation of Production and Floating Asset Removal Environment Plan

Consultation on Carnarvon Basin activities:

- **Ningaloo Vision Cessation of Production and Floating Asset Removal Environment Plan**

Santos is contacting you again as consultation on our proposed Ningaloo Vision Cessation of Production and Floating Asset Removal Environment Plan (EP) commenced on 15 May 2024. We apologise for not sending out a notification on that date. However, we have extended the consultation period by two weeks and are now asking for relevant persons to provide any input they may have in relation to this EP by **28 June 2024** (previously 14 June).

Santos has begun planning for the progressive decommissioning of the Ningaloo Vision floating production, storage and offloading facility and associated production equipment.

Following the end of field life, Santos proposes to disconnect and sail away the Floating Production, Storage and Offloading vessel (FPSO), remove floating (submerged) assets and maintain the remaining equipment on title, ahead of future decommissioning activities.

The Ningaloo Vision is approximately 53 km north-northwest of Exmouth. Activities associated with the removal of the floating assets could occur at any time during the 5-year period of the accepted environment plan.

More information on proposed activities can be found below in this email.

Please contact us at the earliest opportunity so we can assess and respond to your input during the consultation period, which closes on **28 June 2024**. You can provide input via return email or call us toll free on **1800 267 600**.

Also, please let us know if you know of authorities, organisations or individuals who should participate in the consultation process.

We look forward to hearing from you soon.

Regards
Santos Consultation Team

From: Consultation, Santos
Sent: Monday, April 15, 2024 4:06 PM
To: [redacted]
Subject: PRELIMINARY CONSULTATION | Carnarvon Basin | Ningaloo Vision Cessation of Production and Floating Asset Removal Environment Plan

Preliminary Consultation on Carnarvon Basin activities:

- **Ningaloo Vision Cessation of Production and Floating Asset Removal Environment Plan**

Santos is contacting you as we are proposing to undertake activities in Commonwealth waters offshore northern Western Australia.

An activity summary is provided below, as well as a link embedded in the image to a fact sheet published on our Consultation Hub at www.santos.com/offshoreconsultation.

The fact sheet includes information on proposed activities; potential impacts, risks and management measures; and the presence, based on a review of publicly available information, of environmental, social, economic and cultural features and/or values within the Environment That May Be Affected.

Ningaloo Vision Cessation of Operation and Floating Asset Removal

Santos has commenced planning for the progressive decommissioning of the Ningaloo Vision floating production, storage and offloading facility and associated production equipment.

Following the end of field life, Santos proposes to remove floating (submerged) assets and maintain the remaining equipment ahead of future decommissioning activities.

The Ningaloo Vision is approximately 53 km north-northwest of Exmouth. Activities associated with the removal of the floating assets could occur at any time during the 5-year period of the accepted environment plan.

Consultation Requirements
Under Commonwealth government Environmental Regulations, Santos is required to consult with relevant persons whose functions, interests and activities may be affected by proposed activities.

Input from relevant persons is used for the development of Environment Plans (EP) for proposed activities, which are assessed by the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA).

Providing Input
Please contact us at the earliest opportunity if you consider you may be a relevant person and wish to participate in the consultation process. We can then discuss with you consultation methods appropriate to your information needs and interests, as well as a suitable meeting date and location.

Consultation for these activities will commence on **15 May 2024**, with the consultation period closing on **14 June 2024.**

If you would like to provide input now, please note that a summary of your feedback will be included in the EP, including our assessment of your input and our response to you. You can provide input via return email or call us toll free on **1800 267 600**.

Also, please let us know if you would like any sensitive information to remain private. If requested, Santos will ensure your information remains confidential between us and NOPSEMA and will not be published or otherwise made publicly available. Santos will handle your information in accordance with our *Offshore Western Australia and Northern Territory Consultation Privacy Policy*.

Additional resources
NOPSEMA has published information that sets out titleholders' responsibilities for consultation, as well as opportunities for relevant persons to provide guidance for consultation expectations. Click the image to read in full.

We look forward to hearing from you soon.

Regards
Santos Consultation Team

Advertising

SEEKING RELEVANT PERSONS

CARNARVON BASIN NINGALOO VISION CESSATION OF PRODUCTION AND FLOATING ASSET REMOVAL ENVIRONMENT PLAN

Santos is seeking to identify and consult with relevant persons whose functions, interests or activities may be affected by our proposed Carnarvon Basin Ningaloo Vision Cessation of Production and Floating Asset Removal activity off Western Australia's north west coast.

Santos is planning an activity at our Western Australian interests:

- **Ningaloo Vision:** Santos has commenced planning for the progressive decommissioning of the Ningaloo Vision floating production, storage and offloading facility and associated production equipment. Following the end of field life, Santos proposes to remove floating assets and maintain the remaining equipment ahead of future decommissioning activities. The Ningaloo Vision is approximately 53 km north-northwest of Exmouth. Activities associated with the removal of the floating assets could occur at any time during the 5-year period of the accepted environment plan.

The environment that may be affected (EMBA) by proposed activities

Santos is assessing impacts and risks to the environment that may be affected (EMBA) by this activity, including on ecosystems (including people and communities), natural and physical resources, the qualities and characteristics of locations, places and areas and the heritage value of places. This will include assessment of the social, economic and cultural features of the environment.

The map below depicts activity locations and a EMBA. The 'EMBA' represents the greatest spatial extent that could be affected by unplanned 'worst case' spill scenarios, noting that in the unlikely event of a spill not all environmental, social, economic and cultural aspects would be affected.

Santos is proposing to implement measures to reduce the impacts and risks of the activity. It is a requirement under relevant environmental legislation that these impacts and risks are reduced to as low as reasonably practicable and to an acceptable level.

Seeking Relevant Persons for Environment Plans

All petroleum activity must have an Environment Plan (EP) accepted by the respective Commonwealth, State or Territory Regulator before they can take place.

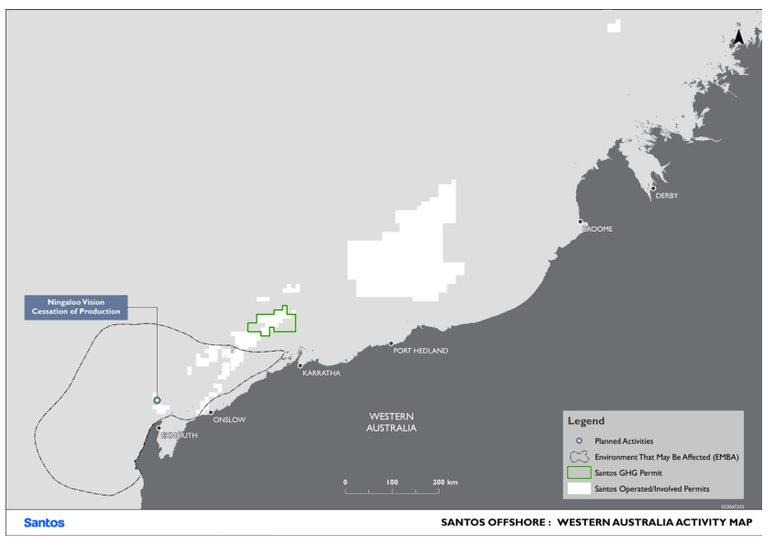
Santos is required to consult with relevant persons about those activities when preparing each EP.

A relevant person includes a person or an organisation whose functions, interests or activities may be affected by the proposed activity. Such functions, interests or activities may include those arising in relation to spiritual or cultural connections to land and sea country in accordance with Indigenous tradition; tourism; recreational and commercial fishing; other commercial or recreational activities and local communities that might be affected by our proposed activity (these are examples and not an exhaustive list).

Feedback from relevant persons is used to refine or change measures proposed to manage activity impacts and risks to a level that is as low as reasonably practicable and acceptable.

Consultation also helps us to identify environmental, social, economic and cultural values and sensitivities that may be affected, in addition to those identified by Santos based on our long-standing operating knowledge in these regions.

If you think your functions, interests or activities may be affected by this activity, you may be a relevant person with whom Santos must consult.



We welcome your feedback

We will use feedback from relevant persons to help us manage impacts and risks associated with this activity, ahead of submitting our environment plan to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. NOPSEMA acceptance of this environment plan is required before any petroleum activity can begin.

We have prepared consultation information sheets, which includes information about planned activities, identified environmental, social, economic and cultural aspects within each EMBA and how we propose to manage impacts and risks.

Contact us

If you consider you may be a relevant person, please contact us by **15 May 2024** to allow Santos to initiate consultation with you in relation to the proposed activity and so you can tell us how you would like to be consulted throughout this process.

Santos is committed to undertaking genuine and meaningful consultation. We want to provide information for people to make informed assessments of the possible consequences of the proposed activity on them.

Your feedback and input are important to us and input will be considered in the development of our environment plan.

Visit: **www.santos.com/offshoreconsultation**
Phone: **1800 267 600**
Email: **offshore.consultation@santos.com**
for more information, to self-identify as relevant person or to provide feedback.

CARNARVON BASIN NINGALOO VISION CESSATION OF PRODUCTION AND FLOATING ASSET REMOVAL ENVIRONMENT PLAN

Santos

Santos is now consulting with relevant persons whose functions, interests or activities may be affected by our proposed Carnarvon Basin Ningaloo Vision Cessation of Production and Floating Asset Removal activity off Western Australia's north west coast.

Santos is planning an activity at our Western Australian interests:

- **Ningaloo Vision:** Santos has commenced planning for the progressive decommissioning of the Ningaloo Vision floating production, storage and offloading facility and associated production equipment. Following the end of field life, Santos proposes to remove floating assets and maintain the remaining equipment ahead of future decommissioning activities. The Ningaloo Vision is approximately 53 km north-northwest of Exmouth. Activities associated with the removal of the floating assets could occur at any time during the 5-year period of the accepted environment plan.

The environment that may be affected (EMBA) by proposed activities

Santos is assessing impacts and risks to the environment that may be affected (EMBA) by this activity, including on ecosystems (including people and communities), natural and physical resources, the qualities and characteristics of locations, places and areas and the heritage value of places. This will include assessment of the social, economic and cultural features of the environment.

The map below depicts activity locations and a EMBA. The 'EMBA' represents the greatest spatial extent that could be affected by unplanned 'worst case' spill scenarios, noting that in the unlikely event of a spill not all environmental, social, economic and cultural aspects would be affected.

Santos is proposing to implement measures to reduce the impacts and risks of the activity. It is a requirement under relevant environmental legislation that these impacts and risks are reduced to as low as reasonably practicable and to an acceptable level.

Consultation

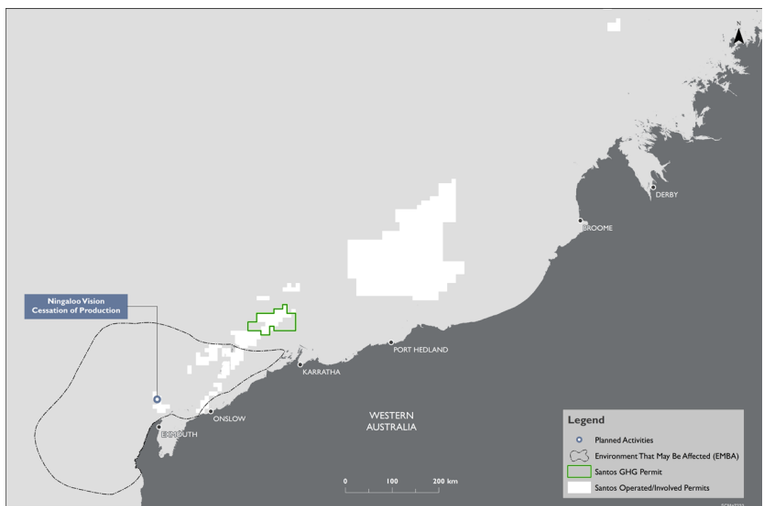
All petroleum activity must have an Environment Plan (EP) accepted by the respective Commonwealth, State or Territory Regulator before they can take place.

Santos is required to consult with relevant persons about those activities when preparing each EP.

A relevant person includes a person or an organisation whose functions, interests or activities may be affected by the proposed activity. Such functions, interests or activities may include those arising in relation to spiritual or cultural connections to land and sea country in accordance with Indigenous tradition; tourism; recreational and commercial fishing; other commercial or recreational activities and local communities that might be affected by our proposed activity (these are examples and not an exhaustive list).

Feedback from relevant persons is used to refine or change measures proposed to manage activity impacts and risks to a level that is as low as reasonably practicable and acceptable.

Consultation also helps us to identify environmental, social, economic and cultural values and sensitivities that may be affected, in addition to those identified by Santos based on our long-standing operating knowledge in these regions.



We welcome your feedback

If you think your functions, interests or activities may be affected by this activity, you may be a relevant person with whom Santos must consult.

We will use feedback from relevant persons to help us manage impacts and risks associated with this activity, ahead of submitting our environment plan to the National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) for assessment. NOPSEMA acceptance of this environment plan is required before any petroleum activity can begin.

We have prepared consultation information sheets, which includes information about planned activities, identified environmental, social, economic and cultural aspects within each EMBA and how we propose to manage impacts and risks.

Contact us

If you consider you may be a relevant person, please contact us as soon as possible to allow Santos to initiate consultation with you in relation to the proposed activity and so you can tell us how you would like to be consulted. Consultation closes on **14 June 2024**.

Santos is committed to undertaking genuine and meaningful consultation. We want to provide information for people to make informed assessments of the possible consequences of the proposed activity on them.

Your feedback and input are important to us and input will be considered in the development of our environment plan.

Visit: **www.santos.com/wp-content/uploads/2024/04/Santos-NV-CoPFAR-fact-sheet.pdf**
Phone: **1800 267 600**
Email: **offshore.consultation@santos.com**
for more information, to self-identify as relevant person or to provide feedback.

NV CoP FAR Radio Ad Script

Preliminary Consultation

Santos is seeking to consult with relevant persons whose functions, interests or activities may be affected by the first phase of decommissioning of the Ningaloo Vision facility, approximately 53 km north-northwest of Exmouth.

If you would like to be consulted, please contact Santos by May 15th.

Learn more at Santos dot com forward slash offshore consultation…

Phone 1800 267 600.

Or email offshore dot consultation at Santos dot com

Consultation

Santos is now consulting with relevant persons for our proposed activity. The first phase of decommissioning of the Ningaloo Vision floating facility, approximately 53 km north-northwest of Exmouth.

If you would like to be consulted, please contact Santos.

Consultation closes June 14th.

Learn more at Santos dot com forward slash offshore consultation…

Phone 1800 267 600.

Or email offshore dot consultation at Santos dot com.

Santos is seeking to identify and consult with relevant persons whose functions, interests or activities may be affected by our proposed Ningaloo Vision Cessation of Production and Floating Asset Removal activity off Western Australia's north west coast.

Tearsheets

regimes through an app," Vernon said.

In the aftermath, the realisation he had broken Brown's record hit home hard as he humbly praised those who've helped him along the way, saying: "Full credit to the team."

That team included mentor Michael-James Terry, who is the current two-stand record holder (set in 2003 with his brother Cartwright), and woolhandlers Maria Ormsby, Raven Waitere, Cyaniquah Rangawhenua, Santi Hemopo and Pope Hick.

Vernon said he was "quite sore" the next day but thanks to a deep-tissue massage by Justin Keally, his recovery was "pretty good".

His name now takes pride of place alongside solo nine-hour record holder Floyd Neil, of Boyup Brook, who shore 540 ewes in 2023.

Rego sting for Airbnb

Fee to combat rent crisis

JAKE DIETSCH

Airbnb owners will have to pay an initial $250 registration fee — plus $100 annually — but Commerce Minister Sue Ellery said the charges were "not a large amount" compared to the money short-stay accommodation owners were making.

The State Government on Tuesday night legislated to establish a registry of short-term accommodation, such as Airbnbs, that will be used by State and local governments to monitor the industry and its impact on long-term rentals.

The scheme is expected to start in July and operators can avoid paying the initial $250 if they sign up during the initial three-month fee-free period, designed to encourage early uptake.

All short stays must be registered by the start of 2025 and operators must use their registration number in all advertisements.

The minister denied the fees were about revenue-raising or an attempt to penalise short-stay operators, insisting they were affordable. The registration applies to regardless of whether the short-term accommodation is "hosted" — such as only one room is rented, or bread & breakfasts — or "unhosted", where the owner is not present during the guest's stay.

Ms Ellery said the registration was part of a package of reforms to manage "the impact that short-term rental accommodation is having on long term rental accommodation".

The Government last year announced $10,000 payments for short-term property operators to make their homes available for long-term renters for at least 12 months.

The Government also passed its Residential Tenancies Amendment Bill on Tuesday, banning rent-bidding, limiting rent increases to once a year and allowing tenants to keep pets and make minor modifications. But it does not ban no-grounds evictions, despite all other State and Territories having banned them or prepared legislation to do so.

Wind farm worries at core of new campaign

Kirsty Sinclair is campaigning against offshore wind farm proposals off the WA coast. Picture: Derek Goforth

DEREK GOFORTH

Long-time Mid West local and educator Kirsty Sinclair has taken a bold step to help safeguard the pristine coastline that defines her community.

Ms Sinclair recently set up the Facebook page, Protect Our Coast, in a bid to raise awareness about potential detrimental impacts of proposed offshore wind farm projects along the WA coast.

"The ocean and our coast are the reason we live where we do," she said. "It's unique, pristine, and part of who we are."

For Ms Sinclair and countless others, the coastline isn't just a scenic backdrop — it's a way of life and integral to the community's identity and well-being.

"At the heart of my concern are the proposed offshore wind farm developments," Ms Sinclair said.

"The current proposal would set a dangerous precedent for companies to pursue the possibility of building offshore wind farms off the coast of Kalbarri."

Danish renewable energy developer Copenhagen Energy proposes up to 200 wind turbines and six substations to run 15km to 70km off the coast of Kalbarri.

Ms Sinclair paints a bleak picture of the potential consequences.

"Excavation and pile driving of our seabeds, burying and smothering of coral reefs and seafloor habitats, the creation of high-intensity, prolonged underwater noise and electromagnetic fields," she said, believing these activities would not only disrupt delicate ecosystems but endanger marine species like various whales, turtles and fish.

"For Kalbarri residents, this development adds to the mounting challenges they face. They're also battling the hydrogen plant that is planned for the north side of the Murchison River."

In response, Kalbarri residents have formed the group Keep Kalbarri Beautiful to co-ordinate their opposition to both the hydrogen plant and offshore wind farm.

That group has lent its support to the Save Our Beloved Geographe Bay campaign in a bid to have the Bunbury Wind Area proposal rejected. The deadline for public consultation for that South West proposal is nearing and Ms Sinclair urges West Australians to make their voices heard.

Ms Sinclair advocates a holistic approach that prioritises conservation and education.

"There is no quick fix," she said, instead calling for collective action and government investment to promote energy efficiency and environmental stewardship.

On Copenhagen Energy's Midwest Offshore Wind Farm website, it states the location of the turbines will be selected after stakeholder and community feedback and the company would continue with a wide range of offshore and onshore studies to better understand the project's environmental, social, and economic impacts.

Ms Sinclair said people could take the Australian Government survey about the Bunbury proposal at dcceew.gov.au before May 3 and sign the State petition calling for a ban of offshore wind farms in WA, available at saveourbeloved geographebay.net.

COUNCILLOR ISSUES

who moved it, said the letter and the improvement plan were opportunities for the council to come together as one team.

"On this bench we are not one individual, we are one team," he said.

"Regardless of whether we have made the wrongs or done anything wrong in these letters.

"By agreeing to develop an implementation plan, it is the council's opportunity to actually have a team conversation, agree or disagree with the findings. But not just that, it doesn't limit us to what the findings have been from the letter, it allows us also to extend and go further to address other concerns and issues we have internally to be able to address that."

Cr Blanco was Hedland's mayor in 2019 when the State Government last stepped in to manage issues within the town. All councillors were suspended, with former State MP Fred Riebeling appointed as commissioner, administering the town's affairs for more than a year.

Then-local government minister David Templeman said the suspension was because of ongoing complaints and concerns lodged over 18 months amid allegations of dysfunction and poor decision-making.

Current Mayor Peter Carter was also on the council at the time of the suspension. It was his resignation that eventually triggered the dissolution of the council because of a lack of quorum, prompting an extraordinary election in 2020 at which he gained his current role.

Long council meetings a cause for concern

LAURA NEWELL

Concerns have been raised about the effective functioning of the Town of Port Hedland when it comes to council meetings.

Among the worries officials and councillors raised with the Department of Local Government, Sport and Cultural Industries during a visit in February were several relating directly to council meetings.

The department elucidated those concerns in a letter to the town last month.

They included concerns council meetings had become too long; that there had been inappropriate use of council member question time during meetings, as well as member questions outside of question time (during debate); and questions raised over the appropriateness of council member motions.

Cr Camilo Blanco, pictured right, took the allegations surrounding these particular concerns rather personally in Wednesday's ordinary council meeting, claiming when it came to asking too many questions he was the "main culprit".

But he added many of the matters raised in the letter had been highlighted before his time on the council.

Deputy Mayor Ash Christensen said in his view, the letter didn't single any one person out and rather it was very "open ended".

However, a look at the town's recorded council meetings shows the length of meetings, while varying wildly from month to month, has seemed, on average, to increase since Cr Blanco's election in October.

February 2023's meeting lasted one hour and 10 minutes, while this February's was just one hour and five minutes. However, the council's November meeting ran for more than 4½ hours, with December's ballooning to nearly six hours. March and April's meetings stood at more than three hours, while this week's lasted for 2¾ hours.

This may continue to be a theme, as Cr Blanco declared in Wednesday's ordinary meeting — during which he spoke at length on nearly every agenda item — he would no longer attend agenda briefing sessions. This was a move Cr Christensen declared was counterintuitive to Cr Blanco's stated aims for his time on council.

"I'm saddened to hear that you will no longer come to briefings," Cr Christensen said. "That in itself will keep lending itself to a longer and longer public meeting.

"Half the questions you asked tonight were asked and challenged at the briefing that you didn't attend."

Briefing sessions are used to inform elected members about items of business that are to be presented and discussed at the following council meeting.

While they are recorded, they are not live streamed — something Cr Blanco said he felt gave protection should allegations be made against him.

"I'm not coming to any more briefings," he said. "Because there is a couple of statements in this (letter) that suggest staff may be stressed or it's going to be a bad working place for them because questions are going to be asked, you know, answers needed on the stuff that's been requested by council members.

"So that being the case, I would rather just do it in the council meetings, OK."

The Cook Government has used tax raised from the Emergency Services Levy to purchase appliances that will be used by the Onslow Volunteer Fire and Emergency Service, such as general rescue utility vehicle.

Emergency crews get new gear

KATYA MINNS

Emergency service volunteer crews in the Pilbara have received four new frontline response vehicles and a marine search and rescue vessel following a $1.65 million funding boost from the State Government.

Funded through the Emergency Services Levy, the new appliances support Pilbara emergency service volunteers and strengthen frontline response to keep regional communities safe.

Appliances include a 12m rigid-hulled search and rescue boat received by Marine Rescue Dampier, named Dampier Legend and valued at $950,000.

The vessel uses the latest navigation technology, including an infrared search camera and radio direction finding equipment, to locate mariners in distress.

A new $250,000 all-terrain light tanker has been received by the Dampier Volunteer Fire and Rescue Service, capable of carrying 500 litres of water and 20 litres of foam, with improved crew safety features.

State Emergency Service units in Roebourne and Karratha, and the Onslow Volunteer Fire and Emergency Service have each received a $150,000 general rescue utility vehicle equipped for a rapid response to natural disasters and missing persons searches.

Emergency Services Minister Stephen Dawson said the State Government was proud to support emergency services with cutting-edge resources to keep communities safe in a region more than twice the size of the UK.

"This $1.65m investment will provide a significant boost to the local crews who do an outstanding job responding to a wide range of emergencies, including fires, floods, cyclones, missing persons searches, and complex rescues," he said. "I know these resources will be a welcome addition to the Pilbara, and I would like to thank all first responders in the region for their selfless commitment to keeping people safe.

"It is reassuring knowing that you are always ready to respond to incidents – 24 hours a day, seven days a week, 365 days of the year."

Pilbara MLA Kevin Michel said it was fantastic to see more investment in the Pilbara.

"This is not just an investment in appliances and vessels, it's a vital investment in our volunteers — in the people who are out there protecting us and our communities when they need it most," he said. "The Cook Government is doing the right thing . . . ensuring our communities have the best resources and new facilities to respond to whatever the Pilbara throws at them."

Hemsworth stars as a villain in most expensive movie ever made in Oz

Mad Max goes to epic proportions

Anya Taylor-Joy as Furiosa.

There's a moment in Furiosa: A Mad Max Saga where Chris Hemsworth's character, Dementus, looks at Anya Taylor-Joy's title hero and says, "Do ya have it in ya to make it epic?"

Some may have wondered the same thing about George Miller, who at 79, is attempting a sequel to his 30-yr hit, Mad Max: Fury Road, widely considered one of the greatest chase movies in cinema history.

Certainly, some doubts creep in if you come to Furiosa having recently rewatched the previous film, because the breakneck pace of the latter takes place over a hectic three-day span, while the former unfolds over a comparatively sedate 15-year period.

Despite Miller changing down a gear for this origin story of the character Charlize Theron made iconic in Fury Road, the director knows when to put the pedal down and fang it.

So, yeah, this latest Mad Max instalment is epic.

FURIOSA: A MAD MAX SAGA
with Ben O'Shea
★★★★½

Fury Road introduced Furiosa as a high ranking imperator for the cruel warlord Immortan Joe, charged with driving his War Rig, the most imposing vehicle in the Wasteland.

Within moments of meeting her in that film, we see her betray the warlord, making off with his "breeder" wives in search of the "Green Place" she recalls from her childhood.

Other than the fact she was missing her left forearm, Furiosa's backstory was a mystery to audiences, but a canny choice to build a follow-up around.

Told in chapters, starting from said childhood in the Green Place (with young Furiosa played by Alyla Browne), Miller reveals in excruciating detail the trauma that shaped the character. And a fair proportion of that trauma is inflicted by Hemsworth's Dementus, a rival warlord who presides over a vicious biker horde.

The Aussie superstar made a great Thor, but turns out he's an even better villain, giving the performance of his career in a transformative turn that displays harrowed soul nuance.

His torture of Furiosa, first as a kid then as Taylor Joy's adult version, is fuelled by his own past trauma, and the hidden depths of Dementus elevate the plot considerably.

Talking about the Queen's Gambit star, Taylor Joy doesn't have an extensive history of stunt work but is now officially a legit action hero, after handling some of the most bonkers action sequences with aplomb.

One such sequence took a whopping nine months to film, which also helps explain why Miller's prequel is the most expensive movie made Down Under. Taylor Joy, to her credit, avoids a Thurm impersonation, but still manages to capture the steely determined ferocity that made the character so popular.

The casting of British actor Tom Burke (from the film Manic) as her mentor is less successful, and that relationship doesn't ring true. But, if wildly dysfunctional, petrol headed fantasy is your thing, Miller's served a humongous helping of the stuff here, and it's a bloody ripper.

Furiosa: A Mad Max Saga is in theatres on May 23.

Region boosted by an extra eight doctors

MATTHEW PADDICK

Eight new GPs have been placed in the Mid West as part of Rural Health West's near-doubling of recruits to the regions compared to last financial year.

This year, so far, the organisation has recruited 50 GPs to WA's rural and remote communities, with eight for the Mid West.

It is a significant increase on the 26 who were hired in the 2022-23 financial year.

The recruits were graduates from Australia and abroad, and were either new to the country or had experience within Australia's health system.

Rural Health West chief executive Tim Shackleton said international graduates were becoming an important part of the sector.

"International medical graduates are an essential part of rural and remote general practice and make up nearly half of its workforce in Western Australia," he said.

"As of November 2023, there were 980 GPs working in rural and remote Western Australia, of which 52 per cent (498) were international medical graduates.

"Of the 50 GPs recruited, 22 were female GPs. Female GPs now represent nearly 50 per cent of the Western Australian rural and remote general practice workforce."

The reasons for the increase in rural GPs was not clear, according to the organisation.

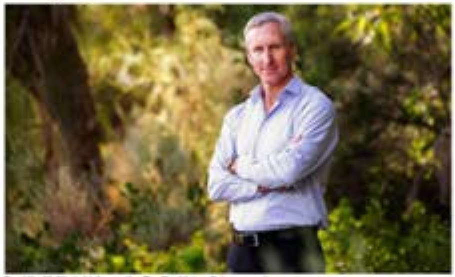
Rural Health West cited normality to life post COVID, as well as doctors looking for new career opportunities as the drivers behind the boost.

"Our demographic and geographic challenges in recruiting GPs are some of the toughest in the nation," Mr Shackleton said.

He acknowledged there were shortfalls in recruiting, due to the uneven spread of doctors across the regions.

The South West region appointed 11 GPs, while just one GP was recruited in the Kimberley.

The organisation said it was working with people throughout the rural health care sector to address the issue.



Rural Health West chief executive Tim Shackleton. Picture: www.thecanstem.com.au

Learn how to identify scammers

ANNA COX

A scam prevention forum will be held in Geraldton next week to ensure members of the community can identify and protect themselves from scammers.

Minister for Commerce Sue Ellery and a representative from Consumer Protection will present the forum, alongside Geraldton MLA Lara Dalton.

Attendees will learn about common scam types, how to verify legitimacy and how to protect themselves when making online transactions.

"I know there is growing community concerns regarding scams and fraudulent behaviour online," Ms Dalton said.

She said keeping West Australians safe included "building awareness and skills in our community so we can better support each other and prevent our loved ones from being victims of scammers".

Attendees are encouraged to discuss their concerns with the minister, which will help contribute to future guiding strategies and policies.

The forum will be held at the Westlalla Bowling Club on Wednesday, June 5, from 1pm.

Anyone interested in attending the Geraldton scam prevention forum can RSVP via 9965 7961 or by emailing lara.dalton@mp.wa.gov.au.

Tourist thanks all after medical scare

MATTHEW PADDICK

A Mt Magnet tourist says he is thankful for the community and its good Samaritans for helping him after he suffered a medical episode while on holiday.

Earlier this month, Terry Nugent was at the Mt Magnet Caravan Park with his partner, Jan, before waking up close to midnight not being able to breathe.

"Jan rang triple-0 around midnight and the ambulance arrived inside 20 minutes, staffed by two young volunteers who took me to their nursing post where I was looked after by two nurses," he said.

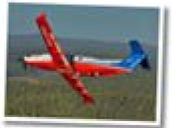
"They felt I had an infection which had stopped, but they didn't have the equipment or expertise to resolve the situation."

The next morning, those two volunteers helped Mr Nugent to the Royal Flying Doctor Service plane, headed for Geraldton.

Mr Nugent, from Australind, said he always had trust in the service.

"I've lived in the bush all my life, I knew I'd be looked after by the flying doctor," he said.

Terry Nugent said he couldn't breathe.



The Royal Flying Doctor Service plane.

Mr Nugent was examined in Geraldton, where they discovered he had a chest infection.

Once the issue was resolved, he was on a commercial flight back to Perth.

Meanwhile, his partner was left to find her own way home, leaving the caravan and car for the family to collect.

Mr Nugent said the community was more than willing to help Jan get home.

"When Jan tried to pay for the extra nights, they would not take any money," he said.

"Apparently one of the volunteers works for the shire and she had arranged accommodation for my family for no charge.

"She then turned up to take Jan to the airport.

"Jan found that not only had Skippers Aviation found a crate for our dog to be able to travel, but then they too would not take any money for her flight."

Mr Nugent said he was grateful to all who helped his family throughout the ordeal.

"What a wonderful example of country hospitality and we both need to say a very sincere thank you to all of you lovely people," he said.

No-saddle bronco riding at the Mullewa Muster. Picture: Anna Cox

Saddle up for 10th annual Mullewa Muster

JESSICA MORONEY

The Mullewa Muster and Rodeo is gearing up to celebrate its 10th annual event this weekend, promising a memorable time kicking up the dust for Mid West families and visitors.

The rodeo returns on Saturday with thrilling event highlights and new competitions.

This year, truck lovers from around the State can showcase their big rigs with the introduction of a new display category.

Secretary Caitlin Bryant said the new category was inspired by local trucking businesses, which noticed the region lacked a truck display.

"There's big truck lovers in the area, and they thought it'd be nice to try and do something. There's really nothing north of Perth that does anything like that," she said.

"So they thought why not put something on in the Mid West that brings our transport industry together, and yeah, it gives them a chance to show off their gear."

Ms Bryant said the number of guests had grown since the event's inception 10 years ago.

She said less than 1000 tickets were sold at the inaugural event in 2013, and she was expecting to see upwards of 3500 people attend this year's event. The entertainment line-up features both local talent and renowned artists, including Tamworth-based Amber Lawrence, who returns after several years.

Henry and Ronald Band will also perform, bringing their rich Indigenous culture to the Mid West stage after touring across the Kimberley.

For families, the DAP Circus will provide exciting performances for both children and adults, while Scarlett's Way from Fremantle will deliver an electrifying finale in the afternoon.

Ms Bryant said Lawrence was a fantastic entertainer and Scarlett's Way would be crowd-pleasers.

There will be no gate sales this year. For tickets, visit mullewamuster.com.au/tickets/.

Attacks spur call for better dog care


Town of Port Hedland Mayor Peter Carter. Picture: Daniel Wilkins

OPINION
PETER CARTER

Responsible pet ownership is something the Town of Port Hedland takes seriously.

The issue of wandering dogs is one that continues to be a problem, and we have seen a sharp rise in the number of dog attacks in recent months.

This financial year, there have been 84 reported dog attacks. That's roughly one every four days.

It's a sobering figure.

An attack can include being rushed, harassed, bitten, chased, or having a dog behave in a manner that causes a person to be fearful or receive a physical injury.

The Town last week prosecuted the owner of two American Staffordshire bull terriers who attacked a man in South Hedland last year.

He received lacerations to his neck and face as well as scratches and abrasions to his abdomen, shoulders and legs in the attack.

The Magistrate said the attack was serious and significant, and would have been extremely painful and frightening for the victim.

The dogs had already been declared dangerous as the result of a previous attack.

A woman was fined more than $8000 after pleading guilty in South Hedland Magistrates Court to 10 charges.

The Town will not hesitate to act against pet owners whose animals engage in serious incidents such as this one.

It's not something we like to do, but residents have a right to feel safe when they are walking the streets. Dog owners have a responsibility to ensure their animals are secured at all times. That means they should be contained while at home, and always on a lead when out on a walk (unless you are in a designated off-leash area).

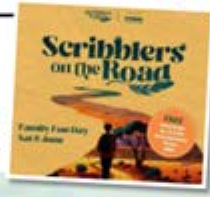
Make sure your yard and home are properly set up and secure – check all fences to ensure they cannot dig under and make sure gates, latches and locks work. And make sure that you register and microchip your dogs.

We also encourage people to contact the town rangers if they see a wandering dog and report any aggressive behaviour so we can take the appropriate action.

We need to work together and do the right thing to ensure Hedland is a safe, liveable community.

Peter Carter is the mayor of Port Hedland

Chance for kids to celebrate literature



NATASHA CLARK

Children across the Pilbara have an opportunity to express their love of literature through participation in this year's Scribblers on the Road.

The event — curated by FORM Building a State of Creativity — aims to celebrate storytelling and empower young people to foster their creativity through exploring all dimensions of fiction composition.

The events and workshops will feature Zeno Sworder, the recipient of the 2023 CBCA Picture Book of the Year award, and Brenton E. McKenna, WA's own graphic novel luminary.

Joining them are award-winning WA poet and novelist Sally Murphy and Shane McCarthy, who has written for DC and Marvel comics.

During their time in the Pilbara, they will hold workshops and presentations, engaging with more than 800 children across more than 50 classrooms spanning 13 regional and/or remote schools.

They will also host workshops for adults at South Hedland Public Library, Marble Bar Public Library and Newman Public Library.

A highlight of Scribblers on the Road will be a gathering of WA and interstate storytellers and illustrators at the JD Hardie Youth and Community Hub in South Hedland on Saturday, June 8, from 10am to 1pm for the free Scribblers on the Road Family Fun Day.

Pilbara-based creatives such as Amelia Blanco, Kelly Howlett, Zach Green, Verity Page, Ivy Chen Zhang, Bobbi Lockyer, Leslie Rigot, Jasmine Hurtwai-Kahu-rere, Rogelio and Letcha Solo will also be part of the event.

The Family Fun Day promises an array of free activities for all ages, including on-the-spot storytelling and illustrations, workshops, art and craft sessions, entertainment, prizes and a community BBQ.

FORM CEO Tabitha McMullan said she was enthusiastic about Scribblers reaching the Pilbara for a second consecutive year.

"Since 2008 it's been an immense privilege to develop and manage Spinifex Hill Studio on Kariyarra Country," she said.

"This art centre supports the art practices of First Nations artists who live in and visit Hedland and I'm thrilled to see Spinifex Hill artists among the Scribblers on the Road storytellers this year."

FORM Scribblers program lead Justine McGinnis said the event's mission was to empower children and young people through creative initiatives, enriching their literacy skills, creative thinking and overall well-being.

"Taking Scribblers 'on the road' to the Pilbara is an exciting opportunity for FORM to strengthen our relationships in the region and provide fun, impactful programming that supports the development of literacy, creative thinking skills and positive well-being," she said.

For program details, visit scribblersfestival.com.au.

Nickel price hot streak looks over

ADRIAN RAUSO

Civil unrest in a tiny tropical paradise that produces more nickel than Australia will not be enough to break the shackles of an Indonesian supply glut, a prominent analyst has warned.

The key price benchmark of three-month nickel futures on the London Metal Exchange has risen from sub-$US16,000 a tonne in January to surpass $US21,000/t earlier this week.

This resurgence has been fuelled by First Quantum's Ravensthorpe mine in WA being mothballed, the LME banning Russian nickel and most recently the Pacific nation of New Caledonia plunging into chaos.

New Caledonia is a French-ruled country that has been grappling with riots after the decree of voting reforms that would essentially strip away electoral power from native ethnic groups.

It's the latest wave of unrest to sweep through the archipelago and has significantly disrupted nickel output.

Once the rioting began the metal's value rocketed by more than $US2000/t in the space of days.

Nickel futures have since cooled back to beneath $US20,100/t and UBS analyst Dan Ariyasinghe believes there's more downside on the horizon, despite continued uncertainty surrounding the New Caledonia situation.

"With ample Indonesia growth near term ... we think prices have potentially overshot and see further upside as limited," Mr Ariyasinghe said.

"We don't see any fundamental reasons to update our medium-term view given the continued threat of Indonesian supply and see the tepid China demand outlook potentially driving near-term price direction."

Mr Ariyasinghe predicts the nickel spot price will hover around $US16,250/t over the next two years.

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Pilbara children all set to celebrate literature

NATASHA CLARK

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It aims to empower children and young people to foster their creativity through exploring all dimensions of fiction composition.

The events and workshops will feature personalities such as Zeno Sworder from Victoria, the recipient of the 2023 CBCA Picture Book of the Year award and Brenton E. McKenna, Western Australia's own graphic novel luminary.

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Additionally, they will host workshops for adults at the South Hedland Public Library, Marble Bar Public Library and the Newman Public Library.

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Joining this gathering of literary talent are Pilbara-based creatives, including Amelia Blanco, Kelly Howlett, Zach Green, Verity Page, Ivy Chen Zhang, Bobbi Lockyer, Leslie Rigot, Jasmine Hurlwai-Kahuroa, Rogollo and Letcha Solo.

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"Taking Scribblers 'on the road' to the Pilbara is an exciting opportunity for FORM to strengthen our relationships in the region and provide fun, impactful programming that supports the development of literacy, creative thinking skills and positive well being," Ms McGinnis said.

For those eager to explore the full program, visit scribblersfestival.com.au and immerse yourself in the world of storytelling and creativity.

Scribblers on the Road is coming to the Pilbara.

Chalmers, WA chiefs in 'frank' talk on economy

DYLAN CAPORN

Some of WA's most influential business leaders met with Jim Chalmers on Thursday for a "frank" discussion about the Australian and State economies, on the Treasurer's first trip to Perth since the Federal Budget.

At a breakfast organised by The West Australian, Dr Chalmers briefed a group of WA high-profile figures that included former premier Mark McGowan. Business leaders included Hancock Prospecting CEO Gerhard Veldsman and BHP Nickel West boss Jessica Farrell.

"We had a very productive, very upfront, very frank discussion about the big challenges and opportunities in this economy, the national economy, and in the context of the way the world is changing," Dr Chalmers said.

"This Budget had WA front and centre. WA is a huge beneficiary of the Budget, and that's partly because of the way that we've engaged ... with the industries of WA."

The Treasurer's trip came as a stoush grows over the Government's proposed $7 billion production tax credit package. Opposition Leader Peter Dutton has rejected it as "billions for billionaires".

Also in Perth, Mr Dutton said the Government had been inconsistent in backing WA projects. "At the moment, the Government talks out of both sides of their mouth. They say when they're here in WA that they support those projects. When they get back to the east coast, they don't support it," he said. "We'll support it, because it's in WA's best interests and the country's best interests as well. As PM, you need to be responsible in the way that you're spending taxpayers' money, and if you've got some of the most astute investors ... taking the decision that they don't want to invest their money in some of these projects, then I think it's a reasonable question to say, 'should we be investing taxpayers' money into those projects?'"

Calls to build a vital facility

CAIN ANDREWS

Opposition Leader Shane Love and the mother of a man who took his life in February, have called on the WA Government to expedite the construction of a mental health facility in Karratha after a string of suicides in the region in the past five years.

The facility in question, Karratha's own Step Up Step Down facility, was first proposed by the Mental Health Commission in 2013, with funding initially allocated in the 2015-16 State Budget by the Liberal National Government. However, a decade after it was first proposed, the facility is yet to be delivered with a MHC Commissioner Maureen Lewis revealing the project was still in its planning stages.

"We're in the planning and design stage of the process, and continued engagement and consultation with the community will help to ensure the service and design of the Step Up Step Down will meet the needs of the local community," she said.

In answer to questions from the Opposition leader in parliament on May 3, Premier Roger Cook said the Government was committed to delivering the facility, despite the more than a decade wait.

"I am passionate about this," he said. "The residents of Karratha deserve it, in the same way that they deserve all the health and mental health services we fund in that region." The Premier cited opposition from the local community for the delay in the delivery of the facility.

"For a range of reasons, including opposition from some in the local community, we are trying to work with the local community to find a suitable place and to get that facility open as soon as possible."

MLA Love said the response from the Premier left much to be desired. "Premier Cook failed to take the opportunity to explain when the community would see this desperately needed facility provided," he said.

"Surely providing appropriate mental health services in regional communities should be a priority of any Government. WA Labor's priorities are wrong. It's simply not good enough."

It comes as a petition calling for more mental health services in the region started by Kristie Grabenhofer, mother of 21-year-old Machlan Felix who took her own life in Karratha in February, gathered more than 2600 signatures. Ms Grabenhofer described the Premier's response as a "disgrace".

"The Labor Government needs to take accountability for their lack of concern for people in my community," she said.

"I find it highly offensive that the Premier uses Parliament as his theatre to discuss these issues like a game show host. The land is there and approved. The previous Government allocated $36 million in 2015, so where is the facility?"

Hitting back, Premier Cook said improving access to mental health services is a priority for the WA Government, and spending on these services has increased by almost 70 per cent since 2017.

"We are reforming the mental health system and bolstering funding for mental health, and suicide prevention initiatives around the State," he said.

"I extend my deepest sympathies to the family of Machlan at this incredibly difficult time."

In December 2023, the City of Karratha called on the Government to expedite the establishment of the facility with the MHC revealing stakeholder consultation was yet to be completed — just months before Mr Felix took his life.

Karratha councillors again reiterated the urgent need for the facility when meeting with MHC in early May.

The Nationals WA Candidate for Pilbara Kieran Dart said it was unforgivable the Government had not made any progress on the project.

"In the Pilbara we experience high rates of suicide and in 2019, Karratha had six deaths in one month which absolutely rocked us"," he said. "We generate the wealth of our nation, and it is absolutely appalling our communities have some of the poorest access to mental health support in the State".

Lifeline: 13 11 14


WA Nationals leader Shane Love and Pilbara Nationals candidate Kieran Dart.

Appendix G Environmental Consequence Descriptors

	Consequence Level	I	II	III	IV	V	VI
	Acceptability	Acceptable	Acceptable	Unacceptable	Unacceptable	Unacceptable	Unacceptable
	Severity Description	**Negligible** ***No impact or negligible impact.***	**Minor** ***Detectable but insignificant change to local population, industry, or ecosystem factors. Localised effect***	**Moderate** ***Significant impact to local population, industry, or ecosystem factors.***	**Major** ***Major long-term effect on local population, industry, or ecosystem factors.***	**Severe** ***Complete loss of local population, industry, or ecosystem factors AND/ OR extensive regional impacts with slow recovery.***	**Critical** ***Irreversible impact to regional population, industry, or ecosystem factors.***
Environmental Receptors	Fauna In particular, EPBC Act listed threatened/migratory fauna or *WA Biodiversity Conservation Act 2016* specially protected fauna	Short term behavioural impacts only to small proportion of local population and not during critical lifecycle activity; No decrease in local population size; No reduction in area of occupancy of species; No loss/disruption of habitat critical to survival of a species; No disruption to the breeding cycle of any individual; No introduction of disease likely to cause a detectable population decline.	Detectable but insignificant decrease in local population size. Insignificant reduction in area of occupancy of species; Insignificant loss/disruption of habitat critical to survival of a species; Insignificant disruption to the breeding cycle of local population.	Significant decrease in local population size but no threat to overall population viability; Significant behavioural disruption to local population; Significant disruption to the breeding cycle of a local population; Significant reduction in area of occupancy of species; Significant loss of habitat critical to survival of a species; Modify, destroy, remove, isolate or decrease availability of quality of habitat to the extent that a significant decline in local population is likely; Introduce disease likely to cause a significant population decline.	Long term decrease in local population size and threat to local population viability; Major disruption to the breeding cycle of local population; Major reduction in area of occupancy of species; Fragmentation of existing population; Major loss of habitat critical to survival of a species; Modify, destroy, remove, isolate or decrease availability of quality of habitat to the extent that a long term decline in local population is likely; Introduce disease likely to cause a long term population decline.	Complete loss of local population; Complete loss of habitat critical to survival of local population; Wide spread (regional) decline in population size or habitat critical to regional population.	Complete loss of regional population; Complete loss of habitat critical to survival of regional population.
	Physical Environment / Habitat Includes: air quality; water quality; benthic habitat (biotic/abiotic), particularly habitats that are rare or unique; habitat that represents a Key Ecological Feature[6]; habitat within a protected area; habitats that include benthic primary producers[7] and/ or epi-fauna[8]	No or negligible reduction in physical environment / habitat area/function.	Detectable but localised and insignificant loss of area/function of physical environment / habitat. Rapid recovery evident within ~ 2 year (two season recovery)	Significant loss of area and/or function of local physical environment / habitat. Recovery over medium term (2–10 years)	Major, large-scale loss of area and/or function of physical environment / local habitat. Slow recovery over decades.	Extensive destruction of local physical environment / habitat with no recovery; Long term (decades) and wide spread loss of area or function of primary producers on a regional scale.	Complete destruction of regional physical environment / habitat with no recovery. Complete loss of area or function of primary producers on a regional scale.
	Threatened ecological communities (EPBC Act listed ecological communities)	No decline in threatened ecological community population size, diversity or function; No reduction in area of threatened ecological community; No introduction of disease likely to cause decline in threatened ecological community population size, diversity or function.	Detectable but insignificant decline in threatened ecological community population size, diversity or function; Insignificant reduction in area of threatened ecological community.	Significant decline in threatened ecological community population size, diversity or function; Significant reduction in area of threatened ecological community; Introduction of disease likely to cause significant decline in threatened ecological community population size, diversity or function.	Major, long term decline in threatened ecological community population size, diversity or function; Major reduction in area of threatened ecological community; Fragmentation of threatened ecological community; Introduce disease likely to cause long term decline in threatened ecological community population size, diversity or function.	Extensive, long term decline in threatened ecological community population size, diversity or function; Complete loss of threatened ecological community.	Complete loss of threatened ecological community with no recovery.

[6] *As defined by the Department of Agriculture, Water and Environment (DAWE)*

[7] *Benthic photosynthetic organisms such as seagrass, algae, hard corals and mangroves*

[8] *Fauna attached to the substrate including sponges, soft corals and crinoids.*

Consequence Level		**I**	**II**	**III**	**IV**	**V**	**VI**
Acceptability		**Acceptable**	**Acceptable**	**Unacceptable**	**Unacceptable**	**Unacceptable**	**Unacceptable**
Severity Description		**Negligible** ***No impact or negligible impact.***	**Minor** ***Detectable but insignificant change to local population, industry, or ecosystem factors. Localised effect***	**Moderate** ***Significant impact to local population, industry, or ecosystem factors.***	**Major** ***Major long-term effect on local population, industry, or ecosystem factors.***	**Severe** ***Complete loss of local population, industry, or ecosystem factors AND/ OR extensive regional impacts with slow recovery.***	**Critical** ***Irreversible impact to regional population, industry, or ecosystem factors.***
	Protected Areas Includes: World Heritage Properties; Ramsar wetlands; Commonwealth/ National Heritage Areas; Land/ Marine Conservation Reserves.	No or negligible impact on protected area values; No decline in species population within protected area; No or negligible alteration, modification, obscuring or diminishing of protected area values.*	Detectable but insignificant impact on one of more of protected area's values. Detectable but insignificant decline in species population within protected area. Detectable but insignificant alteration, modification, obscuring or diminishing of protected area values*	Significant impact on one of more of protected area's values; Significant decrease in population within protected area; Significant alteration, modification, obscuring or diminishing of protected area values.	Major long term effect on one of more of protected area's values Long term decrease in species population contained within protected area and threat to that population's viability Major alteration, modification, obscuring or diminishing of protected area values	Extensive loss of one or more of protected area's values; Extensive loss of species population contained within protected area.	Complete loss of one or more of protected area's values with no recovery; Complete loss of species population contained within protected area with no recovery.
	Socio-economic receptors Includes: fisheries (commercial and recreational); tourism; oil and gas; defence; commercial shipping.	No or negligible loss of value of the local industry. No or negligible reduction in key natural features or populations supporting the activity.	Detectable but insignificant short-term loss of value of the local industry. Detectable but insignificant reduction in key natural features or population supporting the local activity.	Significant loss of value of the local industry. Significant medium-term reduction of key natural features or populations supporting the local activity.	Major long-term loss of value of the local industry and threat to viability. Major reduction of key natural features or populations supporting the local activity.	Shutdown of local industry or widespread major damage to regional industry; Extensive loss of key natural features or populations supporting the local industry.	Permanent shutdown of local or regional industry; Permanent loss of key natural features or populations supporting the local or regional industry.

Appendix H Spill Modelling Results

Surface release of 1,519 m^3 of MDO over 1 hour from vessel collision

Receptor	Receptor Type	Minimum Time to Contact (hrs)										Maximum Hydrocarbon Concentrations		
		Low Exposure Values				Moderate Exposure values			High Exposure Values					
		Floating oil (1 g/m^2)	Shoreline accumulation (10 g/m^2)	Entrained hydrocarbons (1,000 ppb)	Dissolved hydrocarbons (10ppb)	Floating oil (10 g/m2)	Shoreline accumulation (100 g/m2)	Dissolved hydrocarbons (50 ppb)	Floating oil (50 g/m^2)	Shoreline accumulation (1,000 g/m^2)	Dissolved hydrocarbons (400 ppb)	Shoreline accumulation (g/m^2)	Dissolved hydrocarbons (ppb)	Entrained hydrocarbons (ppb)
Muiron Islands	Emergent	55	52	55	38	55	55	55	NC	55	NC	2047.1	123.2	233.6
Ningaloo Coast North	Emergent	21	52	31	26	24	52	28	28	57	45	18,554.5	977.7	1,048.2
Ningaloo Outer Coast North	Submerged	14	NA	16	14	14	NA	16	14	NA	43	NA	887.2	1,139
Ningaloo Outer NW	Submerged	4	NA	4	4	4	NA	4	4	NA	31	NA	908.5	1,306.3
Ningaloo Offshore	Submerged	2	NA	2	2	2	NA	2	2	NA	4	NA	648.9	1,242.3
Ningaloo Coast South	Emergent	NC	139	NC	NC	NC	NC	NC	NC	NC	NC	21.9	NC	NC
State Waters-WA	NA	4	NA	4	4	4	NA	4	4	NA	31	NA	908.5	1,306.3

Subsea release of 1,225 m^3 of Van Gogh crude over 100 days from LOWC

Receptor	Receptor Type	Minimum Time to Contact (Hrs)									Maximum Hydrocarbon Concentrations		
		Low Exposure Values				Moderate Exposure values			High Exposure Values					
		Floating oil (1 g/m^2)	Shoreline accumulation (10 g/m^2)	Entrained hydrocarbons (1,000 ppb)	Dissolved hydrocarbons (10ppb)	Floating oil (10 g/m2)	Shoreline accumulation (100 g/m2)	Dissolved hydrocarbons (50 ppb)	Floating oil (50 g/m^2)	Shoreline accumulation (1,000 g/m^2)	Dissolved hydrocarbons (400 ppb)	Shoreline accumulation (g/m^2)	Dissolved hydrocarbons (ppb)	Entrained hydrocarbons (ppb)
Gascoyne AMP	Submerged	439	NA	NA	NA	NC	NA	NA	NC	NA	NA	NA	NA	NA
Ningaloo-Outer Coast North	Submerged	1,313	NA	NA	NA	NC	NA	NA	NC	NA	NA	NA	NA	NA
Ningaloo-Outer NW	Submerged	90	NA	NA	NA	NC	NA	NA	NC	NA	NA	NA	NA	NA
Ningaloo Coast North	Emergent	496	NA	NA	NA	NC	NA	NA	NC	NA	NA	NA	NA	NA
State Waters-WA	NA	496	NA	NA	NA	NC	NA	NA	NC	NA	NA	NA	NA	NA
Barrow Island	NA	NA	403	NA	NA	NA	NC	NA	NA	NC	NA	30	NA	NA
Dampier Archipelago	NA	NA	876	NA	NA	NA	NC	NA	NA	NC	NA	11.7	NA	NA
King Sound	NA	NA	2,002	NA	NA	NA	NC	NA	NA	NC	NA	14	NA	NA
Lowendal Islands	NA	NA	680	NA	NA	NA	NC	NA	NA	NC	NA	12.5	NA	NA
Middle Islands Coast	NA	NA	2,534	NA	NA	NA	NC	NA	NA	NC	NA	11.4	NA	NA

Receptor	Receptor Type	Minimum Time to Contact (Hrs)										Maximum Hydrocarbon Concentrations		
		Low Exposure Values				Moderate Exposure values			High Exposure Values					
		Floating oil (1 g/m^2)	Shoreline accumulation (10 g/m^2)	Entrained hydrocarbons (1,000 ppb)	Dissolved hydrocarbons (10ppb)	Floating oil (10 g/m2)	Shoreline accumulation (100 g/m2)	Dissolved hydrocarbons (50 ppb)	Floating oil (50 g/m^2)	Shoreline accumulation (1,000 g/m^2)	Dissolved hydrocarbons (400 ppb)	Shoreline accumulation (g/m^2)	Dissolved hydrocarbons (ppb)	Entrained hydrocarbons (ppb)
Montebello Islands	NA	NA	576	NA	NA	NA	NC	NA	NA	NC	NA	20.5	NA	NA
Muiron Islands	NA	NA	474	NA	NA	NA	NC	NA	NA	NC	NA	21.4	NA	NA
Ningaloo Coast North	NA	NA	384	NA	NA	NA	NC	NA	NA	NC	NA	27.6	NA	NA
Northern Islands Coast	NA	NA	704	NA	NA	NA	NC	NA	NA	NC	NA	12.4	NA	NA
Southern Islands Coast	NA	NA	1,038	NA	NA	NA	NC	NA	NA	NC	NA	21	NA	NA
Thevenard Islands	NA	NA	2,050	NA	NA	NA	NC	NA	NA	NC	NA	14.4	NA	NA